Awarding Great British Qualifications

Designing a Website

Topic 4:

Design and Build A Database (1)

Scope and Coverage

This topic will cover:

- Introductory concepts in PHP
- The language design of PHP
- Loops, selections and iterations
- Version considerations
- HTML via PHP

Learning Outcomes

By the end of this topic students will be able to:

- Create scripts to facilitate data transfer between a database and a web page
- Evaluate the functionality of a database-driven website in the context of a given problem.

Introduction to PHP

- In this lecture, we are going to look at how we can use PHP to develop simple dynamic websites.
  - PHP is only part of the toolkit we need to do this properly.
- You will need to be comfortable with basic programming techniques as some programming is required.
- You will be introduced to the basic syntaxes that make up PHP as well as some notes about its design and how it fits into our N-Tier systems.

PHP - 1

- PHP is a ***server-side scripting language.***
  - You request a page on the internet.
  - The server interprets the PHP it has been given.
  - It returns the results of that interpretation to you as an HTML page.
- PHP makes use of the general structure of HTTP on the internet.
  - As such, it suffers from the same limitations as HTLM, primarily ***statelessness***.

PHP 2

- **PHP programs are written in a different way to desktop applications. You need several tools:**
  - A web-server with PHP installed.
    - That will be taken care for you.
  - Some kind of programming environment.
    - Normally we write PHP code using a simple text editor (not a word processor)
  - Some good choices for this are Notepage++ and Jedit.
  - Any internet browser to interact with the application.
    - Any of these will be fine for now.

Program Architecture - 1

- PHP fits in the application layer of our N-Tier architecture.
- PHP is used to manipulate data.
- Data layer hands the storing of persistent data.

GET

- Using the GET method, the information that is encoded gets sent as an extension to the URL.
- It will appear as something like:
- http://<url>/dice_roll_get.php?num=6&faces=7
- This information is available to PHP via the $_GET variable.
- The action used to provide data to a PHP form influences the code that we use to access it.

Example Using GET - HTML

```
<html>
  <head>
    <title>Dice Form</title>
  </head>
  <body>
  <form action = "dice_roll_get.php" method = "get">
     <p>How many dice</p>
     <input type = "text" name = "num">
     <p>How many faces?</p>
     <input type = "text" name = "faces">

     <input type = "submit" value = "Roll">
     <input type = "reset" value = "Clear values">
  </body>
</html>
```

Example using GET - PHP

```
<?
    $num = $_GET["num"];
    $faces= $_GET["faces"];
    $total = 0;
    $roll = 0;

    for ($i = 0; $i < $num; $i++) {
      $roll = $random = (rand()%$faces) + 1;
      echo "<p>Dice roll " . ($i+1) . " is
$roll.</p>";
      $total += $roll;
    }

    echo "<p>Total roll is $total</p>"
  ?>
```

The POST Protocol

- The POST protocol is most useful on a day-to-day basis
- POST has no limitations on size of data.
- It has no limitations on data types.
- It places the encoded data in a standard HTTP header.

An Example PHP Script

```
<html>
   <head>
  <title>My First PHP Script</title>
  </head>
<body>
 <?php
   Echo "<p>Hello World!</p>";
?>
</body>
</html>
```

My First PHP Script

- PHP works like standard HTML, except you can set sections of the page to be interpreted by the server.
- PHP sections are marked by blocks.
  - <?php Starts a block of PHP
  - ?> ends a block of PHP
  - All of your PHP codes goes in this block.
- The echo function is used to output some text to the browser.
  - The script will display the text “Hello World” in a browser.

The Produced HTML

- We will not see the PHP code in our browser, because the processing is done on the server.
  - What we get back is the processed HTML:

```
<html>
    <head>
                <title>My First PHP Script</title>
    </head>
    <body>

    <p>Hello World!</p>
    </body>
</html>
```

User Input

- As with all programming, it is important that we are able to get and manipulate user information.
- This is handled in PHP through the use of ***form elements.***
- We create an HTML page that links to our PHP script, and when the form element is triggered, its information will be passed to the scripts.
- Note that this page uses no PHP itself.
  - It is the ***front-end*** to our PHP script.

