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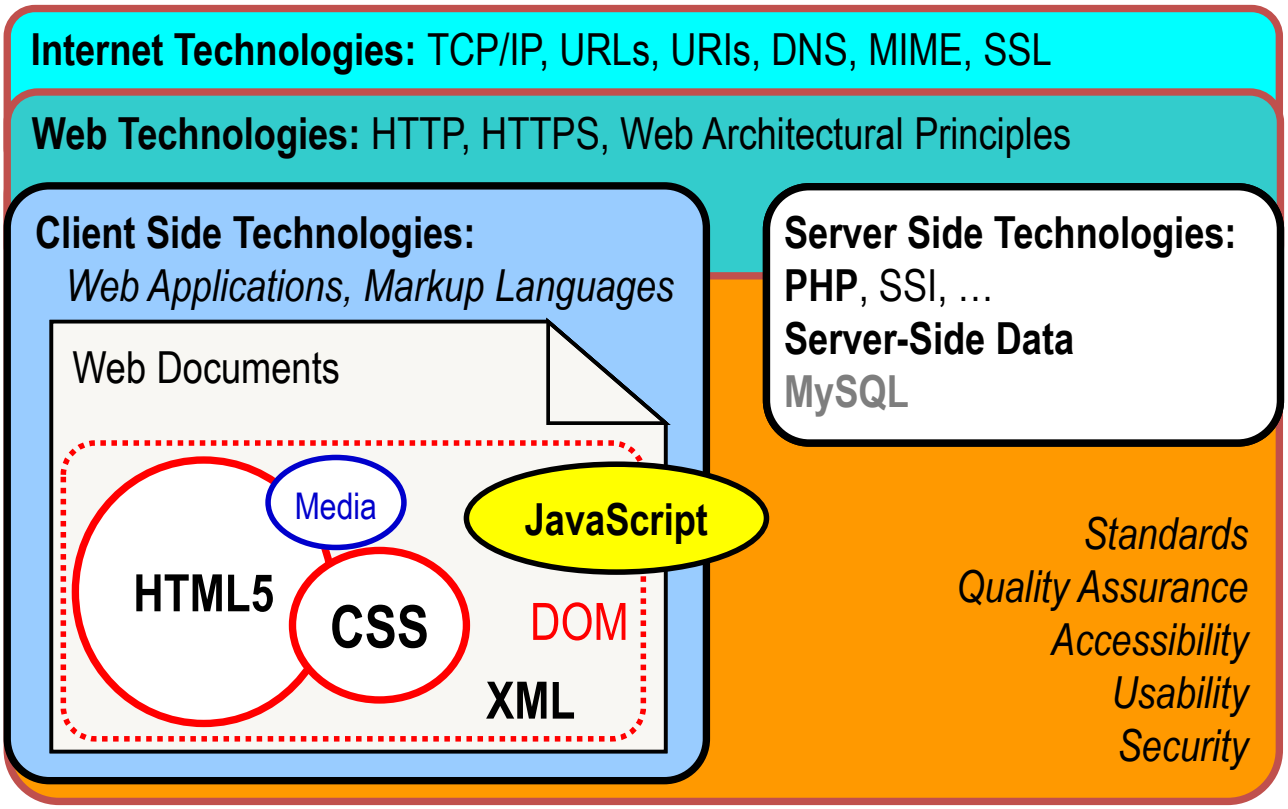
COS10011/60004
Creating Web Applications

