Web Application Development : Arrays, PHP Strings, Files, and Directories

Week 3

SWINBURNE UNIVERSITY OF TECHNOLOGY

Content of this Lecture

- Working with arrays
- Associative and multidimensional arrays
- Handling form submissions and processing
- Manipulating, parsing and comparing strings
- Managing files and directories
- Working with files: open, close, write, read

Adding and Removing Elements

- From the beginning of an array
  - The **`array_shift()`** function removes the first element from the beginning of an array
  - The **`array_unshift()`** function adds one or more elements to the beginning of an array. Pass the name of an array followed by comma-separated values for each element you want to add
- From the end of an array
  - The **`array_pop()`** function removes the last element from the end of an array
  - The **`array_push()`** function adds one or more elements to the end of an array.

```
$hospitalDepts = array("Anesthesia", "Molecular Biology",
                                  "Neurology", "Pediatrics");
array_pop($hospitalDepts);  //removes Pediatrics from end
array_push($hospitalDepts,"Psychiatry","Pulmonary Diseases");
// adds these to the end of array
```

Adding and Removing Elements

- The **`array_splice()`** function adds or removes array elements **within an array**, and renumbers the indexes

  ```
  array_splice(array_name, starting element,
     elements_to_delete, values_to_insert);
  ```

- To add an element within an array, include a value of 0 as the 3rd parameter
- To add more than one element within an array, pass the `array()` construct as the 4th parameter, separate the new `array()` element values by commas
- Delete array elements by omitting the 4th parameter from the `array_splice()` function. *If the 3rd* parameter *is also omitted, all elements starting from the specified position are deleted*

Examples of `array_splice()`

```
$hospitalDepts = array(
       "Anesthesia",                 // first element (0)
       "Molecular Biology",          // second element (1)
       "Neurology",                  // third element (2)
       "Pediatrics");                // fourth element (3)

//  Add two new elements between "Neurology" and  "Pediatrics"
array_splice($hospitalDepts, 3, 0,
   array("Ophthalmology","Otolaryngology"));

//  Delete 2nd & 3rd elements ("Molecular Biology" and "Neurology")
array_splice($hospitalDepts, 1, 2);
```

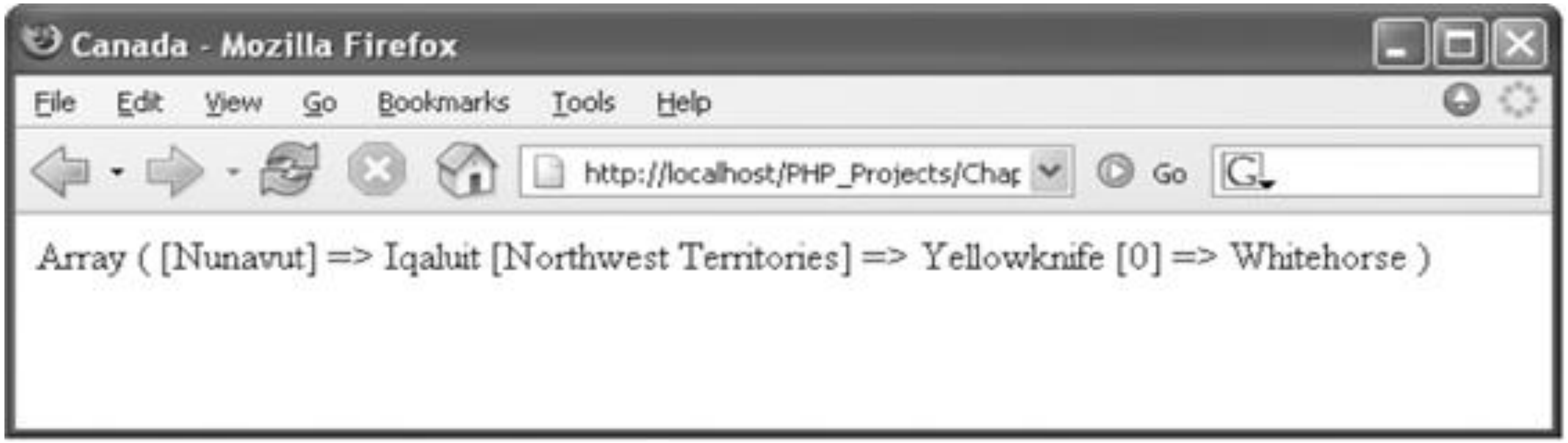
Declaring and Initialising Associative Arrays

- With associative arrays, you specify an element's key by using the array operator (=>)
- The syntax for declaring and initialising an associative array:
  - `$array_name = array(key=>value, ...);`
    e.g.
    ```
    $ProvinceCapitals = array("Ontario"=>"Toronto",
    "Alberta"=>"Edmonton", ...);
    ```
  - `$array_name[key] = value;`
    e.g.
    ```
    $provinceCapitals["Ontario"] = "Toronto";
    $provinceCapitals["Alberta"] = "Edmonton";
    ...
    ```
- The sytax to refer to an element in an associate array

  e.g. `echo $provinceCapitals["Ontario"];`

Output of Associative Arrays

```
$territorialCapitals["Nunavut"] = "Iqaluit";
$territorialCapitals["Northwest Territories"] = "Yellowknife";
$territorialCapitals[] = "Whitehorse"; // next indexed element
print_r($territorialCapitals);
```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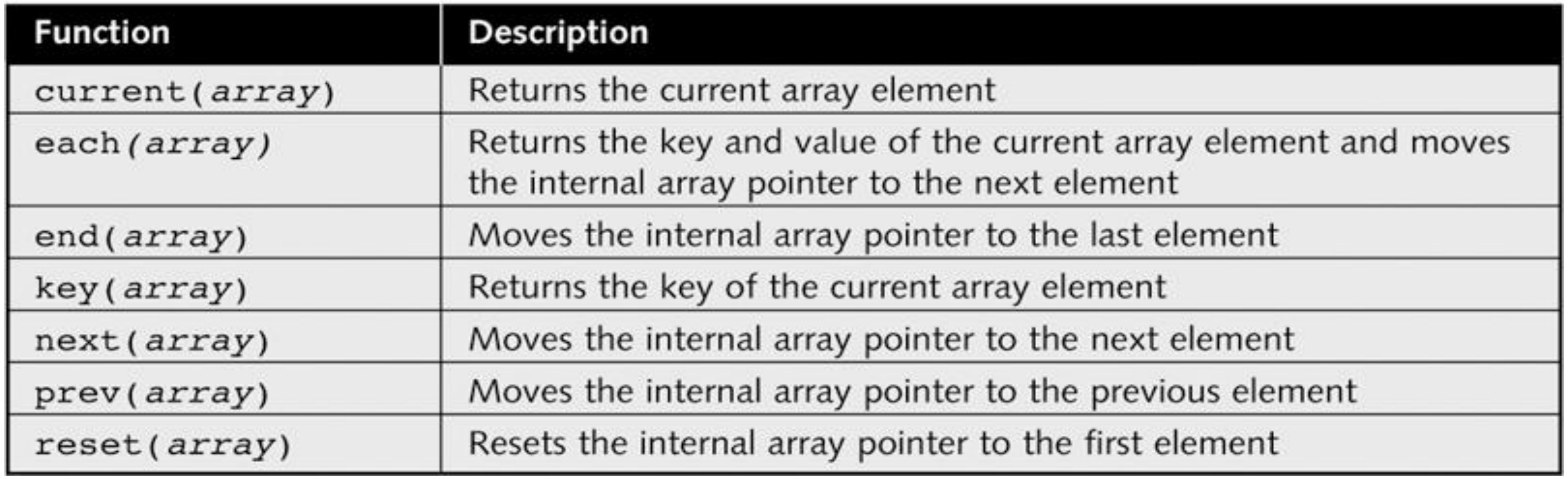
```
Array ( [Nunavut] => Iqaluit [Northwest Territories] => Yellowknife [0] => Whitehorse )
```

Output of array with associative and indexed elements
Mixed use of keys and indexes

Iterating Through an Array

- The **internal array pointer** refers to the currently selected element in an array

Array pointer iteration functions



Function	Description
current(*array*)	Returns the current array element
each*(array)*	Returns the key and value of the current array element and moves the internal array pointer to the next element
end(*array*)	Moves the internal array pointer to the last element
key(*array*)	Returns the key of the current array element
next(*array*)	Moves the internal array pointer to the next element
prev(*array*)	Moves the internal array pointer to the previous element
reset(*array*)	Resets the internal array pointer to the first element

Iterating Through an Array (continued)

```
$provinceCapitals = array(
  "NewFounderland and Labrador"=>"St. John's",
  "Prince Edward Island"=>"Charlottetown",
  "Nova Scotia"=>"Halifax",
  "New Brunswick"=>"Fredericton",
  "Quebec"=>"Quebec City",
  "Ontario"=>"Toronto",
  "Manitoba"=>"Winnipeg",
  "Saskatchewan"=>"Regina",
  "Alberta"=>"Edmonton",
  "British Columbia"=>"Victoria");
  foreach ($provinceCapitals as $capital) {
     echo "The capital of " .
      key($provinceCapitals) . " is $capital<br />";
  }
```

✗

Correct as follows ☺

```
   foreach ($provinceCapitals as $capital) {
     echo "The capital of ".
      key($provinceCapitals) . " is $capital<br />";
     next($provinceCapitals);

   }
```

✓

`foreach` Statement **(slide from Lecture 2)**

- Used to iterate or loop through the elements in an array
- Does not require a counter; instead, you specify an array expression within the pair of parentheses following the `foreach` keyword