HTML Form

```
<html>
  <head>
   <title>Test Form</title>
  </head>
<body>
<form action = “test_variables.php” method = “post”>

               <p>What is your name?</p>
               <input type = “text” name” = “name”>
               <p>What is your question?</p>
               <input type> = “text” name = “question”>

<input type = “submit” value = “ask”>
<input type =“reset” value =“Clear values”>

</body>
</html>
```

Variables - 1

- When the user presses “ask”, the browser will send the information they have entered into the textboxes to the page test_variables.php.
  - We will not do much with them yet.
  - We will just print them out to the screen.
- Before we do that, we need to talk a little about variables in PHP.
  - These work differently depending on what version of PHP you are using.

Variables - 2

- The concept of variables in PHP is identical to that in other languages – they let us deal with the unknown.
  - For example, we do not know what a user will type for their name or for their question.
- In PHP, variable names are always preceded by a $.
  - Such as $myVariable.

Variables - 3

- We do not provide the type of variable.
  - Just a name.
- When the browser sends the contents of our text boxes to the PHP script, it provides them as part of a hash table it maintains called $_POST.
  - The elements have the same name as we give them in the form elements.

Test_variables.php

```
<html>
<head>
<title>Testing Variables</title?
</head?

<body>
<?php
$name = $_POST[“name”];
$question = $_POST[“question”];

echo”<p>You entered $name for the name.</p>”;
echo ”<p>You entered $question for the question.</p>”;

?>

</body>
</html>
```

Why Use PHP? - 1

- Because its quick to setup an interface.
  - As you can see, input and output are simple to accomplish.
- HTML is a very rich output language.
  - You can lay things out in PHP much better than you can in any other programming language.
  - This is because rendering the output is handled on the client, and not in our PHP.
  - It will simply provide our output as HTML.

Why Use PHP? - 2

- Database connectivity is built into the core of the language.
  - It is very easy to hook up to a database.
- It is quite easy to learn.
  - Lots of the complicated things that are present in other languages are simplified.

Why Not Use PHP?

- It is designed for running over the internet, with all the complications that brings.
- Architecturally, it has numerous disadvantages compared to more strict programming languages.
- It is hard to find good “example” programs.
- Persistent data representation requires the use of other applications.
  - Like mySQL.

Some More PHP

- Let us look at doing something a little more complicated in PHP.
  - A program that answers our questions.
- We need to use arrays to handle this.
- PHP does not distinguish between variables of one type, and variables of another in code.
  - They are just ‘variables’.
- In technical terms, it is loosely typed.
  - This means you have to be careful.

The Magic Eight Ball - 1

- Our program is going to take questions from users, and then given random answers.
  - Much like with a “magic eight ball”.
- We declare an array of possible answers using the array keyword:

```
$responses = array (
“I have no idea.”,
“I don’t know why you’re asking me, I don’t know.”,
“Please stop asking questions, I don’t know”.,
“That’s an interesting question.  I don’t know the answer.”,
);
```

The Magic Eight Ball - 2

- When we get a question, we do not really care what the question is.
  - We just care that a random answer is given.
- The items inside a list (or an array) are identified by a numeric index.
  - The first element in an array is identified by the index 0, the second by 1, and so on.
- Programmers start counting from zero, which is useful to remember.
  - Thus, if we wanted to always give the first answer:

```
$answer=“resopnses[0];
```

Picking a Random Number

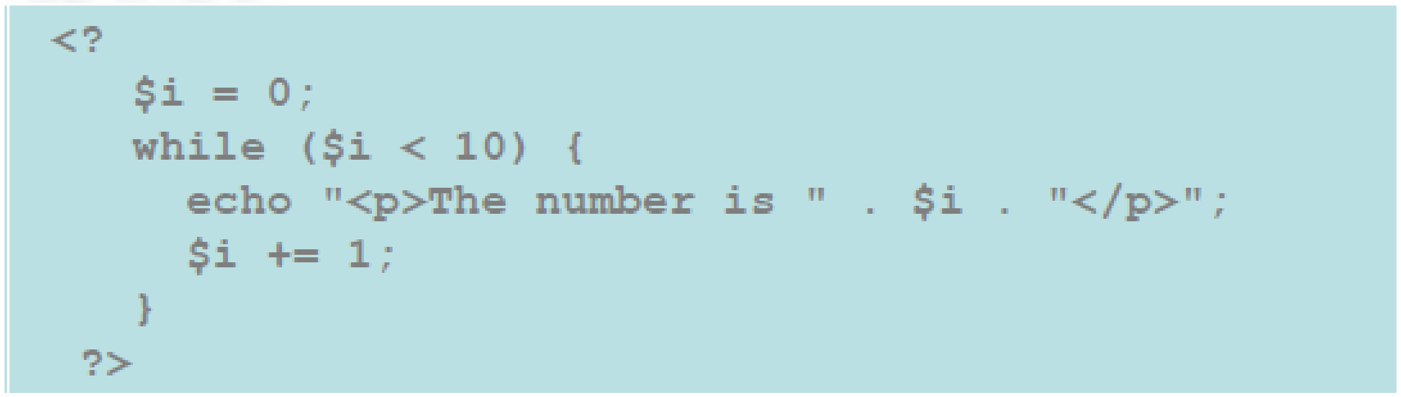
- If we want to get a random index from an array, we do it like so:
  - $random_response = array_rand ($responses);
- Array_rand is a function that is built into PHP, we do not need to write it ourselves.
- With this line of code, the variable $random_response contains a valid random index number.