Lecture 9 - Server-side Programming
PHP: Part 2

Unit of Study Outline



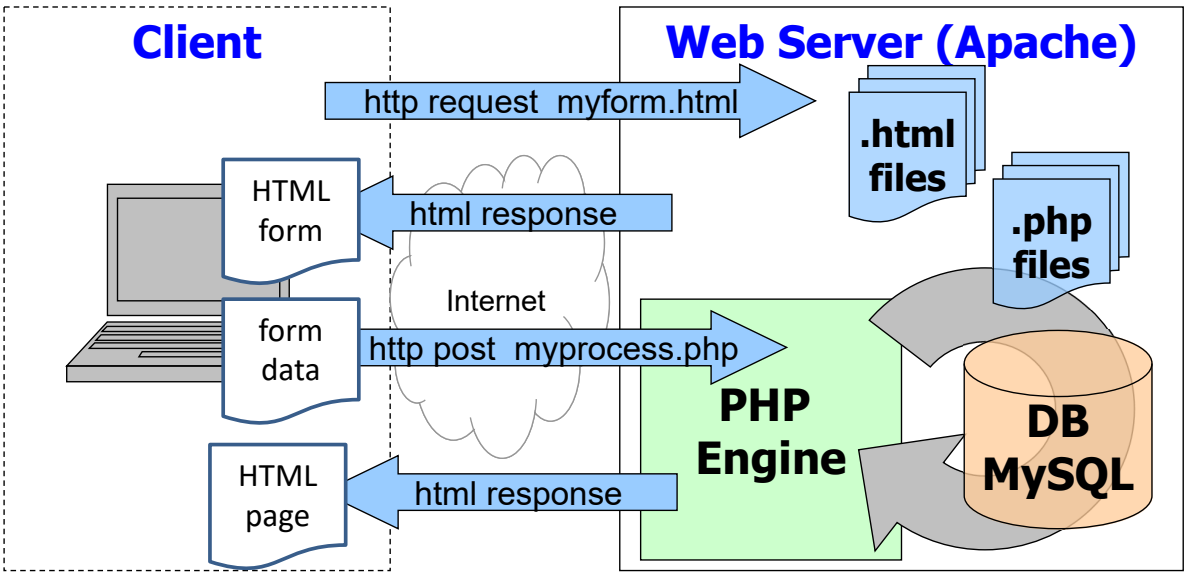
Last Week

- Client/Server Architecture
- PHP Scripting
- PHP Variables and Constants
- Data Types
- Arrays
- Expressions
- Functions and Scope
- Control Flow
- Server Side Includes (SSI)

Outline - this week

- PHP Form Data Processing
  - Form data extraction
  - Superglobal variables
- Checking Form Data server-side using PHP
- PHP Includes
- Managing 'state' between client and server
  (hidden fields, query strings, sessions)
- Managing Page Flow
  (hidden inputs, self call, redirection)

Apache/PHP/MySQL example



FORM DATA EXTRACTION AND SUPERGLOBALS

http://php.net/manual/en/language.variables.scope.php

Form data extraction

must match

myfirst_phpform.html

```
....
<form method="post" action="php_process1.php">
    <p>Enter First Name:
    <input type="text" name="fname" />
    <input type="text" name="lname" />
    ...
    <input type="submit" value="Process" />
</form>
...
```

php_process1.php

```
<?php
    ...
//Transfer form data to variables
    $fname = $_POST["fname"];
    $lname = $_POST["lname"];
    $favnum = $_POST["favnum"];

    ...
    echo "<h1>Welcome
            $fname!</h1>";

    ...
?>
```

superglobals

Form Data Extraction Using Superglobals

- $_GET and $_POST **superglobals** (or autoglobals) read an array of *name-value* pairs submitted to the PHP script
- Superglobals are **associative arrays** – arrays whose elements are referred to with an alphanumeric key instead of an index number

  e.g. `$favnum = $_POST["favnum"];`

  Alphanumeric "Key" instead of an index number

- Are always accessible, regardless of scope

See ***Predefined Variables, Superglobals and examples:***
http://php.net/manual/en/reserved.variables.php

Using Superglobals (continued)

- **$_GET** is the default method for submitting a form
- **$_GET** and **$_POST** allow you to access the values sent by forms that are submitted to a PHP script
- **GET method** appends form data as one long string to the URL specified by the **action** attribute
  - typically used for ***get*** information from a resource
    e.g. getting a record from a database
- **POST method** sends form data in the body of the HTTP request, not visible in the URL
  - typically used for ***creating*** a resource
    e.g. creating a new record in a database

More Superglobals

- Superglobals contain client, server, and environment information that you can use in your scripts

See ***Predefined Variables, Superglobals and examples:***
http://php.net/manual/en/reserved.variables.php

Array	Description
$_COOKIE	An array of values passed to the current script as HTTP cookies
$_ENV	An array of environment information
$_FILES	An array of information about uploaded files
$_GET	An array of values from a form submitted with the GET method
$_POST	An array of values from a form submitted with the POST method
$_REQUEST	An array of all the elements found in the $_COOKIE, $_GET, and $_POST arrays
$_SERVER	An array of information about the Web server that served the current script
$_SESSION	An array of session variables that are available to the current script
$GLOBALS	An array of references to all variables that are defined with global scope