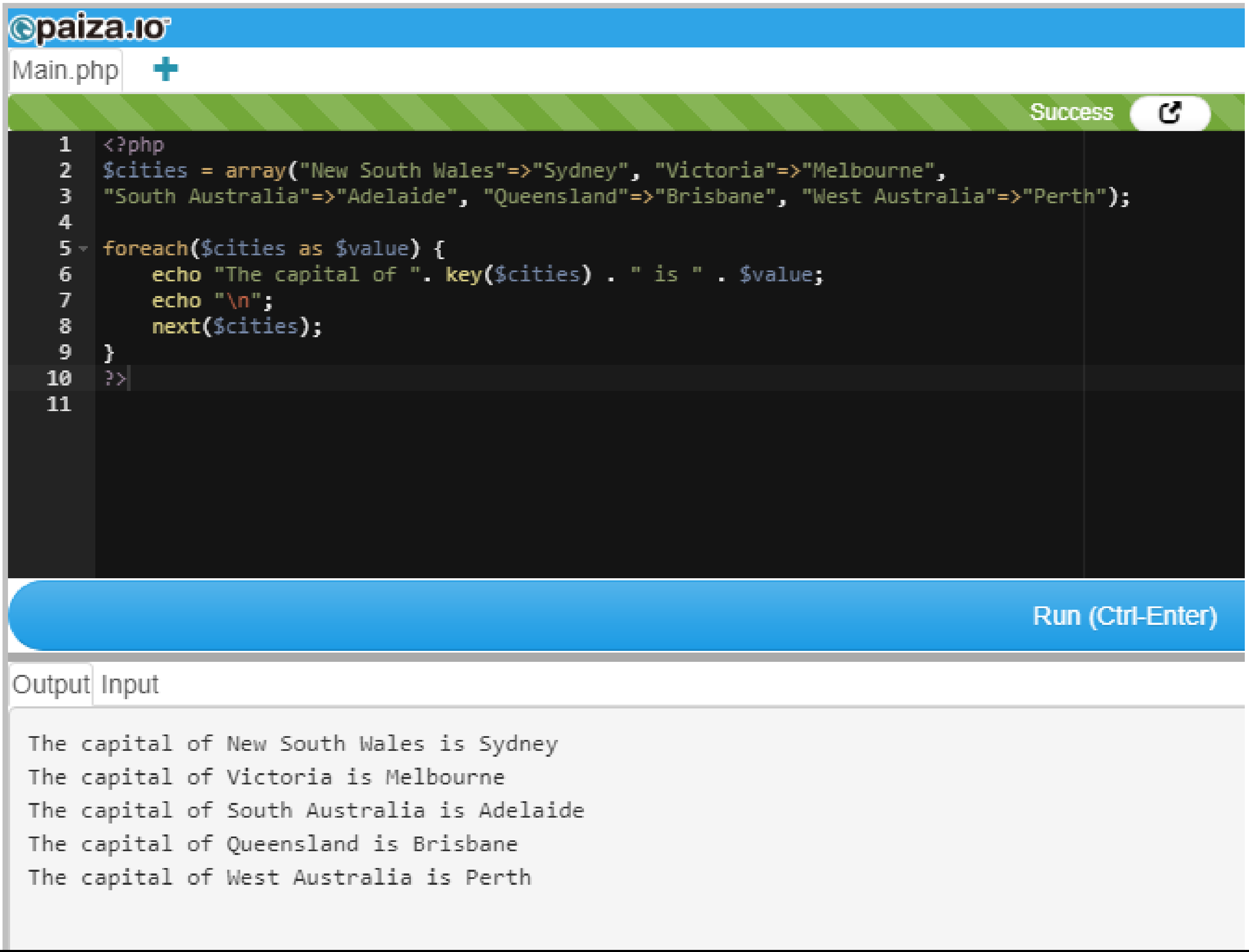
```
 foreach ($array_name as $variable_name) {
      statements;
 }
```

- example

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

foreach ($cities as $value)

PHP Code Editor:

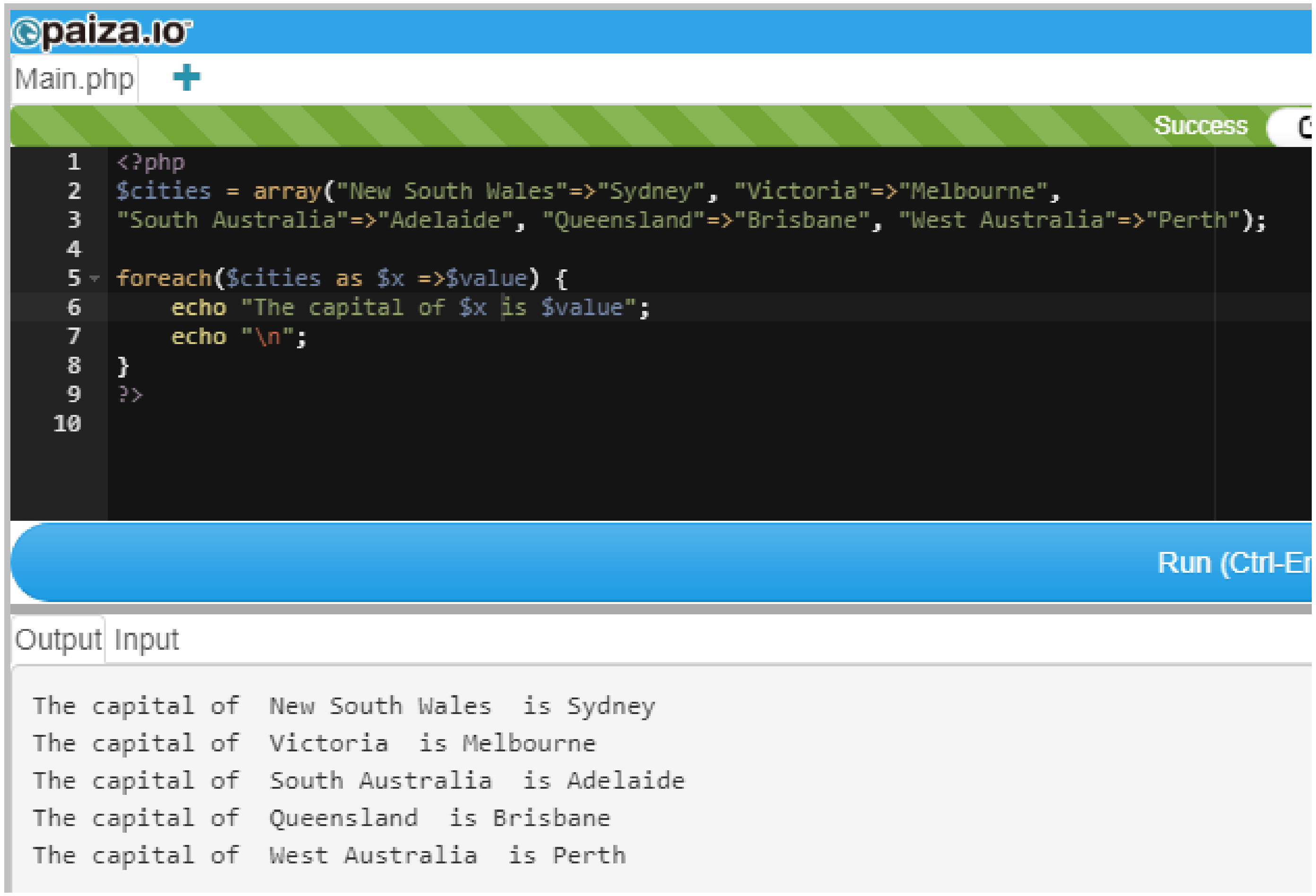


```php
<?php
$cities = array("New South Wales"=>"Sydney", "Victoria"=>"Melbourne",
"South Australia"=>"Adelaide", "Queensland"=>"Brisbane", "West Australia"=>"Perth");

foreach($cities as $value) {
    echo "The capital of ". key($cities) . " is " . $value;
    echo "\n";
    next($cities);
}
?>
```

```
The capital of New South Wales is Sydney
The capital of Victoria is Melbourne
The capital of South Australia is Adelaide
The capital of Queensland is Brisbane
The capital of West Australia is Perth
```

foreach ($cities as $x => $value)

PHP Code Editor:



```php
<?php
$cities = array("New South Wales"=>"Sydney", "Victoria"=>"Melbourne",
"South Australia"=>"Adelaide", "Queensland"=>"Brisbane", "West Australia"=>"Perth");

foreach($cities as $x =>$value) {
    echo "The capital of $x is $value";
    echo "\n";
}
?>
```

```
The capital of  New South Wales  is Sydney
The capital of  Victoria  is Melbourne
The capital of  South Australia  is Adelaide
The capital of  Queensland  is Brisbane
The capital of  West Australia  is Perth
```

Determining if a Value or a Key Exists

- The **`in_array()`** function returns ***true*** if a given value exists in an array
- The **`array_search()`** function determines whether a given value exists in an array and returns the ***index*** or ***key*** of the first matching element if the value exists, or returns ***false*** if the value does not exist

```
if (in_array("Neurology", $hospitalDepts))
   echo "<p>The hospital has a Neurology department.</p>";
```

- The **`array_key_exists()`** function determines whether a given index or key exists
  - The first parameter represents the key to search for
  - The second parameter represents the name of the array in which to search

Example - Determining if a Key Exists

```
$gamePieces["Dancer"] = "Daryl";
$gamePieces["Fat Man"] = "Dennis";
$gamePieces["Assassin"] = "Jennifer";
if (array_key_exists("Fat Man", $gamePieces)) {
      echo "<p>{$gamePieces["Fat Man"]} is already
              'Fat Man'.</p>";
} else {
      $gamePieces["Fat Man"] = "Don";
      echo "<p>{$gamePieces["Fat Man"]} is now
              'Fat Man'.</p>";
}
```

Returning a Portion of an Array

- The **`array_slice()`** function returns a portion of an array and assigns it to another array

new_array = array_slice(*array_name, starting element, elements_to_return*);

```
$topGolfers = array("Tiger Woods", "Vijay Singh", "Ernie
Els", "Phil Mickelson", "Retief Goosen", "Padraig
Harrington", "David Toms", "Sergio Garcia", "Adam Scott",
"Stewart Cink");
$TopFiveGolfers = array_slice($TopGolfers, 1, 3);
echo "<p>The three selected golfers are:</p><p>";
for ($i = 0; $i < count($topFiveGolfers); $i++) {
   echo "{$topFiveGolfers[$i]}<br />";
}
echo "</p>";
```

