Introduction to PHP – Part 2

Instructor: Dr. Mark Llewellyn
markl@cs.ucf.edu
HEC 236, 407-823-2790

Department of Electrical Engineering and Computer Science
University of Central Florida
Functions In PHP

• Functions are at the heart of a well-organized script and will make your code easy to read and reuse.

• Large projects would be unmanageable without functions because the problem of repetitive code would bog down the development process.

• If you haven’t had any experience using functions, you can think of a function as an input/output machine. The machine takes the raw materials you feed it (the input) and works with them to produce a product (the output).

• A function accepts values, processes them, and then performs an action (printing to the browser, for example), returns a new value, or both.
Functions In PHP

• If you need to bake a cake, you would probably do it yourself, in your own kitchen with your oven. But if you need to bake thousands of cakes, you would probably build or acquire a special cake-baking machine, built for making cakes in massive quantities.

• Similarly, when deciding whether to create a function for reuse, the most important factor to consider is the extent to which it can save you from writing repetitive code.

• If the code you are writing will be used more than once, it is probably best to create a function to represent the code.
Functions In PHP

• A function is a self-contained block of code that can be called by your script.

• When called (or invoked), the function’s code is executed and performs a particular task. You can pass values to a function (called arguments), which then uses the values appropriately – storing them, transforming them, displaying them, whatever the function is designed to do. When finished, a function can also pass a value back to the original code that called it into action.

• In PHP, functions come in two flavors – those built in to the language, and those that you define yourself.
Functions In PHP

- PHP has hundreds of built-in functions. Consider the following example that utilizes the built-in function `strtoupper()`.

```php
<?php
    $original_string = "Hello World!";
    $capitalized_string = strtoupper($original_string);
    echo "<br />"."The original string is: \".$original_string."<br />
    echo 'The string after function strtoupper() operated on the string is: '.
?>
```

The original string is: Hello World!
The string after function strtoupper() operated on the string is: HELLO WORLD!
Functions In PHP

• In the previous example, the function `strtoupper()` is called and passed a variable whose value is represented by a string. The function goes about its business of changing the contents of the string to uppercase letters.

• A function call consists of the function name followed by parentheses. (Note, even a function that has no parameters requires a set of parentheses.) The information being passed to the function (the arguments) are placed between the parentheses.

• For functions that require more than one argument, the arguments are separated by commas:

```php
some_function ($an_argument, $another_argument);
```
Functions In PHP

• The `strtoupper()` function from the previous example is typical for a function in that it returns a value. Most functions return some information back after they’ve completed their task – they usually at least tell whether their mission was successful.

• The `strtoupper()` function returns a string value so its usage requires the presence of a variable to accept the returned string, as was the case in the line:

```php
$capitalized_string = strtoupper($original_string);
```

• Functions in PHP that return values use a `return` statement within the body of the function. We’ll use this in a few more pages when we start constructing our own functions.
Defining Functions In PHP

• You can define your own functions in PHP using the `function` statement:

```php
function someFunction($argument1, .., argument2) {
    //function code goes here
}
```

• The name of the function follows the function statement and precedes a set of parentheses. If your function requires arguments, you must place the comma-separated variable names within the parentheses. These variables will be filled by the values passed to your function when it is called.

• Even if your function does not require arguments you must still supply the parentheses.
Defining Functions In PHP

• Naming conventions for functions are the same as for normal variables in PHP. As with variables you should apply meaningful names and be consistent in naming and style. Using mixed case in function names is a common convention, thus `myFunction()` instead of `myfunction()` or `my_function()`. (Note: variables names are case sensitive in PHP, function names are not!)

• Let’s define a simple function that simply prints out the word “Hello” in big letters.

```php
function bigHello() {
    echo "<h1> HELLO </h1>"
}
```
Defining Functions In PHP

```php
function bigHello() {
    echo "<h1>HELLO</h1>";
}
bigHello();
```
Defining Functions In PHP

• For the next example, let’s define a function that requires an argument. Actually, let’s define two different functions that each take an argument.