Using Superglobals (continued)

```
echo "<p>This script was executed with the
  following server software: ",
  $_SERVER["SERVER_SOFTWARE"], "<br />";
echo "This script was executed with the
  following server protocol: ",
  $_SERVER["SERVER_PROTOCOL"], "</p>";
```

Associative array of pre-defined elements (in capitals)

Using Superglobals (Example 2)

- Given the following registration form

```
<body>
<h1>Log In Form</h1>
<form method="post" action="storeName.php">
  <p><label for="uname">Name</label>
  <input id="uname" type="text" name="username"></p>
  <p><label for="uemail">Email</label>
  <input id="uemail" type="email" name="useremail"></p>
  <p><input type="submit" value="Log In" /></p>
</form>
</body>
```

form control *name values* will become *key index* for the superglobal associative array

Using Superglobals (Example 2)

- In the file **storeName.php**, data is extracted via superglobal **$_POST**, because form **method="post"**

Any preferred variable name

Name from the input form

```
...
$u_name = $_POST['username'];
$u_email = $_POST['useremail'];
echo "<p>User name: $u_name<br/>";
echo "Email: $u_email</p>";
...
```


FORM DATA CHECKING USING PHP

Checking Form Data at the Server

- Always check/validate data at the server:
  - Maintain integrity of the server data
  - Help prevent malicious attack – e.g. SQL injection
- Check that GET or POST has been entered
- Validate data formats
- Cleanse entered data

Example php_form1.php

See also http://www.w3schools.com/php/php_form_validation.asp

Checking GET or POST data exists

- Use the **`isset()`** function to ensure that a variable is set before you attempt to use it

```
<?php
    if (isset ($_POST["fname"]))
        $fname = $_POST["fname"];
    else
        echo "<p>Error: Please enter data in the
        <a href=\"php_form1.php\">form</a><p>";
?>
```

Assign data to local variable if it is set

Validating data formats – e.g. strlen

```
<$php
    if (isset ($_POST["fname"])) {
        $fname = $_POST["fname"];
        $err_msg = "";   // set the message to have no value
        if (strlen ($fname) == 0 ) {        // Look for data that is wrong
            $err_msg .= "<p>Error: enter first name.</p>";
        }
        if ($err_msg == "") {               // Proceed if nothing is wrong
            echo "<h1>Welcome $fname!</h1>";
        } else {        // Display error message, if data validation fails
            echo $err_msg;                  }
    } else
        echo "<p>Error: Please enter data in the form</p>";
?>
```

Similar approach to that used in JavaScript

Validating data formats – RegExp

```
<$php
    if (isset ($_POST["fname"])) {
        $fname = $_POST["fname"];
        $err_msg = "";
        if (!preg_match("/^[a-zA-Z ]*$/",$fname)) {
            $err_msg .=
              "<p>Error: Only letters and spaces allowed.</p>";
        }
        ...
    }
    } else
        echo "Error: Please enter data";
?>
```

PHP function

Same regular expression pattern as used in JavaScript

Regular expressions in PHP

int preg_match (string $pattern , string $subject)

- Performs regular expression match
- Returns 1 if the pattern matches given subject, 0 if it does not, or FALSE if an error occurred.

- For more complex forms of the function see http://php.net/manual/en/function.preg-match.php

Validating using the filter_var function

- filter_var() filters a variable, predefined filters
- Returns the filtered data, or FALSE if the filter fails, e.g.

```
if (!filter_var($email, FILTER_VALIDATE_EMAIL)) {
        $err_msg .=  "Invalid email format";
}
```

- Predefined filters for validating
  - email, types, ip addresses, URLS, …
- Filters also available for sanitising data

Pre-defined filter

http://php.net/manual/en/function.filter-var.php

Sanitising data

- Because code can be mixed with HTML, form data can be vulnerable to 'code injection'.
- Help prevent this by making sure there are no control characters in the data sent to a PHP script.
- Use a small function like:

```
function sanitise_input($data) {
  $data = trim($data);
  $data = stripslashes($data);
  $data = htmlspecialchars($data);
  return $data;
}
```

Remove leading or trailing spaces

Remove backslashes in front of quotes

Converts HTML control characters like < to the HTML code **<**

Ex: Sanitising data before processing

```
<$php
    function sanitise_input($data) {
        $data = trim($data);
        $data = stripslashes($data);
        $data = htmlspecialchars($data);
        return $data;
    }
    if (isset ($_POST["fname"])) {
        $fname = $_POST["fname"];
        $fname = sanitise_input($fname);
        if (!preg_match("/^[a-zA-Z ]*$/",$fname)) {
... } ...?>
```

