CHAPTER 2

FUNCTIONS AND CONTROL STRUCTURES

PHP PROGRAMMING WITH MYSQL
2ND EDITION

Objectives

In this chapter, you will:

- Study how to use functions to organize your PHP code
- Learn about variable scope
- Make decisions using `if` statements, `if...else` statements, and `switch` statements
- Repeatedly execute `while` statements, `do...while` statements, `for`, and `foreach` statements
- Learn about `include` and `require` statements

Defining Functions

- **Functions** are groups of statements that you can execute as a single unit
- **Function definitions** are the lines of code that make up a function
- The syntax for defining a function is:

```
<?php
function name_of_function(parameters) {
        statements;
}
?>
```

Defining Functions (continued)

- Functions, like all PHP code, must be contained within `<?php . . . ?>` tags
- A **parameter** is a variable that is passed to a function when it is called
- Parameters are placed within the parentheses that follow the function name (can contain multiple parameters separated by commas)
- Functions do not have to contain parameters
- You can also assign default values to parameter(s)
- The set of curly braces (called **function braces**) contain the function statements

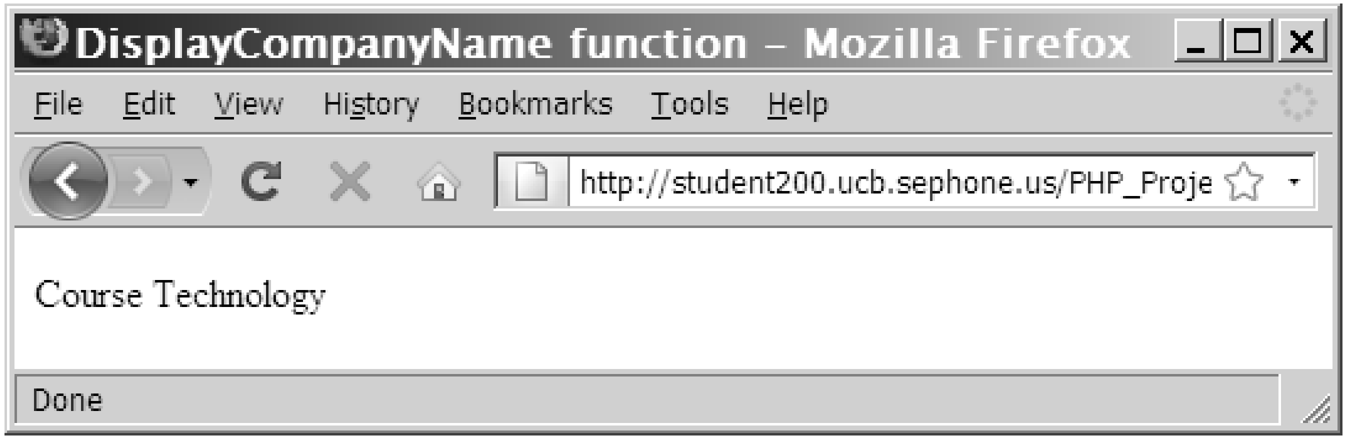
Defining Functions (continued)

- **Function statements** do the actual work of the function and must be contained within the function braces

```
function displayCompanyName($Company1,
  $Company2, $Company3) {
   echo "<p>$Company1</p>";
   echo "<p>$Company2</p>";
   echo "<p>$Company3</p>";
}
```

Calling Functions

```
function displayCompanyName($CompanyName) {
     echo "<p>$CompanyName</p>";
}
displayCompanyName("Course Technology");
```


DisplayCompanyName function – Mozilla Firefox
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http://student200.ucb.sephone.us/PHP_Proje
Done

Course Technology

Figure 2-1 Output of a call to a custom function

Returning Values

- A **return statement** returns a value to the statement that called the function
- Not all functions return values

```
function averageNumbers($a, $b, $c) {
  $SumOfNumbers = $a + $b + $c;
  $Result = $SumOfNumbers / 3;
  return $Result;
}
$ReturnValue = averageNumbers(1, 2, 3);
```

Returning Values (continued)

- You can pass a function parameter by **value** or by **reference**
- A function parameter that is **passed by value** is a local copy of the variable.
- A function parameter that is **passed by reference** is a reference to the original variable.
  - Add an **ampersand** (&) before the dollar sign of the parameter name *in the function declaration*.