// output: **Vijay Singh, Ernie Els, Phil Mickelson** in three lines

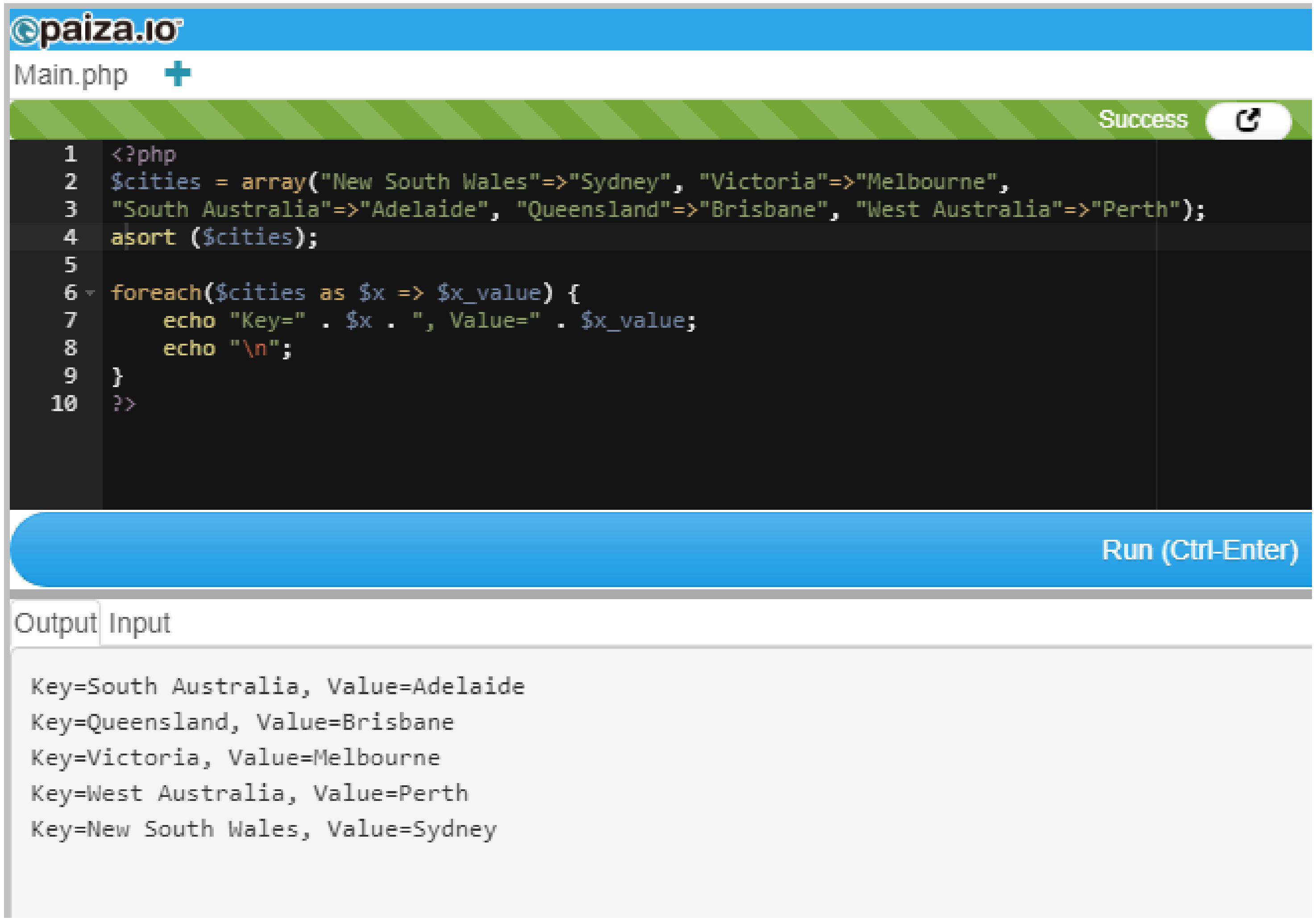
Sorting Arrays

The most commonly used array sorting functions are:

- **`sort()`** and **`rsort()`** for *indexed arrays*
  - ☐ `sort()` sorts an indexed array in ascending order by value and renumbers the indexes
  - ☐ `rsort()` performs a reverse sort
-
- **`asort()`** and **`arsort()`** for *associative arrays*
  - ☐ `sort()` sorts an associative array in ascending order by value
  - ☐ `rsort()` performs a reverse sort
- **`ksort()`** and **`krsort()`** for *associative arrays by key*

Example - asort

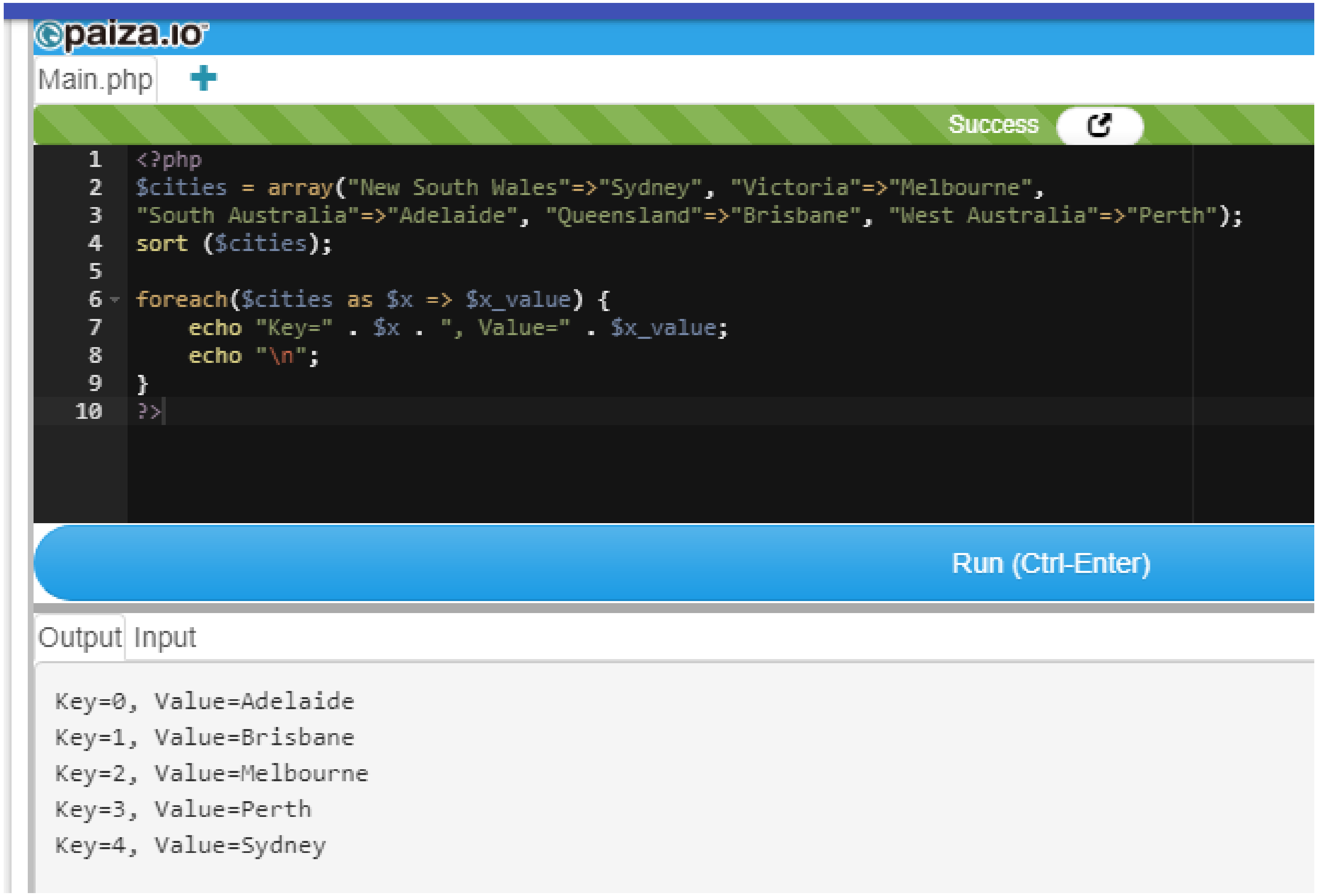
PHP Code Editor:



```php
<?php
$cities = array("New South Wales"=>"Sydney", "Victoria"=>"Melbourne",
"South Australia"=>"Adelaide", "Queensland"=>"Brisbane", "West Australia"=>"Perth");
asort ($cities);

foreach($cities as $x => $x_value) {
    echo "Key=" . $x . ", Value=" . $x_value;
    echo "\n";
}
?>
```

```
Key=South Australia, Value=Adelaide
Key=Queensland, Value=Brisbane
Key=Victoria, Value=Melbourne
Key=West Australia, Value=Perth
Key=New South Wales, Value=Sydney
```