Call the function

PHP INCLUDES

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PHP Includes

- Facilitates the reuse of PHP code at the files level
- Useful for including recurring functionality or content e.g. menus

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PHP include example

```
<!DOCTYPE html>
<html lang="en">
<head>
        ...
</head>
<body>
        <?php
                include_once ("php_menu.html");
        ?>
        <!-- Web page starts here -->
        <h1>Input checking using input values</h1>
        ...
</html>
```

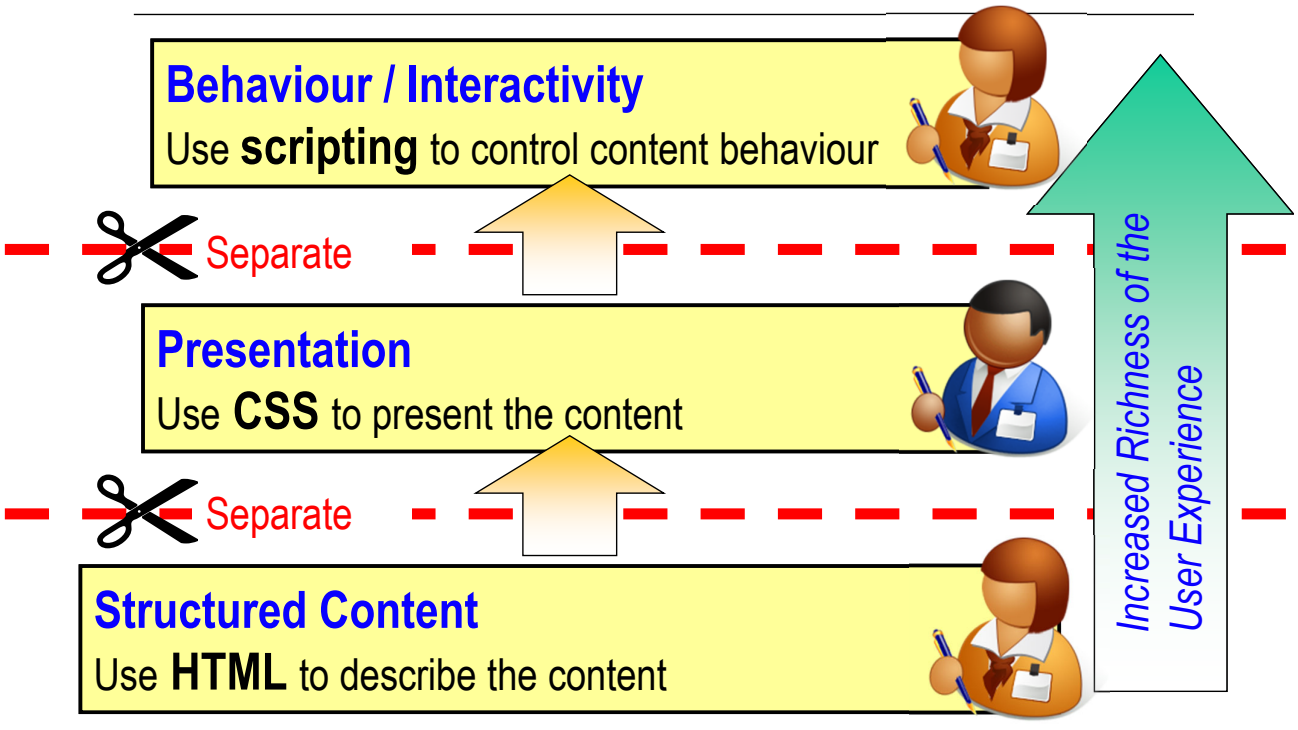
include_once ensures that the code is only included once

Whatever text is in the file `php_menu.html` will be inserted at this point

Here file is named `.html` could be `php_menu.inc`

Example demo: home.php

Use the correct tools and people for the job



Don't write server-side code, that is usually done by others.