Short Quiz, p. 81

1. Explain the two-step process of creating user-defined functions in a PHP script.
   a. declare then call
2. Describe the purpose of the return statement in a function.
   a. When you want to use the results from a function in another script.
3. Explain why some functions do not need parameters.
   a. When they dont need any external data
4. Explain why some function do not have a `return` statement.
   a. you may need to use the data from a function later in code
5. Explain the difference between passing a parameter to a function by value versus by reference.
   a. Value: a local copy of the variable
   b. Reference: a reference to the original value.

Understanding Variable Scope

- **Variable scope** is where in your program a declared variable can be used
- A variable's scope can be either global or local
- A **global variable** is one that is declared outside a function and is available to all parts of your program
- A **local variable** is declared inside a function and is only available within the function in which it is declared

The `global` Keyword

- In PHP, you must declare a global variable with the `global` keyword inside a function definition to make the variable available within the scope of that function

The `global` Keyword (continued)

```
<?php
$GlobalVariable = "Global variable";
function scopeExample() {
global $GlobalVariable;
echo "<p>$GlobalVariable</p>";
}
scopeExample();
?>
```

Short Quiz, p. 83

1. Define the term *variable scope.*
    a. Where in your program a declared variable can be used
2. Explain the difference between a local variable and a global variable.
    a. local just within a function, Global available to all parts of your program
3. A variable declared outside of a function must be declared to be available within the function by using which keyword?
    a. Global

Making Decisions

- **Decision making** or **flow control** is the process of determining the order in which statements execute in a program
- The special types of PHP statements used for making decisions are called **decision-making statements** or **decision-making structures**

`if` Statements

- Used to execute specific programming code if the evaluation of a conditional expression returns a value of `TRUE`
- The syntax for a simple `if` statement is:

```
if (conditional expression)
     statement;
```

`if` Statements (continued)

- Contains three parts:
  - the keyword `if`
  - a conditional expression enclosed within parentheses
  - the executable statements
- A **command block** is a group of statements contained within a set of braces
- Each command block must have an opening brace ({) and a closing brace (})

`if` Statements (continued)

```
$ExampleVar = 5;
if ($ExampleVar == 5) {    // condition evaluates to 'TRUE'
     echo " <p>The condition evaluates to true.</p> ";
     echo '<p>$ExampleVar is equal to ',
     " $ExampleVar.</p> ";
    echo " <p>Each of these lines will be printed.</p> ";
}
echo " <p>This statement always executes after the if
statement.</p> ";
```

`if...else` Statements

- An `if` statement that includes an `else` clause is called an **`if...else` statement**
- An `else` clause executes when the condition in an `if...else` statement evaluates to `FALSE`
- The syntax for an `if...else` statement is:

```
if (conditional expression)
     statement;
else
     statement;
```

`if...else` Statements (continued)

- An `if` statement can be constructed without the `else` clause
- The `else` clause can only be used with an `if` statement

```
$Today = "Tuesday";
     if ($Today == "Monday")
          echo "<p>Today is Monday</p>";
    else
         echo "<p>Today is not Monday</p>";
```

Nested `if` and `if...else` Statements

- When one decision-making statement is contained within another decision-making statement, they are referred to as **nested decision-making structures**

```
if ($SalesTotal >= 50)
    if ($SalesTotal <= 100)
        echo "<p>The sales total is between
  50 and 100, inclusive.</p>";
```

`switch` Statements

- Control program flow by executing a specific set of statements depending on the value of an expression
- Compare the value of an expression to a value contained within a special statement called a **case label**
- A **case label** is a specific value that contains one or more statements that execute if the value of the case label matches the value of the switch statement's expression

`switch` Statements (continued)

- Consist of the following components:
  - The `switch` keyword
  - An expression
  - An opening brace
  - One or more `case` labels
  - The executable statements
  - The `break` keyword
  - A `default` label
  - A closing brace