The Magic Eight Ball - 3

```
  <html>
  <heal>
  <title>Magic Eight Ball</title>
  </head>
  <body>
  <?php
        $responses = array (
        “I have no idea.”,
        “I don’t know why you’re asking me, I don’t know.”,
        “Please stop asking questions, I don’t know”.,
        “That’s an interesting question.  I don’t know the answer.”,
        );
        $random_response = array_rand ($responses) ;
        $answer = $responses[$random_response);
        $name = $ POST[“name”] ;
        Echo “<p>I have an answer for you, $name - $answer</p>”
?>
</body>
/html>
```

Loops in PHP - 1

- PHP offers the full complement of loops for you to use.
  - Syntactically these are very similar to c/JAVA, except that variables are referenced with the $ notation.

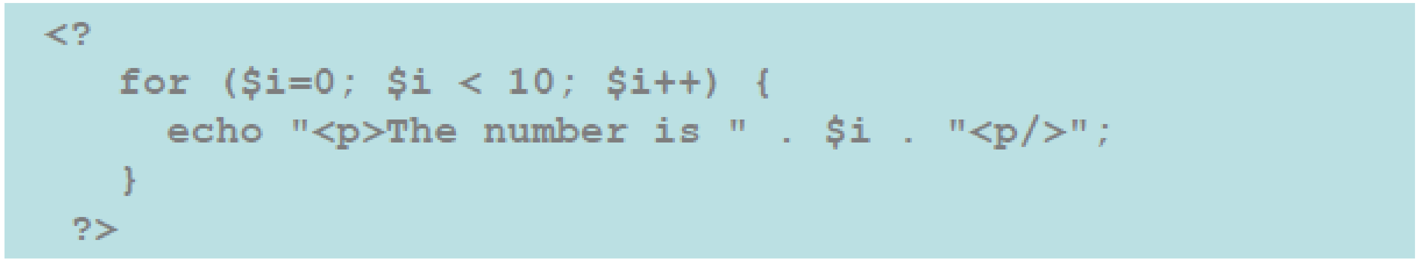


```
<?
   $i = 0;
   while ($i < 10) {
     echo "<p>The number is " . $i . "</p>";
     $i += 1;
   }
 ?>
```

While Loop

Loops in PHP - 2

- Note here too that we are using a slightly different way of outputting the values.
  - This is not specific to for loops, it is just to show you different ways of accomplishing the same thing.
  - The dot is the ***concatenation*** operator.



```
<?
   for ($i=0; $i < 10; $i++) {
     echo "<p>The number is " . $i . "<p/>";
   }
 ?>
```