Example - sort

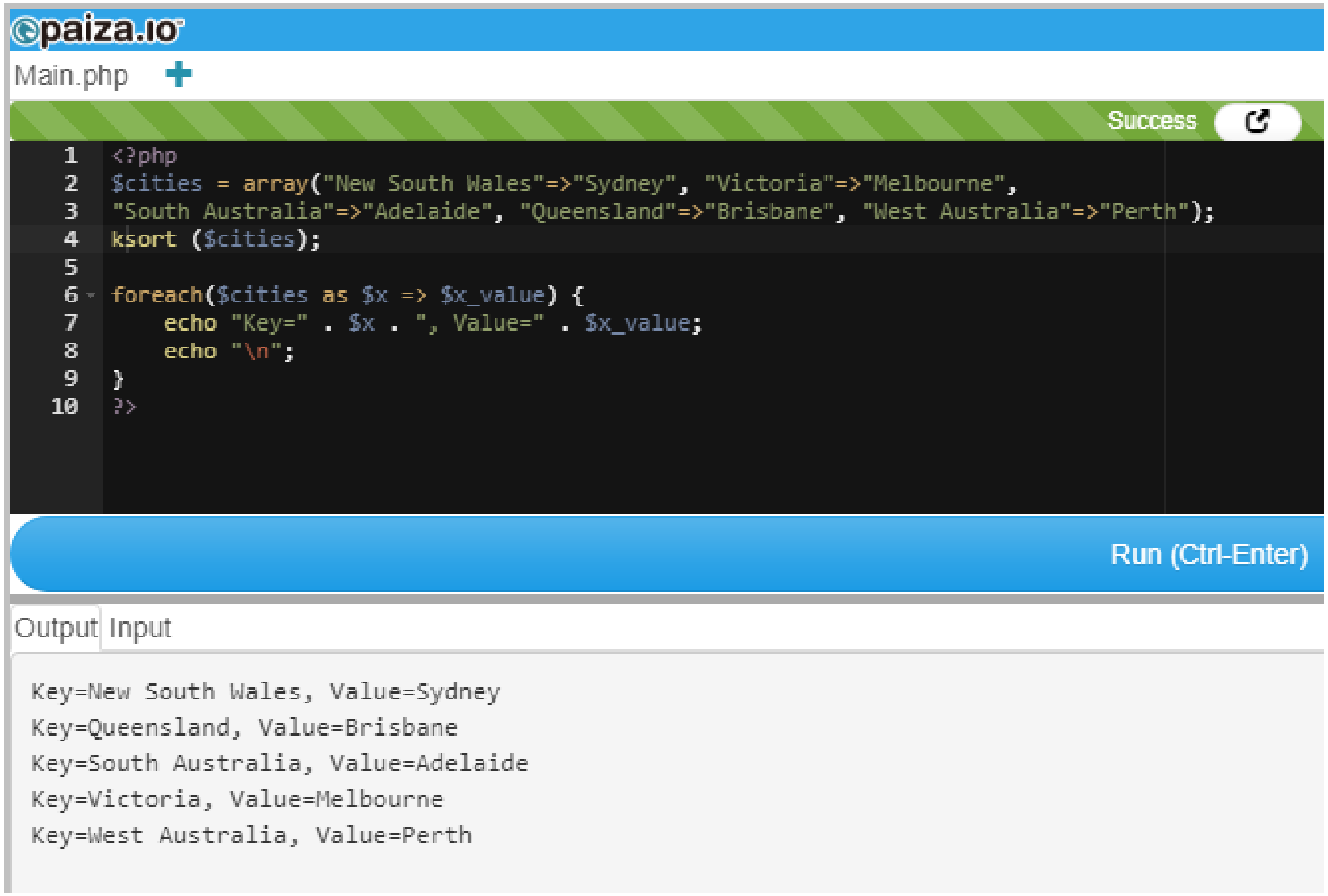


```php
<?php
$cities = array("New South Wales"=>"Sydney", "Victoria"=>"Melbourne",
"South Australia"=>"Adelaide", "Queensland"=>"Brisbane", "West Australia"=>"Perth");
sort ($cities);

foreach($cities as $x => $x_value) {
    echo "Key=" . $x . ", Value=" . $x_value;
    echo "\n";
}
?>
```

```
Key=0, Value=Adelaide
Key=1, Value=Brisbane
Key=2, Value=Melbourne
Key=3, Value=Perth
Key=4, Value=Sydney
```

Example -ksort

PHP Code Editor:



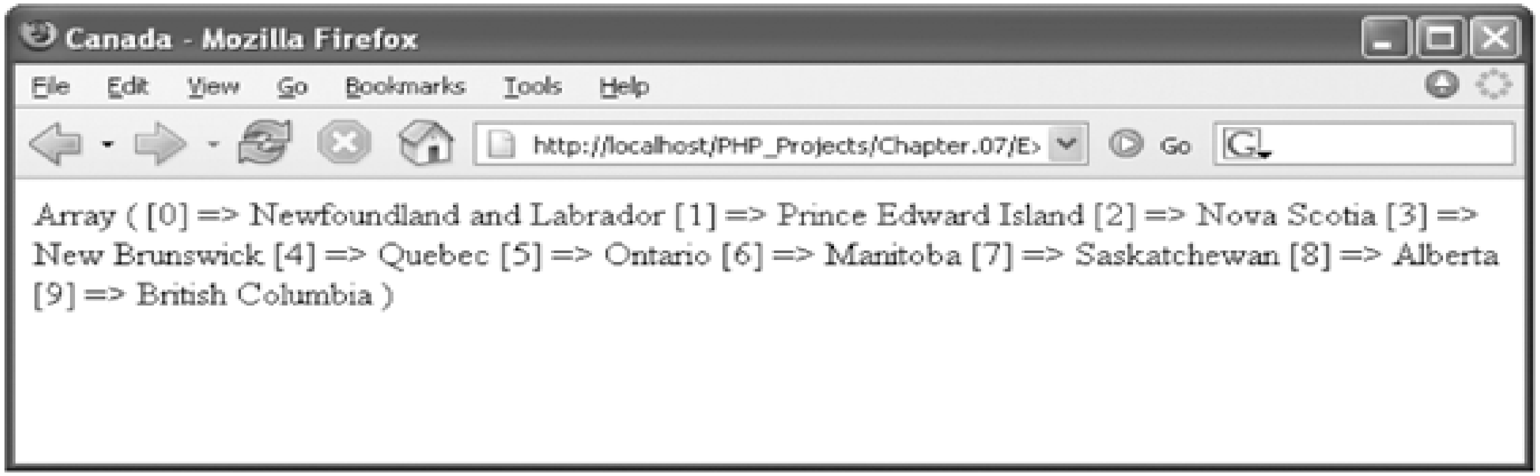
```php
<?php
$cities = array("New South Wales"=>"Sydney", "Victoria"=>"Melbourne",
"South Australia"=>"Adelaide", "Queensland"=>"Brisbane", "West Australia"=>"Perth");
ksort ($cities);

foreach($cities as $x => $x_value) {
    echo "Key=" . $x . ", Value=" . $x_value;
    echo "\n";
}
?>
```

```
Key=New South Wales, Value=Sydney
Key=Queensland, Value=Brisbane
Key=South Australia, Value=Adelaide
Key=Victoria, Value=Melbourne
Key=West Australia, Value=Perth
```

Combining Arrays

- To append one array to another, use the addition (+) or the compound assignment operator (+=). Only array elements with unique keys are appended. Duplicated indexes/keys are ignored

```
$provinces = array("Newfoundland and Labrador",
   "Prince Edward Island", "Nova Scotia", "New Brunswick",
   "Quebec", "Ontario", "Manitoba", "Saskatchewan", "Alberta",
   "British Columbia");
$territories = array("Nunavut", "Northwest Territories",
   "Yukon Territory");
$canada = $provinces + $territories;
print_r($canada); // territories ignored due to duplicate indexes
```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```
Array ( [0] => Newfoundland and Labrador [1] => Prince Edward Island [2] => Nova Scotia [3] =>
New Brunswick [4] => Quebec [5] => Ontario [6] => Manitoba [7] => Saskatchewan [8] => Alberta
[9] => British Columbia )
```

Combining Arrays (continued)

- + and += works best on associative arrays, especially if the arrays involved do not have any common keys.
- For example

```
$arr1 = array ("one"=>"apple", "two"=>"banana");
$arr2 = array ("three"=>"cherry", "four"=>"grapes");
$arr3 = $arr1 + $arr2;
print_r($arr3);
```

Output

```
Array ( [one] => apple [two] => banana [three] => cherry
 [four] => grapes )
```

Combining Arrays - Examples

- To merge two or more arrays use the **`array_merge()`** function. Duplicated associative keys **overwrite**, elements of numeric keys are appended.

```
new_array = array_merge($array1, $array2, $array3, ...);
```

Example, given

```
$arr1 = array ("one"=>"apple", "two"=>"banana");
$arr2 = array ("three"=>"cherry", "two"=>"grapes");
```

// Duplicate keys ignored

```
$arr3 = $arr1 + $arr2;
print_r($arr3);
```

Output: Array ([one] => apple [two] => banana [three] => cherry)

// Duplicate keys overwritten

```
$arr4 = array_merge($arr1, $arr2);
print_r($arr3);
```

Output: Array ([one] => apple [two] => grapes [three] => cherry)

Combining Arrays (continued)

- array_merge works best with arrays having numeric keys
- For example

```
$provinces = array("Newfoundland and Labrador",
   "Prince Edward Island", "Nova Scotia", "New Brunswick",
   "Quebec", "Ontario", "Manitoba", "Saskatchewan", "Alberta",
   "British Columbia");

$territories = array("Nunavut", "Northwest Territories",
   "Yukon Territory");

$canada = array_merge ($provinces, $territories);

print_r($canada);  //territories appended
```

Output:

```
Array ( [0] => Newfoundland and Labrador [1] => Prince Edward Island [2] => Nova
Scotia [3] => New Brunswick [4] => Quebec [5] => Ontario [6] => Manitoba [7] =>
Saskatchewan [8] => Alberta [9] => British Columbia [10] => Nunavut [11] =>
Northwest Territories [12] => Yukon Territory )
```

Comparing Arrays

- The **`array_diff()`** function returns an array of elements that exist in one array but not in any other arrays to which it is compared

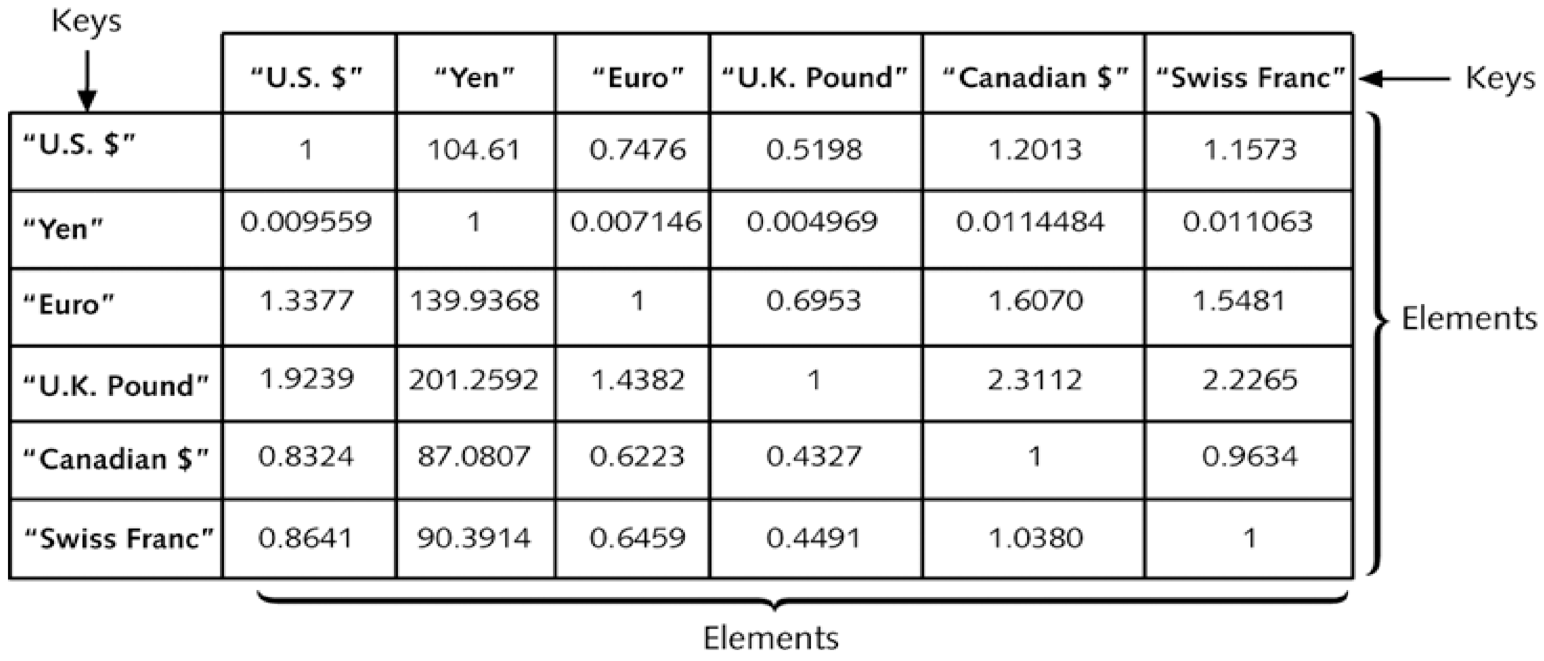
```
new_array = array_diff($array1, $array2, $array3, ...);
```

- The **`array_intersect()`** function returns an array of elements that exist in all of the arrays that are compared