`switch` Statements (continued)

- The syntax for the `switch` statement is:

```
switch (expression) {
        case label:
             statement(s);
             break;
        case label:
             statement(s);
             break;
        ...
        default:
             statement(s);
             break;
}
```

`switch` Statements (continued)

- A `case` label consists of:
  - The keyword **case**
  - A literal value or variable name
  - A colon (:)
- A `case` label can be followed by a single statement or multiple statements
- Multiple statements for a `case` label do not need to be enclosed within a command block

`switch` Statements (continued)

- The **`default` label** contains statements that execute when the value returned by the `switch` statement expression does not match a `case` label
- A `default` label consists of the keyword `default` followed by a colon (:)

Short Quiz, p. 95

1. What are the three required components of an `if` statement?
    a. if, conditional expression, executable statement
2. Describe how the use of command blocks makes an `if…else` control structure more efficient.
    a. Controls which statements belong to which decision struture
3. Explain the purpose of the `default` label in a `switch statement?`

    A. does not match any case label.

Repeating Code

- A **loop statement** is a control structure that repeatedly executes a statement or a series of statements while a specific condition is `TRUE` or until a specific condition becomes `TRUE`
- There are four types of loop statements:
  - `while` statements
  - `do...while` statements
  - `for` statements
  - `foreach` statements

while Statements

- Tests the condition prior to executing the series of statements at each iteration of the loop
- The syntax for the while statement is:

```
while (conditional expression) {
        statement(s);
}
```

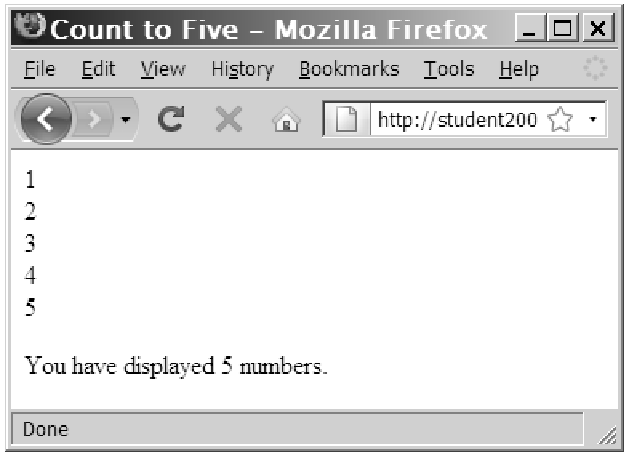
- As long as the conditional expression evaluates to TRUE, the statement or command block that follows executes repeatedly

`while` Statements (continued)

- Each repetition of a looping statement is called an **iteration**
- A `while` statement keeps repeating until its conditional expression evaluates to `FALSE`
- A **counter** is a variable that increments or decrements with each iteration of a loop statement

`while` Statements (continued)

```
$Count = 1;
while ($Count <= 5) {
      echo "$Count<br />";
      ++$Count;
}
echo "<p>You have printed 5 numbers.</p>";
```


Count to Five – Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://student200
Done

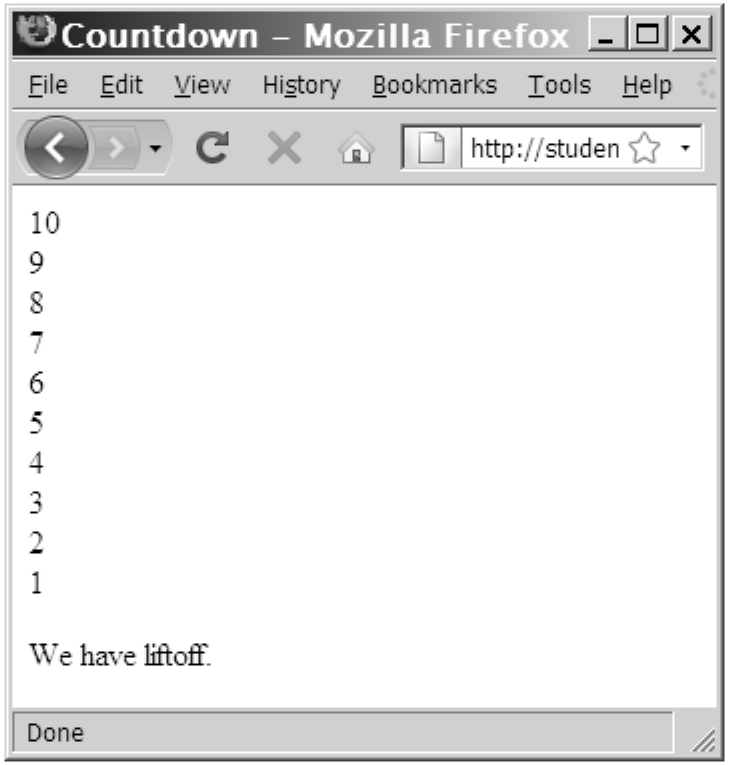
```
1
2
3
4
5

You have displayed 5 numbers.
```