PHP include and require

```
<!DOCTYPE html>
<html lang="en">
<head>
        …
</head>
<body>
        <?php
                require ("php_menu.html");
        ?>
        <!-- Web page starts here -->
        <h1>Input checking using input values</h1>
        …
</html>
```

Same as include by will produce a fatal error if the file is missing

Name file `.php` if it needs to be processed

MANAGING STATE

Managing State

Techniques for **maintaining state** information with PHP include:

- Hidden form fields
- Query strings
- Sessions

Understanding State Information

- HTTP was originally designed to be **stateless** – *Web browsers store no persistent data about a visit to a Web site*
- We need techniques to **maintaining state**: *i.e. store persistent information about Web site visits, that can be passed backwards and forwards between the client and the server.*
- We have previously used Web Storage and Cookies to store information locally on the client
- Information about individual visits to a Web site also needs to be maintained on the server

Understanding State Information (cont)

Some reasons why a web application may need to **maintain state** information:

- Temporarily store information as a user navigates through a multi-page form
- Allow a user to create bookmarks for returning to specific locations within a Web site
- Customize individual Web pages based on user preferences
- Provide shopping carts that store order information
- Store user IDs and passwords
- Use counters to keep track of how many times a user has visited a site

Using Hidden Form Fields to Save State

- Use hidden form fields to temporarily store data that needs to be sent to a server that a user does not need to see
- Examples include the result of a calculation
- Create hidden form fields with the **`<input />`** element using **`type="hidden"`**

```
<input type="hidden"
   name="..." value="..."   />
```

Both **name** and **value** attributes are needed.

Using Hidden Form Fields to Save State

- When submitted to a PHP script, access the values submitted from the form with the **`$_GET[]`** and **`$_POST[]`** Superglobals

- Pass the form values from one PHP script to another PHP script, by storing the *name-values* in **input** elements with **type="hidden".**

Using Hidden Form Fields to Save State

```
<form action="toolLoans.php" method="get">
. . .
<p>
<input type="hidden" name="toolID"
          value="<?php echo $tool_id ?>" />
<input type="submit" value="Hire Tool" />
</p>
</form>
```

Note: The hidden value will be visible if you "view page source" on the client.

Using Query Strings to Save State

- A **query string** is a set of name=value pairs ***appended to a target URL***
- A **query string** consists of a single text string containing one or more pieces of information

- Any forms that are submitted with the **`GET`** method automatically add a question mark (?) and append the **query string** to the URL of the server-side script

Using Query Strings to Save State

- To pass information from one Web page to another using a query string,
  - add a question mark (?) immediately after the URL
  - followed by the query string containing the information in name=value pairs, and
  - separate the name=value pairs within the query string by ampersands (&)

```
<a href="details.php?firstName=John&lastName=Smith
&occupation=singer">John Smith</a>
```


Using Query Strings to Save State

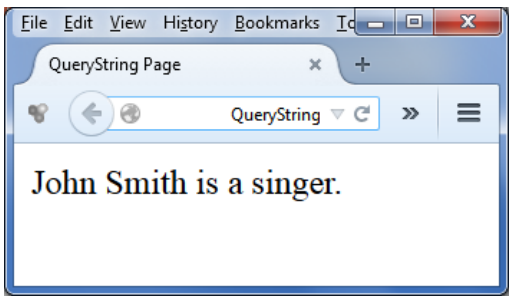
- To pass query string information from one PHP script to another PHP script, echo the values in the first script

```
<a href="details.php?firstName=<?php echo $fname; ?>
&lastName=<?php echo $lname; ?>
&occupation=<?php echo $occ; ?>">
<?php echo $fname, $lname; ?></a>
```

Note: The values will be visible in the query string.

Using Query Strings to Save State

```
echo "{$_GET['firstName']} {$_GET['lastName']}",
 "is a {$_GET['occupation']}. ";
```