• The first function will take a string and print the string with a `<br />` element appended to the string. The second function will do the same, but append two `<br />` elements to the end of the string.
Defining Functions In PHP

```
<?php

function appendSingleBreak($text) {
    echo $text."<br />
}

function appendDoubleBreak($text) {
    echo $text."<br />";
}

appendSingleBreak("This is line 1.");
appendSingleBreak("This is line 2.");
appendSingleBreak("This is line 3.");
appendSingleBreak("This is line 4.");
appendDoubleBreak("This is line 5.");
appendDoubleBreak("This is line 6.");

?>
</body>
</html>
```
Defining Functions In PHP

• For the next example, let’s define a function that requires two arguments. We’ll basically repeat the exercise from the previous example, but in this case rather than writing two different functions that differ only in the number of `<br />` elements they append to a line of text, the new function will have a second argument that represents the number of `<br />` elements to be appended. Clearly this would be more efficient, in terms of code, than creating a different function for each number of `<br />` elements we might want to append.

• In the first version of this example, shown on the next page, I simply repeated the same effect as in the previous version, so the two screen shots from the browser should look identical.

• The second version of this example, shown on page 15, a different effect is produced by the function calls.
<title>Defining A Function In PHP With Two Arguments</title>

<h3>Using a built in function in PHP</h3>

<?php

function appendBreaks($text, $number) {
    echo $text;
    for($i = 1; $i <= $number; $i++){
        echo "<br />";
    }
}

appendBreaks("This is line 1.", 1);
appendBreaks("This is line 2.", 1);
appendBreaks("This is line 3.", 1);
appendBreaks("This is line 4.", 2);
appendBreaks("This is line 5.", 2);
appendBreaks("This is line 6.", 0);

?>

</html>
<?php

function appendBreaks($text, $number) {
    echo $text;
    for($i = 1; $i <= $number; $i++){
        echo "<br />";
    }
}

appendBreaks("This is line 1.", 4);
appendBreaks("This is line 2.", 1);
appendBreaks("This is line 3.", 3);
appendBreaks("This is line 4.", 10);
appendBreaks("This is line 5.", 2);
appendBreaks("This is line 6.", 0);
?>
Defining Functions In PHP

• As a final example of simple function definition, let’s construct a function that returns a value.

• In the previous two examples, the string that had the `<br />` elements appended to it was simply printed out in the browser. Sometimes, however, you will want the function to provided a value that you can work with yourself. For example, if the function had returned the appended string, we could have passed that to another function to further process the amended string before it was printed.

• Let’s construct a function that will take three integer arguments and determine the largest of the argument values and return this value to the caller.
<html>
<head>
<title>Defining A Function In PHP With A Return Value</title>
</head>
<body style="font-family: arial, sans-serif; background-color: #856363" background="image1.jpg">

<?php

function findMax($one, $two, $three) {
    if (($one >= $two) && ($one >= $three)) {
        return $one;
    } elseif (($two >= $one) && ($two >= $three)) {
        return $two;
    } else if (($three >= $one) && ($three >= $two)) {
        return $three;
    }
}

//end function findMax
$currentMax = findMax(12, 13, 14);
echo "The maximum value is: $currentMax <br />

$currentMax = findMax(2, 4, 3);
echo "The maximum value is: $currentMax <br />

$currentMax = findMax(24, 12, 3);
echo "The maximum value is: $currentMax <br />

?>
</body>
</html>
Defining Functions In PHP

- The `return` statement can return a value or nothing at all.
- How you arrive at a value passed by a `return` statement can vary.
  - The value can be hard-coded: `return 4;`
  - It can be the result of an expression: `return $a/$b;`
  - It can be the value returned by yet another function call:
    ```php
    return anotherFunction($an_argument);
    ```
Variable Scope

• A variable that is declared within a function remains local to that function. In other words, that variable is not available outside of the function or within other functions.

• This is referred to as the scope of a variable.

• This also implies that variable names are not required to be unique across functions. Therefore the same variable can be defined in more than one function.