```
new_array = array_intersect($array1, $array2, $array3,
...);
```

Multi-dimensional Indexed Arrays

- A **multi-dimensional array** consists of multiple indexes or keys
- A ***two-dimensional*** array has two sets of indexes or keys


Keys
Keys
Elements
Elements

	"U.S. $"	"Yen"	"Euro"	"U.K. Pound"	"Canadian $"	"Swiss Franc"
"U.S. $"	1	104.61	0.7476	0.5198	1.2013	1.1573
"Yen"	0.009559	1	0.007146	0.004969	0.0114484	0.011063
"Euro"	1.3377	139.9368	1	0.6953	1.6070	1.5481
"U.K. Pound"	1.9239	201.2592	1.4382	1	2.3112	2.2265
"Canadian $"	0.8324	87.0807	0.6223	0.4327	1	0.9634
"Swiss Franc"	0.8641	90.3914	0.6459	0.4491	1.0380	1

Elements and keys in the `$exchangeRates[row][col]` array

Creating Two-Dimensional Indexed Arrays

```
$usDollars = array(1, 104.61, 0.7476, 0.5198, 1.2013, 1.1573);
$yen = array(0.009559, 1, 0.007146, 0.004969, 0.011484, 0.011063);
$euro = array(1.3377, 139.9368, 1, 0.6953, 1.6070, 1.5481);
$ukPound = array(1.9239, 201.2592, 1.4382, 1, 2.3112, 2.2265);
$canadianDollar = array(0.8324, 87.0807, 0.6223, 0.4327, 1, 0.9634);
$swissFranc = array(0.8641, 90.3914, 0.6459, 0.4491, 1.0380, 1);
$exchangeRates = array($usDollars, $yen, $euro, $ukPound,
   $canadianDollar, $swissFranc);
```

```
$exchangeRates = array(
    array(1, 104.61, 0.7476, 0.5198, 1.2013, 1.1573),  // U.S. $
    array(0.009559, 1, 0.007146, 0.004969, 0.011484, 0.011063), // Yen
    array(1.3377, 139.9368, 1, 0.6953, 1.6070, 1.5481), // Euro
    array(1.9239, 201.2592, 1.4382, 1, 2.3112, 2.2265), // U.K. Pound
    array(0.8324, 87.0807, 0.6223, 0.4327, 1, 0.9634), // Canadian $
    array(0.8641, 90.3914, 0.6459, 0.4491, 1.0380, 1)  // Swiss Franc
);
```

A 2D index array

What is the final value of $num[2][2]?

```
$num = array(
array (3, 4, 6, 7), array (5, 6, 3, 3),
array (9, 2, 3, 1), array (7, 6, 8, 5));
```

Answer: ____________________

Handling Form Submissions

- Form data is submitted in `name=value` pairs, based on the `name` and `value` attributes of each element

```
<form action="processOrder.php" method="get" > ...
<input type="text" name="book_title" value="technical" />
<input type="text" name= "number_of_copies" value= "1" />
 ...
</form>
```

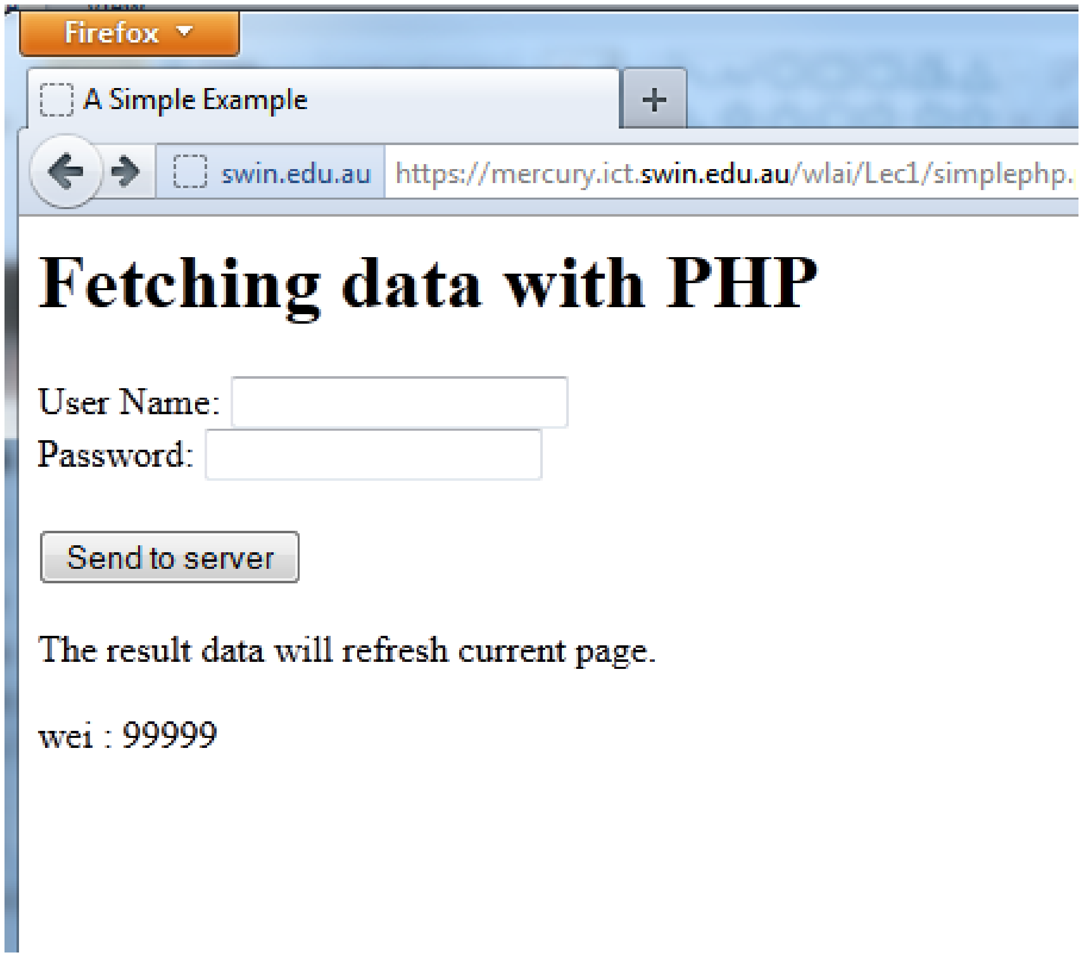
- A **query string** is a set of `name=value` pairs appended to a target URL. Each `name=value` pair is separated with ampersands (`&`)

```
books_title=technical&number_of_copies=1
```

- A question mark (`?`) and a query string are automatically appended to the URL of a server-side script for any forms that are submitted with the `get` method

```
processOrder.php?books_title=technical&number_of_copies=1
```

Handling Form Submissions (3 slides from Lecture 1)



https://mercury.ict.swin.edu.au/wlai/Lec1/simplephp.

Fetching data with PHP

User Name:

Password:

Send to server

The result data will refresh current page.

wei : 99999

User Interface

```
<!– file simplephp.php  -->
<HTML XMLns="http://www.w3.org/1999/xHTML">
  <head>
    <title>A Simple Example</title>
  </head>
  <body>
    <H1>Fetching data with PHP &nbsp;</H1>
    <form method=“get">
      <label>User Name:  <input type="text" name="namefield"> </label>
      <label><br>Password: <input type="text" name="pwdfield"> <br><br></label>
      <input name="submit" value = “Send to server">
    </form>
    <p> The result data will refresh current page.</p>
  </body>
```

Embedded PHP

```
  <?php
     // get name and password passed from client
     if(isset($_GET['namefield']) && isset($_GET['pwdfield']))
     {
        $name = $_GET['namefield'];
        $pwd = $_GET['pwdfield'];
        // sleep for 5 seconds to slow server response down
        sleep(5);
        // write back the password concatenated to end of the name
        ECHO ($name." : ".$pwd);
     }
  ?>
</HTML>
```

In PHP, a dot represents string concatenation. So this concatenates the name, with a colon, with the password

PHP Autoglobals (slide from Lecture 2)

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

Associative Array

Determining if Form Variables Contain Values

- Use the `isset()` function to determine whether a variable has been declared and initialised (or "set")
- Use the `empty()` function to determine whether a variable is empty
- Use the `is_numeric()` function to test whether a variable contains a numeric string

```
if (isset($_GET['height']) && isset($_GET['weight'])) {
    if (is_numeric($_GET['weight']) &&
       is_numeric($_GET['height'])) {
          $BodyMass = $_GET['weight'] / ($_GET['height']
                    * $_GET['height']) * 703;
          printf("<p>Your body mass index is %d.</p>", $BodyMass);
     }
     else echo "<p>You must enter numeric values!</p>";
}
```

Note: Use `$_POST` when `method=post` is used instead of `get` for `form` submission.

Using `mail()` Function

- The syntax for the `mail()` function is:

  mail(*recipient(s)*, *subject*, *message*[, additional_headers])

- The `mail()` function returns a value of true if a message was delivered successfully or false if it was not