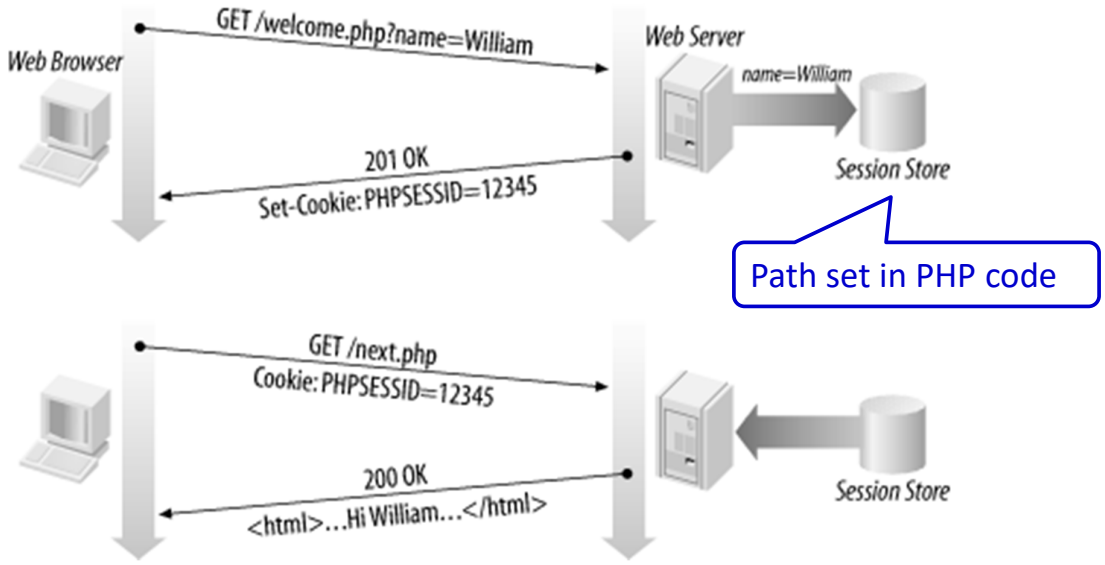


Output of the contents of a query string

Using Sessions to Save State

- A **session** refers to a period of activity when a PHP script stores *state information on a Web server*
- **Sessions** allow you to maintain state information *even when clients disable cookies in their Web browsers*

Session interaction



Starting a Session

```
<?php
session_start();
...
?>
<p><a href='<?php echo
  "occupation.php?PHPSESSID="
    . session_id() ?>'>Occupation</a></p>
```


Starting a Session

- The **`session_start()`** function starts a new session or continues an existing one
- The **`session_start()`** function generates a unique session ID to identify the session
- A **session ID** is a random alphanumeric string that looks something like:

  `7f39d7dd020773f115d753c71290e11f`

- The **`session_start()`** function creates a text file on the Web server that is the same name as the session ID, preceded by **`sess_`**

Starting a Session (continued)

- Session ID text files are stored in the Web server directory specified by the **`session.save_path`** directive in your php.ini configuration file
- The **`session_start()`** function does not accept any arguments, nor does it return a value that you can use in your script

```
<?php
session_start();
...
```


Starting a Session (continued)

- You must call the **`session_start()`** function ***before*** you send the Web browser any output
- If a client's Web browser is configured to accept cookies, the session ID is assigned to a temporary cookie named `PHPSESSID`
- Pass the session ID as a query string or hidden form field to any Web pages that are called as part of the current session

Working with Session Variables

- Session state information is accessed using the **`$_SESSION`** superglobal
- When the **`session_start()`** function is called, PHP either initializes a new **`$_SESSION`** superglobal or retrieves any variables for the current session (based on the session ID) into the **`$_SESSION`** superglobal

Working with Session Variables (continued)

```
<?php
session_set_cookie_params(3600);
session_start();
$_SESSION['firstName'] = "John";
$_SESSION['lastName'] = "Smith";
$_SESSION['occupation'] = "singer";
?>
<p><a href='<?php echo "Occupation.php?"
 . session_id() ?>'>Occupation</a></p>
```

Sets the "lifetime" argument to 3600 seconds

Working with Session Variables (continued)

- Use the **`isset()`** function to ensure that a session variable is set before you attempt to use it

```
<?php
session_start();
if (isset($_SESSION['firstName']) &&
   isset($_SESSION['lastName'])
      && isset($_SESSION['occupation']))
    echo "<p>" . $_SESSION['firstName'] . " "
         . $_SESSION['lastName'] . " is a "
         . $_SESSION['occupation'] . "</p>";
?>
```


Deleting a Session (continued)

```
<?php
session_start();
$_SESSION = array();
session_destroy();
?>
```

Step 1

Step 2: Use the array() construct to reinitialize the $_SESSION superglobal

Step 3: Delete the session

This is the code often used for a "Log-out" script, or the code that is included in a "Registration" / "Log In" page, so that it deletes any existing user sessions whenever a user opens it.

PHP Syntax Checking

- http://phpcodechecker.com/

Next Lecture

What's Next?

- Server-side Data
- PHP and MySQL