• The following example illustrates the scope of a variable. Notice that both functions `functionOne` and `functionTwo` declare variables named `myInt`.
<head>
<title>Variable Scope In PHP Functions</title>
</head>

<body style="font-family: arial, sans-serif; background-color: #856363" background="image1.jpg">

<?php

function functionOne($one) {
    $myInt = $one;
    echo 'The value of '. '$myInt in functionOne is: '. $myInt. "<br />
}
//end functionOne

function functionTwo($two) {
    $myInt = $two;
    echo 'The value of '. '$myInt in functionTwo is: '. $myInt. "<br />
}
//end functionTwo

$arg1 = 4;
$arg2 = 6;
functionOne($arg1);
functionTwo($arg2);
// echo 'The value of $one is: '. $one. "<br />"; //uncomment this line to
// echo 'The value of $two is: '. $two. "<br />"; //uncomment this line to
echo 'The value of $myInt is: '. $myInt. "<br />

?>

</body>
Defining Functions In PHP

Inside the functions the variable is visible (it is in scope).

Outside the functions the variable is not visible (it is out of scope).
Variable Scope

• Similar to a variable defined inside a function having no scope outside of the function, a variable declared outside of a function is not accessible from inside the function.

• In general, if a function needs information from outside of the function in order to accomplish its task, the information should be passed as an argument to the function.

• Having said this however, there are times when you might want to access an important variable without passing it in as an argument. This is accomplished in PHP with the global statement. The global statement allows a function to access a variable declared outside of the function. More than one variable can be declared global at one time by separating the variable names with commas.

• The following example illustrates this concept using a variation of the previous example.
<?php

$alpha = 14; // $alpha is declared outside of any functions
$beta = 10; // $beta too is declared outside of any functions

function functionOne($one) {
    global $alpha; // allow functionOne access to $alpha
    $myInt = $one;
    $alpha = $alpha + $myInt;
    echo 'The value of '$myInt in functionOne is: ' . $myInt. "<br />
    echo 'The value of '$alpha in functionOne is: ' . $alpha. "<br />
}

function functionTwo($two) {
    global $alpha; // allow functionTwo access to $alpha
    $myInt = $two;
    echo 'The value of '$alpha in functionTwo is: ' . $alpha. "<br />
    echo 'The value of '$myInt in functionTwo is: ' . $myInt. "<br />
    echo 'The value of '$beta in functionTwo is: ' . $beta. "<br />
    // $beta is out of scope here - next line generates an error
    echo 'The value of '$beta in functionTwo is: ' . $beta. "<br />
}

$arg1 = 4;
$arg2 = 6;
functionOne($arg1);
functionTwo($arg2);

// both $alpha and $beta are in scope here
echo 'The value of $alpha is: ' . $alpha. "<br />
echo 'The value of $beta is: ' . $beta. "<br />
?>
Variable Scope

Inside functionOne the variable $alpha is visible via the global statement. Note that the function modified the value of $alpha.

Inside functionTwo the variable $alpha is also visible via the global statement. The third echo statement in this function will generate the error when it attempts to reference the variable $beta which is not in scope.

Outside of the functions the variables are again in scope and notice the modified value of $alpha.
Saving State Between Function Calls

• Local variables within functions have a short but happy life – they come into existence when the function is called and die when the execution of the function is finished.

• Occasionally, however, you might want to give a function a rudimentary memory.

• For example, suppose that you’d like a function to keep track of the number of times it has been called so that numbered headings can be created by a script.

• You could of course accomplish this by using the global statement and accessing a variable declared outside of the function. The example on the next page illustrates this technique.
<html>
<head>
<title>Saving State Using Global Variable</title>
</head>
<body style = "font-family: arial, sans-serif;"
    background-color: #856363" background=imagel.jpg

<?php

$number_of_calls = 0; // number of times the function has been called
function numberedHeading($txt) {
    global $number_of_calls; //allow function access to $number_of_calls
    $number_of_calls++;
    echo "<h1>$number_of_calls</h1>" . $txt . "</h1>";
} //end numberedHeading

numberedHeading("First Header");
echo "<p> Some text goes here.</p>";
numberedHeading("Second Header");
echo "<p> Some text goes here.</p>";
numberedHeading("Third Header");
echo "<p> Some text goes here.</p>";

?>

</body>
</html>
Saving State Between Function Calls

1 First Header
Some text goes here.

2 Second Header
Some text goes here.

3 Third Header
Some text goes here.
Saving State Between Function Calls

- The previous example illustrated providing a function some “memory” through the use of a global variable.