Figure 2-5 Output of a `while` statement using an increment operator

`while` Statements (continued)

```
$Count = 10;
while ($Count > 0) {
      echo "$Count<br />";
      --$Count;
}
echo "<p>We have liftoff.
      </p>";
```


Countdown – Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://studen
Done

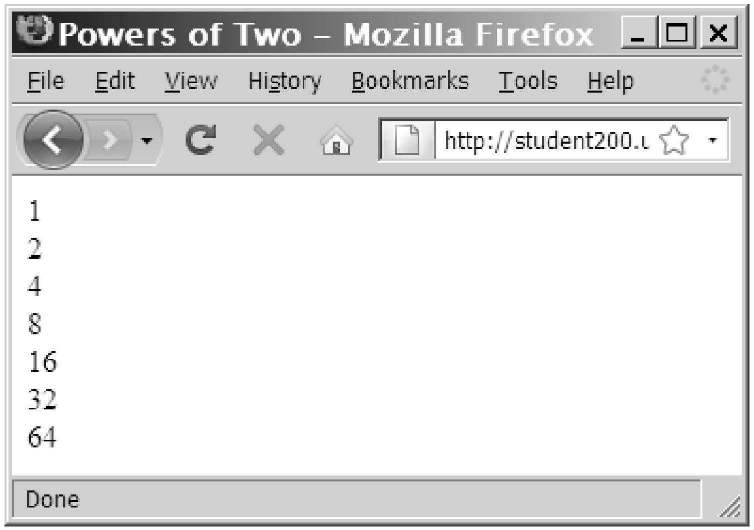
```
10
9
8
7
6
5
4
3
2
1

We have liftoff.
```

Figure 2-6 Output of a `while` statement using a decrement operator

`while` Statements (continued)

```
$Count = 1;
while ($Count <= 100) {
      echo "$Count<br />";
      $Count *= 2;
}
```


Powers of Two – Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://student200.u
Done

```
1
2
4
8
16
32
64
```

Figure 2-7 Output of a `while` statement using the assignment operator *=

`while` Statements (continued)

- In an **infinite loop**, a loop statement never ends because its conditional expression is never `FALSE`

```
$Count = 1;
while ($Count <= 10) {
      echo "The number is $Count";
}
```

`do...while` Statements

- Test the condition after executing a series of statements then repeats the execution as long as a given conditional expression evaluates to `TRUE`
- The syntax for the `do...while` statement is:

```
do {
     statement(s);
  } while (conditional expression);
```

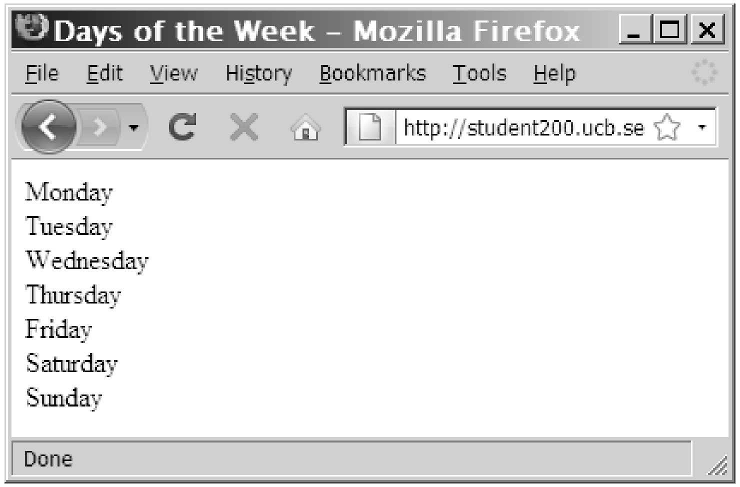
`do...while` Statements (continued)