```
$to = "cchua@swin.edu.au";
$subject = "This is the subject";
$message = "This is the message.";
$headers = "From: Caslon Chua <cchua@swin.edu.au>";
mail($to, $subject, $message, $headers);
```

Content of this Lecture

- Working with arrays
- Associative and multidimensional arrays
- Handling form submissions and processing
- **Manipulating, parsing and comparing strings**
- **Managing files and directories**
- **Working with files: open, close, write, read**

Constructing Text Strings

- A text string contains zero or more characters surrounded by double or single quotation marks
- Text strings can be used as literal values or assigned to a variable

```
echo "<p>Dr. Livingstone, I presume?</p>";
$explorer = "Henry M. Stanley";
echo $explorer;
```

- To include a quoted string within a literal string surrounded by double (single) quotation marks, you surround the quoted string with single (double) quotation marks

```
$explorerQuote = '<p>"Dr. Livingstone, I presume?"</p>';
$explorerQuote = "<p>'Dr. Livingstone, I presume?'</p>";
```

Combining Strings

- **Concatenation operator .**

```
$destination = "Paris";
$location = "France";
$destination = "<p>" . $destination . " is in
  France.</p>";
echo $destination;
```

- **Concatenation assignment operator .=**

```
$destination = "<p>Paris";
$destination .= " is in France.</p>";
echo $destination;
```

Adding Escape Characters and Sequences

- An escape character tells the compiler or interpreter that the character that follows it has a special purpose
- In PHP, the escape character is the backslash \

```
echo '<p>Marilyn Monroe\'s real name was Norma Jean
Baker.</p>'; // output >>> Marilyn Monroe's real name was Norma Jean Baker.
```

```
echo "<p>\"Dr. Livingstone, I presume?\" asked Henry M.
Stanley.</p>"; // output >>> "Dr. Livingstone, I presume?" asked Henry M. Stanley.
```

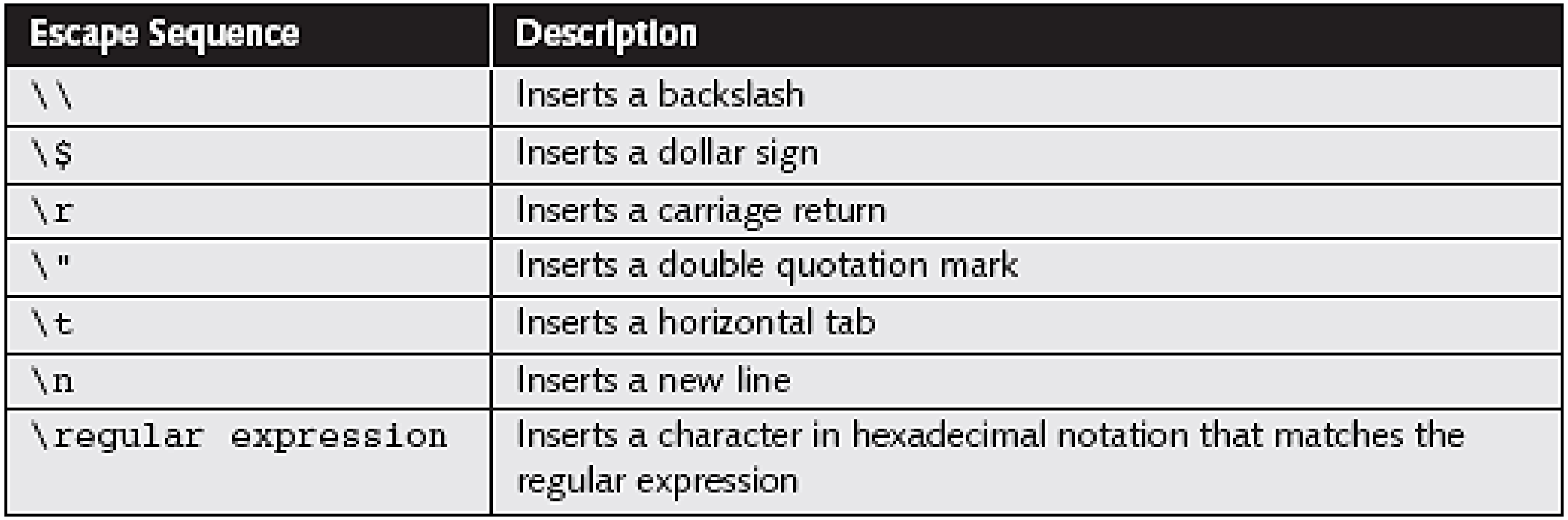
- Do not add a backslash before an apostrophe if you surround the text string with double quotation marks

```
echo "<p>Marilyn Monroe's real name was Norma Jean
Baker.</p>"; // output >>> Marilyn Monroe's real name was Norma Jean Baker.
```

Adding Escape Characters and Sequences

- The escape character combined with one or more other characters is called an escape sequence

Table of PHP escape sequences within double quotation marks



Escape Sequence	Description
`\\`	Inserts a backslash
`\$`	Inserts a dollar sign
`\r`	Inserts a carriage return
`\"`	Inserts a double quotation mark
`\t`	Inserts a horizontal tab
`\n`	Inserts a new line
`\regular expression`	Inserts a character in hexadecimal notation that matches the regular expression

Simple and Complex String Syntax

- **Simple string syntax** uses the value of a variable within a string by including the variable name inside a text string with double quotation marks

```
$vegetable = "broccoli";
echo "<p>Do you have any $vegetable?</p>";
```

How about: `echo "<p>Do you have any $vegetables?</p>";`

```
   //causes an error, variable not declared.
```

- When variables are placed within curly braces inside of a string, it is called **complex string syntax**

```
$vegetable = "carrot";
echo "<p>Do you have any {$vegetable}s?</p>";

   //output is: Do you have any carrots?
```

Comparing Strings using Comparison Operators

```
$loc01 = "Miami";
$loc02 = "Havana";
if ($loc01 == $loc02) echo "<p>Same location.</p>";
else echo "<p>Different location.</p>";
```

```
$firstLetter = "A";
$secondLetter = "B";
if ($secondLetter > $firstLetter)
  echo "<p>The second letter is higher in the
       alphabet than the first letter.</p>";
else
  echo "<p>The second letter is lower in the
       alphabet than The first letter.</p>";
```

ASCII American Standard Code for Information Interchange

- Numeric representations of English characters
- ASCII values range from 0 to 255
- Lowercase letters are represented by the values 97 (“a”) to 122 (“z”)
- Uppercase letters are represented by the values 65 (“A”) to 90 (“Z”)
- Since lowercase letters have higher values than uppercase letters, they are evaluated as being “greater” than the uppercase letters

Note: UTF-8 is a strict superset of ASCII with the same physical encoding for ASCII characters

String Comparison Functions

- The `strcasecmp(string1, string2)` function performs a case-insensitive comparison of two strings
- The `strcmp(string1, string2)` function performs a case-sensitive comparison of two strings
- Most string comparison functions compare strings based on their ASCII values: returns <0 (if smaller); =0 (if same); >0 (if larger)

e.g.

```
echo strcmp("Hello world!","Hello world!");
```

Parsing Strings

- The `strlen()` function returns the total number of characters in a string

```
echo strlen(' ab cd '); // 7
```

- The `str_word_count()` function returns the number of words inside a string

```
$title = "The Cask of Amontillado";
echo "<p>" . str_word_count($title) . " words in
total.</p>";
```

- The `strpos()` function performs a case-sensitive search and if found, returns the position of the first occurrence of one string (the 2nd parameter) in another string (the 1st parameter); otherwise, returns `false`

```
$email = "president@whitehouse.gov";
echo strpos($email, ‘@’); // 9
echo strpos($email, ‘p’); // 0 for the 1st character
```

Finding Substrings

- The `strchr()` function searches the first occurrence of a string (the 2nd parameter) inside another string (the 1st parameter), and returns the rest of the string (from the matching point), or `false`, if the string to search for is not found

```
echo strchr("Hello world!!!","world"); // world!!!
```

- The `str`**`r`**`chr()` function searches from the end of a string
- The `substr()` function returns a substring from a string (the 1st parameter). The starting position is specified by the 2nd parameter and the length is specified by the optional 3rd parameter.

```
$email = "president@whitehouse.gov";
$nameEnd = strpos($email, "@");
echo substr($email, 0, $nameEnd); // president
echo substr($email, $nameEnd+1); // whitehouse.gov
```

Replacing Substrings

- The `str_replace()` / `str_ireplace()` functions perform case-sensitive / case-insensitive replacement of all occurrences of a substring (the 1st parameter) by a replacement substring (the 2nd parameter) in a string (the 3rd parameter)

```
$email = "john@swin.edu.au";
echo str_replace("john", "mary", $email);// mary@swin.edu.au
```

- The substr_replace(*string, replacement_string, start_position[, length]*) function perform replacement of a substring starting from the specified start position (and the optional length)

Dividing Strings into Smaller Pieces

- The `strtok()` function breaks a string into smaller strings, called **tokens** one by one

```
$variable = strtok(string, separators);
```

- After the first call, this function only needs the separators in the subsequent calls as it keeps track of where it is in the current string

```
<?php
$string = "Hello world. Beautiful day today.";
$token = strtok($string, ". ");

while ($token != false)
{
  echo "$token<br />";
  $token = strtok(". ");
}
?>
```

Output:

```
Hello
world
Beautiful
day
today
```

Converting Between Strings and Arrays

- The `str_split()` function splits each character (or each set of fixed number of characters) in a string into an array element

```
$array = str_split(string[, length]);
```

- The `explode()` function splits a string into an indexed array at a specified separator