- This is not a very elegant way to achieve this task. Why?

- **Answer:** Functions that use the global statement cannot be read as standalone blocks of code. In reading or reusing them, you must look out for the global variables that they manipulate. Failing to do so will render the function useless.

- This is where the `static` statement comes into play in PHP.

- Declaring a variable within a function to be static, the variable remains local to the function and the function remembers its value from execution to execution. The next example illustrates the `static` statement.
<html>
<head>
<title>Saving State Using the Static Statement</title>
</head>
<body style = "font-family: arial, sans-serif; background-color: #856363" background=imagel.jpg>
<?php

function numberedHeading($txt) {
    static $number_of_calls = 0; // number of times the function has been called
    $number_of_calls++;
    echo "<h1>).$number_of_calls." ".$txt."</h1>";
} //end numberedHeading
numberedHeading("First Header");
echo "<p> Some text goes here.</p>";
numberedHeading("Second Header");
echo "<p> Some text goes here.</p>";
numberedHeading("Third Header");
echo "<p> Some text goes here.</p>";
numberedHeading("Fourth Header"); //added to differentiate from previous examples
echo "<p> Some text goes here.</p>";

?>
</body>
</html>
Saving State Between Function Calls

1 First Header
Some text goes here.

2 Second Header
Some text goes here.

3 Third Header
Some text goes here.

4 Fourth Header
Some text goes here.
Setting Default Values For Arguments

- PHP provides a nifty feature to help you construct flexible functions. For functions that require one or more arguments, you can specify that some arguments are optional. This makes your functions more flexible.

- To illustrate the concept of the usefulness of setting default argument values, let’s build a function that takes a string of text and an integer that corresponds to the point size in which the string is to be printed in the browser.

- This is shown on the next page.
function fontWrapper($txt, $fontsize) {
    echo "<span style='font-size:$fontsize' >".$txt."</span>";
} //end numberedHeading

fontWrapper("A Heading <br />", "24pt");
fontWrapper("Some text in the body <br />", "16pt");
fontWrapper("Some smaller text in the body <br />", "12pt");
fontWrapper("Some even smaller text in the body <br />", "8pt");

?>

</body>

</html>
Setting Default Values For Arguments

• The nifty feature that PHP provides is to allow you to assign a value to a function argument within the function definition’s parentheses.

• The effect of this is to make the argument value passed from the caller optional as the argument will assume the default value if no value is provided by the caller. The next example modifies the previous example to make use of this feature of PHP.

WARNING

You can create as many optional arguments to a function as you wish. However, the arrangement of the arguments becomes important. Once an optional argument is defined in a function definition, all subsequent arguments must also be optional. In other words, you cannot have the first argument be optional, the second argument required, the third argument optional and so on. The ordering must be: all required arguments followed by all optional arguments.
The second parameter has a default value specified making it an optional parameter to the function. The 2\textsuperscript{nd} and 3\textsuperscript{rd} calls make use of this default value.
Passing Variable References To Functions

• When you pass arguments to functions, they are stored as copies in parameter variables. This means that any changes made to these variables by the function is local to the function and are not reflected beyond it.

```php
function add10($num) {
    $num += 10;
    echo "In the function the value is: $num <br />";
} //end add10
$original_num = 10;
add10($original_num);
echo "The number is: $original_num <br/>";
```
Passing Variable References To Functions

• By default in PHP, variables passed to functions are passed by value. In other words, only local copies of the variables are used by the functions and the original values of the variables are not accessible by the function.

• So how can you allow a function to actually modify a variable sent to it? You must create a reference to the variable.

• The reference operator in PHP is the & (ampersand). Placing an ampersand in front of an argument in a function definition creates a reference to the variable and allows the function to modify the original variable.

• The following example modifies the previous example to make use of passing an argument by reference.
Passing Variable References To Functions

The argument $num is passed by reference since it is preceded with the & operator.

```php
function add10(&$num) {
    $num += 10;
    echo "In the function the value is: $num \<br\>";
}
```

```php
$original_num = 10;
add10($original_num);
```

```php
echo "The number is: $original_num \<br\>";
```