- `do...while` **statements always execute once, before a conditional expression is evaluated**

```
$Count = 2;
do {
      echo "<p>The count is equal to $Count</p>";
      ++$Count;
} while ($Count < 2);
```

`do...while` Statements (continued)

```
$DaysOfWeek = array("Monday", "Tuesday", "Wednesday", "Thursday",
"Friday", "Saturday", "Sunday");
$Count = 0;
do {
     echo $DaysOfWeek[$Count], "<br />";
     ++$Count;
} while ($Count < 7);
```


Days of the Week – Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://student200.ucb.se
Done

```
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
Sunday
```

Figure 2-9 Output of days of week script in Web browser

`for` Statements

- Combine the initialize, conditional evaluation, and update portions of a loop into a single statement
- Repeat a statement or a series of statements as long as a given conditional expression evaluates to `TRUE`
- If the conditional expression evaluates to `TRUE`, the `for` statement executes and continues to execute repeatedly until the conditional expression evaluates to `FALSE`

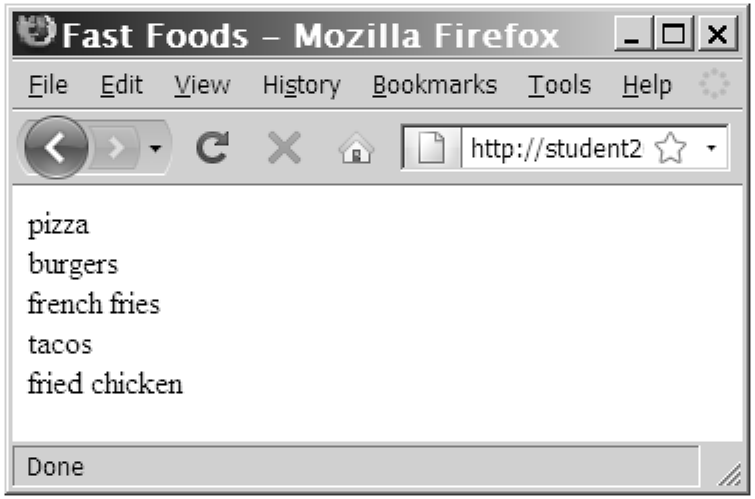
`for` Statements (continued)

- Can also include code that initializes a counter and changes its value with each iteration
- The syntax of the `for` statement is:

```
for (counter declaration and initialization;
      condition; update statement) {
   statement(s);
 }
```

`for` Statements (continued)

```
$FastFoods = array("pizza”,"burgers","french fries", "tacos
  ", "fried chicken");
for ($Count = 0; $Count < 5; ++$Count) {
     echo $FastFoods[$Count], "<br />";
}
```


Fast Foods – Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://student2
Done

```
pizza
burgers
french fries
tacos
fried chicken
```

Figure 2-10 Output of fast foods script

`foreach` Statements

- Used to iterate or loop through the elements in an array
- Do not require a counter; instead, you specify an array expression within a set of parentheses following the `foreach` keyword
- The syntax for the `foreach` statement is:

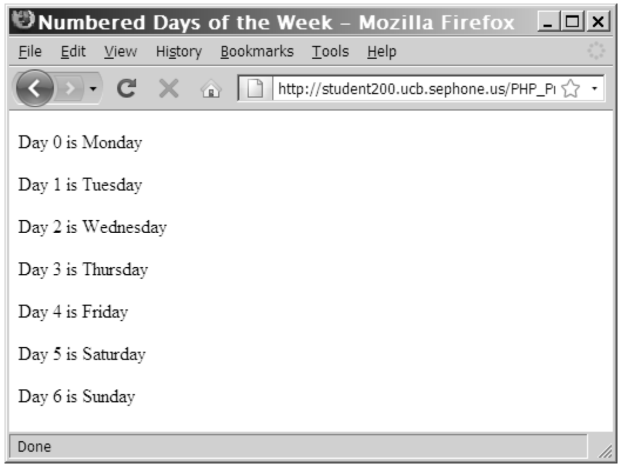
```
foreach ($array_name as $variable_name) {
statements;
}
```

foreach Statements (continued)

```
$DaysOfWeek = array("Monday", "Tuesday",
  "Wednesday", "Thursday", "Friday",
  "Saturday", "Sunday");
foreach ($DaysOfWeek as $Day) {
     echo "<p>$Day</p>";
```

`foreach` Statements (continued)

```
$DaysOfWeek = array("Monday", "Tuesday",
"Wednesday", "Thursday", "Friday", "Saturday",
"Sunday");
foreach ($DaysOfWeek as $DayNumber => $Day) {
  echo "<p>Day $DayNumber is $Day</p>";
```


Numbered Days of the Week – Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://student200.ucb.sephone.us/PHP_P
Done

```
Day 0 is Monday

Day 1 is Tuesday

Day 2 is Wednesday

Day 3 is Thursday

Day 4 is Friday

Day 5 is Saturday

Day 6 is Sunday
```

Figure 2-11 Output of the foreach script with index values

Short Quiz, p. 109

1. All loops require what feature to ensure that the looping will eventually end and not result in an infinite loop?
   a. expression needs to evaluate to false
2. What four looping structures are used in PHP?
   a. While, dowhile, for, foreach
3. Explain the purpose of a "counter" variable when executing a loop.
   a. Ensures that the conditional expression is falls
4. Which type of looping structure is used to iterate through elements of an array?
   a. foreach

Including Files

- The `include` and `require` statements reuse content by allowing you to insert the content of an external file on multiple Web pages
  - The `include` statement generates a warning if the include file cannot be found
  - The `require` statement halts the processing of the Web page and displays an error if the include file cannot be found
- The `include_once` and `require_once` statements assure that the external file is added to the script only one time, which helps to avoid conflicts with variable values or function names that might occur if the file was included multiple times

Short Quiz, p. 111

1. Describe the purpose of the group of `include`, `require`, `include_once`, and `require_once` statements.
2. When might you want to use the `require` statement instead of the `include` statement?
3. Why is it important that you add PHP script delimiters to each PHP code block in the include file?
4. Explain why one might want to save all include files in a separate folder and how this folder can be accessed.

Summary

- The lines that make up a function are called the **function definition**
- A function parameter that is passed by **value** is a local copy of the variable
- A function parameter that is passed by **reference** is a reference to the original variable
- A **global variable** is declared outside a function and is available to all parts of your program

Summary (continued)

- A **local variable** is declared inside a function and is only available within the function in which it is declared
- The process of determining the order in which statements execute in a program is called **decision making** or **flow control**
- The `if` statement is used to execute specific programming code if the evaluation of a conditional expression returns a value of `TRUE`

Summary (continued)

- An `if` statement that includes an `else` clause is called an `if...else` statement. An `else` clause executes when the condition in an `if...else` statement evaluates to `FALSE`
- When one decision-making statement is contained within another decision-making statement, they are referred to as **nested decision-making structures**

Summary (continued)

- The **switch statement** controls program flow by executing a specific set of statements, depending on the value of an expression
- A **loop statement** is a control structure that repeatedly executes a statement or a series of statements while a specific condition is `TRUE` or until a specific condition becomes `TRUE`
- A `while` statement tests the condition prior to executing the series of statements at each iteration of the loop

Summary (continued)

- The `do...while` statement tests the condition after executing a series of statements
- The `for` statement combines the initialize, conditional evaluation, and update portions of a loop into a single statement
- The `foreach` statement is used to iterate or loop through the elements in an array

Summary (continued)

- The `include`, `require`, `include_once`, and `require_once` statements insert the contents of an external file at the location of the statement