```
$array = explode(separator, string);
```

- Note: the 1st parameter is separator, where the characters in the separator are treated as a substring, not individual characters.

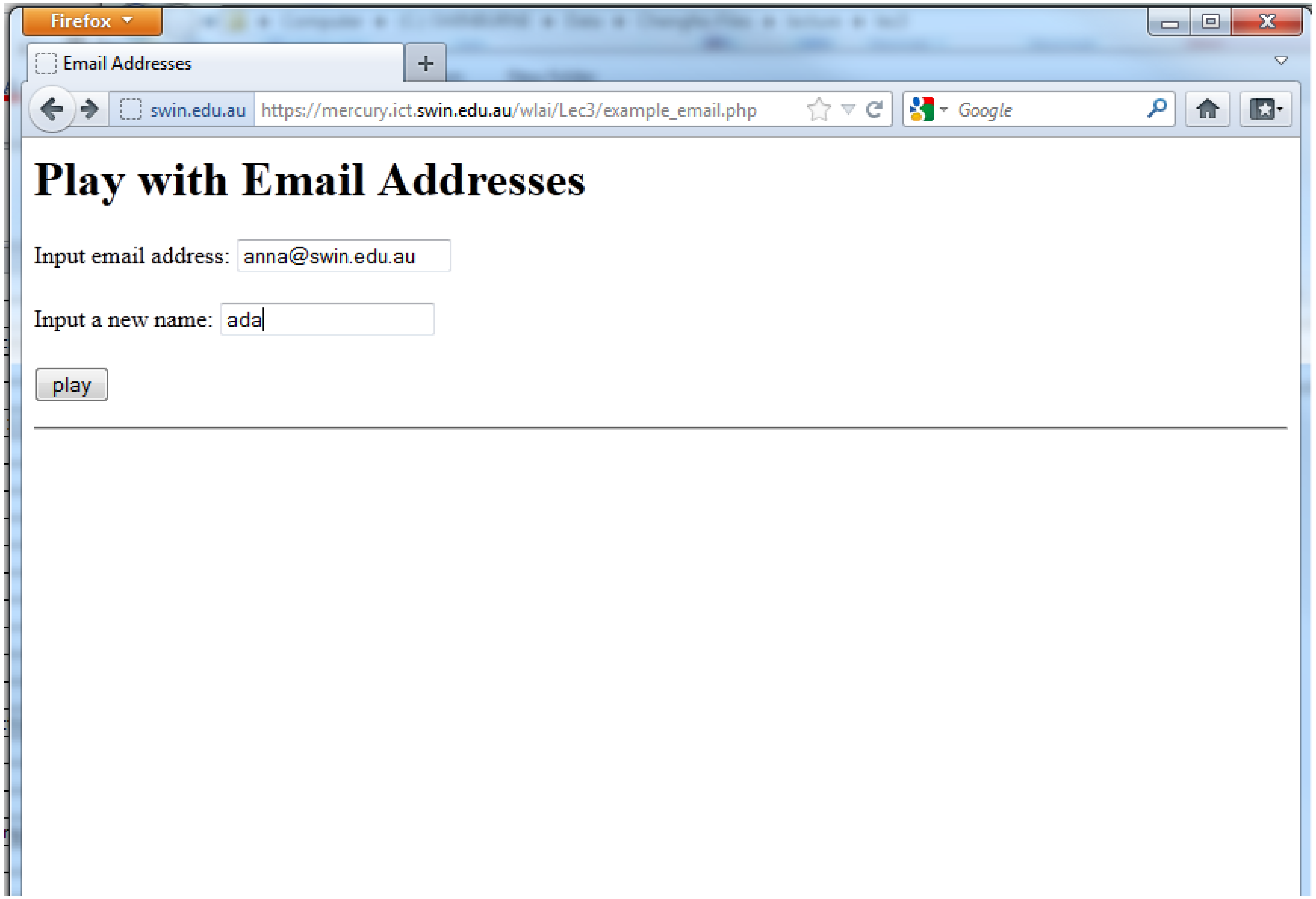
```
$string = "Hello world. Beautiful day today.";
$sentence = explode(". ", $string);
```

Output:

```
Hello world
Beautiful day today.
```

- The `implode()` function combines an array's elements into a single string, separated by specified characters

Examples – Play with Email Addresses



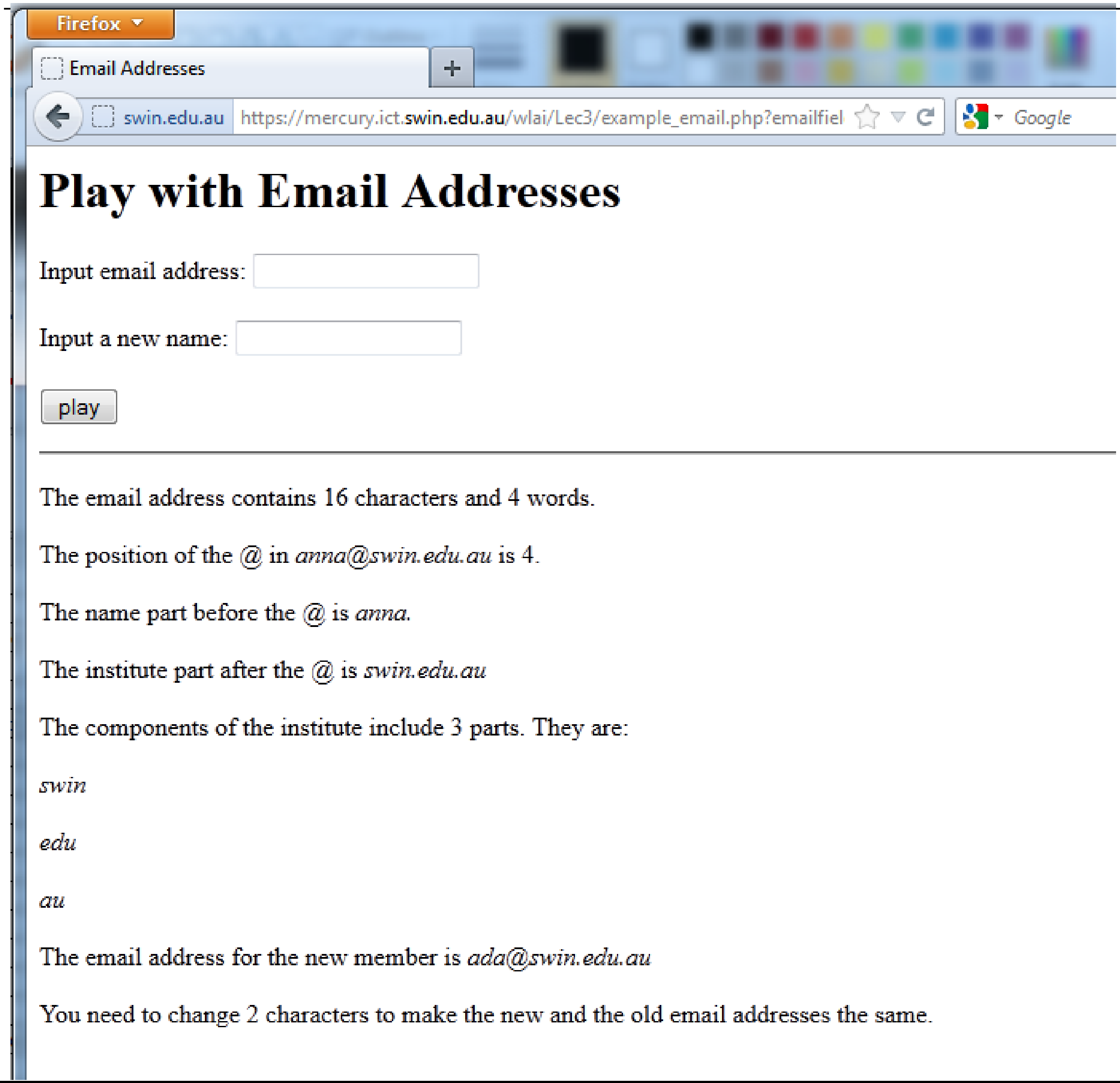
Play with Email Addresses

Input email address: anna@swin.edu.au

Input a new name: ada

play

Examples – Some String Operations


Firefox
Email Addresses
swin.edu.au
https://mercury.ict.swin.edu.au/wlai/Lec3/example_email.php?emailfiel
Google

Play with Email Addresses

Input email address:

Input a new name:

play

The email address contains 16 characters and 4 words.

The position of the @ in *anna@swin.edu.au* is 4.

The name part before the @ is *anna*.

The institute part after the @ is *swin.edu.au*

The components of the institute include 3 parts. They are:

swin

edu

au

The email address for the new member is *ada@swin.edu.au*

You need to change 2 characters to make the new and the old email addresses the same.

How to Implement These Operations

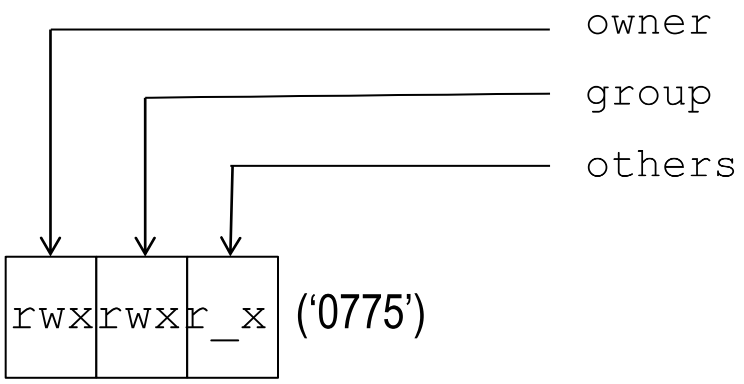
```
<?php
  if(isset($_GET['emailfield']) && isset($_GET['namefield'])) {
      $email = $_GET['emailfield'];
      echo "<p> The email contains " . strlen($email) . " chars and " . str_word_count($email) . " words.</p>";
      $newName = $_GET['namefield'];
      $nameEnd = strpos($email, "@");
      echo "<p> The position of the @ in <em>$email</em> is $nameEnd.</p>";
      $name = substr($email, 0, $nameEnd);
      echo "<p> The name part before the @ is <em>$name.</em></p>";
      $institute = substr($email, $nameEnd+1);
      echo "<p> The institute part after the @ is <em>$institute</em></p>";
      $instSegment = explode(".", $institute);
      $cnt = count($instSegment);
      echo "<p> The components of the institute include $cnt parts. They are:</p>";
      for ($i=0; $i<$cnt; $i++)  echo "<p><em>" . $instSegment[$i] . "</em></p>";
      echo "<p> Email for the new member is <em>". str_replace($name, $newName, $email). "</em></p>";
      echo "You need to change " . levenshtein($name, $newName) . " characters to make the new and the old
email addresses the same.</p>";
  }
?>
```

More String Functions

- http://www.w3schools.com/php/php_ref_string.asp
- http://php.net/manual/en/ref.strings.php

Windows & Unix/Linux File and Directory

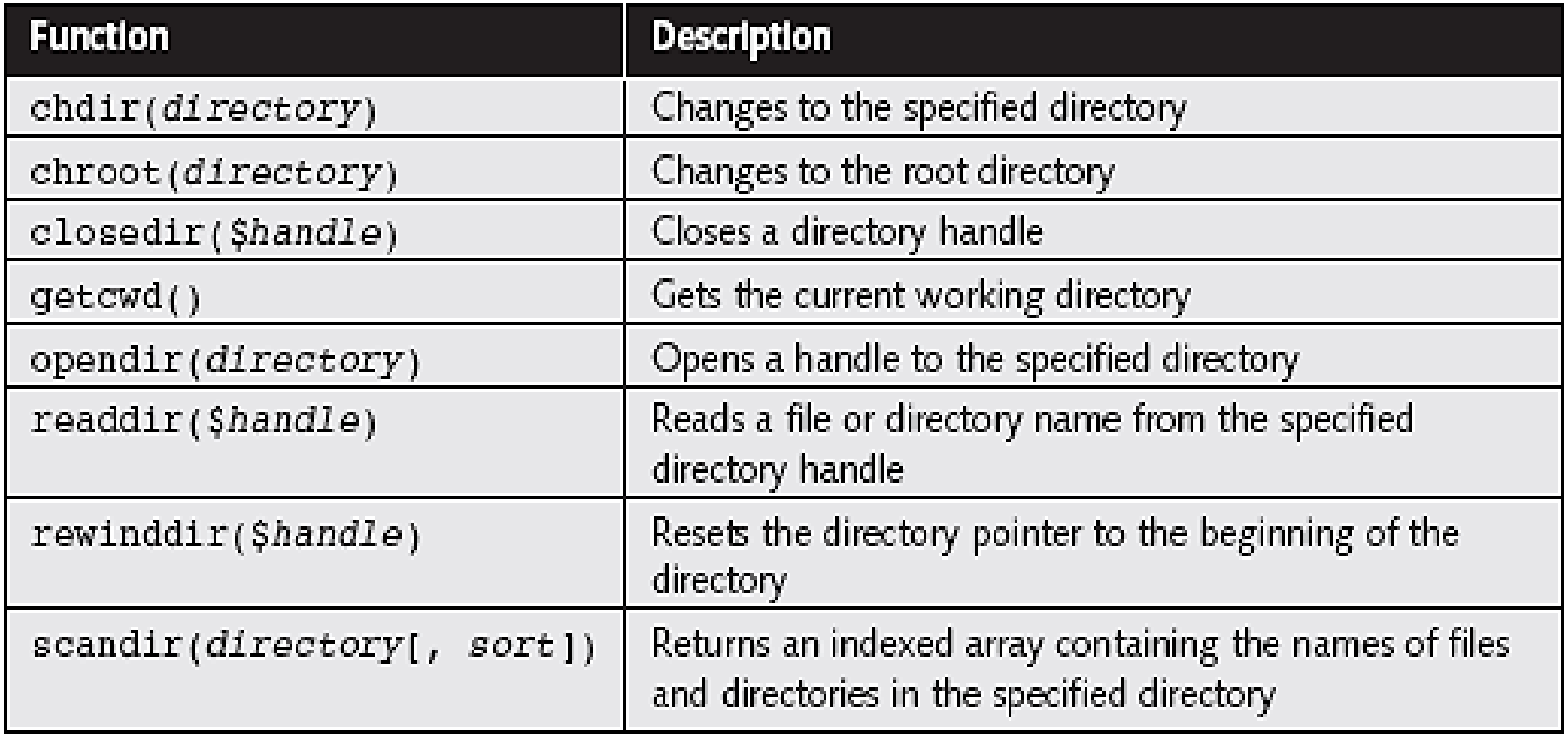
- File is used to store data permanently for retrieval later
  - May use different end of line ‘\r’ ‘\n’ characters
- Directory (in Unix/Linux), also referred to as a folder (in Windows) is a virtual container within an electronic file system
- Path delimiting character
  - Windows uses ‘\’, e.g. ‘hit3323\assign1’
  - Unix/Linux uses ‘/’, e.g. ‘hit3323/assign1’
- Unix/Linux has access permissions for directories/files, e.g.



(‘0775’)

PHP Directory Functions

PHP directory functions



Function	Description
chdir(*directory*)	Changes to the specified directory
chroot(*directory*)	Changes to the root directory
closedir(*$handle*)	Closes a directory handle
getcwd()	Gets the current working directory
opendir(*directory*)	Opens a handle to the specified directory
readdir(*$handle*)	Reads a file or directory name from the specified directory handle
rewinddir(*$handle*)	Resets the directory pointer to the beginning of the directory
scandir(*directory*[, *sort*])	Returns an indexed array containing the names of files and directories in the specified directory

Reading Directories

- Open a handle to the directory with the **`opendir()`** function
- To iterate through the entries in a directory, use the **`readdir()`** function to return the file and directory names from the open directory
- Use the **`closedir()`** function to close a directory handle