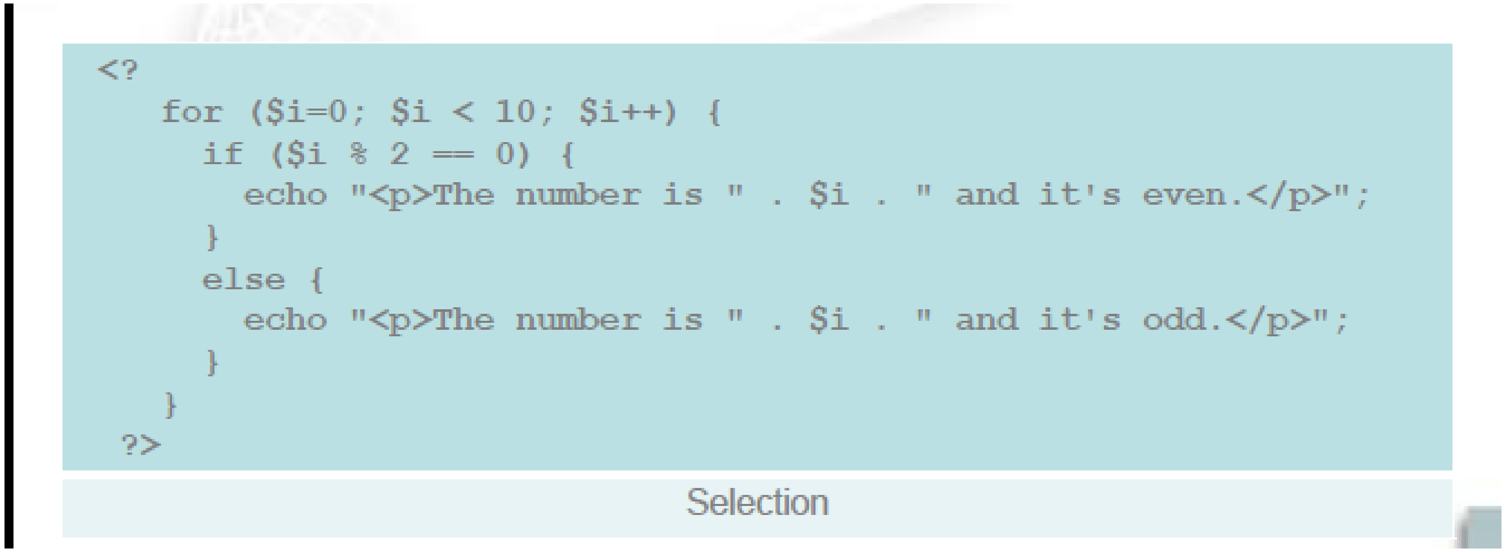
For Loop

Loops in PHP - 3

- There are two other kinds of loop in PHP that can be useful.
  - The do-while loop, which is common to most programming languages.
  - The foreach loop, which is slightly more unusual.
- You are invited to research these loops for yourself.
  - There are lots of examples available on the internet for you to have a go with, for example visit the following website for further details:
    - https://www.w3schools.com/php/php_looping_for.asp

Selection in PHP

- As with for and while loops, the syntax for selection in PHP is syntactically similar to C/Java.



```
<?
   for ($i=0; $i < 10; $i++) {
     if ($i % 2 == 0) {
       echo "<p>The number is " . $i . " and it's even.</p>";
     }
     else {
       echo "<p>The number is " . $i . " and it's odd.</p>";
     }
   }
 ?>
```

Selection

String Comparison in PHP

- You might be tempted to use the == operator to compare strings in PHP.
  - You will not get the behavior you want doing that.
  - The == in PHP is called a ***loose comparison operator***.
    - It tries to do some ***type juggling*** to make sure a comparison between two types of data is sensible.
  - PHP offers ***strict comparison operators*** too
    - ===
    - !==
  - These should be used for string comparisons.

Type Casting

- While PHP is loosely typed, it is often valuable to be able to change the contents of a variable from one type to another.
- This is done through type casting:
  - $num = 10
  - $strnum = (string)$num;
- You will need to keep track of what is contained within variables.
  - It is a good idea to be consistent with your typing.

PHP and Version Differences - 1

- In an early slide, the point was made that it is difficult to find good example programs.
  - Part of that problem is due to version and configuration differences.
- PHP is a very flexible language, but it changes much depending on its context and version.
- During this course we will assume you are using version 5 of PHP.
  - Make sure that any example code you research is also using PHP version 5.

Conclusion

- PHP is a C-Type language
  - The syntax is syntactically very similar to C, C++ and JAVA.
- It is a server-side scripting language.
  - All the processing of the code is done on the server side.
- We can make use of the fact our output goes to a browser by using HTML markup.
  - This greatly increases how effective our input and output can be.
- There are often substantial version differences between installations of PHP on a server.
  - You need to be careful on this.

Terminology

- *Loosely typed -* A programming language that does not require the type of variables to be declared
- *Type juggling -* The automatic type conversions that PHP performs.
- *Type casting -* Changing the type of a variable from one kind of data to another.

References

- Random.org, 2017. [online]. Available at www.random.org/dice

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Topic 4 – Introduction to PHP

Any Questions?