```
$dir = "../data";
$dirOpen = opendir($dir);
while ($curFile = readdir($dirOpen)) {
    echo $curFile , "<br />";
}
closedir($dirOpen);
```

- Use the **`scandir()`** function to returns an indexed array containing the names of files and directories in the specified directory

```
$dir = "../data";
$dirEntries = scandir($dir);
foreach ($dirEntries as $entry) {
            echo $entry , "<br />";
}
```

Creating Directories

- The **`mkdir()`** function creates a new directory. It returns true on success, or false on failure.

  ```
  mkdir(path, mode[, recursive, context]);
  ```

- On mercury, suppose the current directory is username/COS30020/www/htdoc. We create

  ```
  mkdir("Lec2", 0777);
  ```

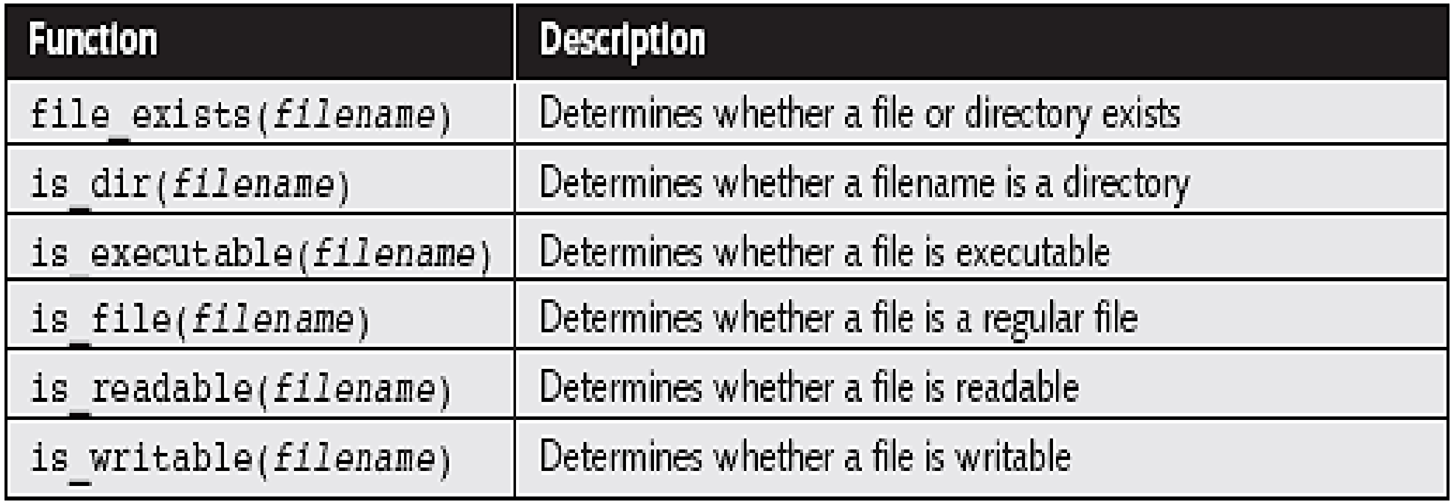
  ```
  mkdir("../data", 02770);
  ```

Note: we need to change mode of username/cos80021/www/data

```
…/www> chmod 02770 data
```

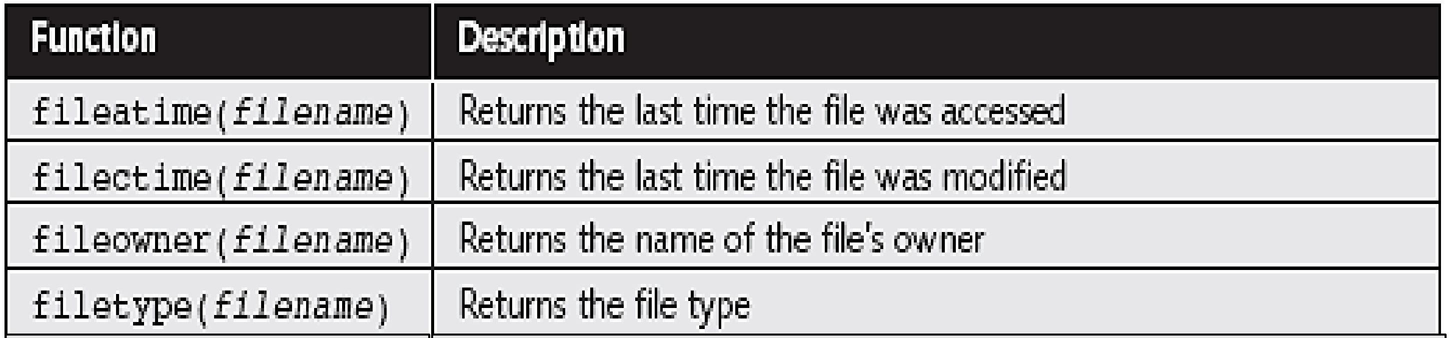
Obtaining File and Directory Information

PHP file and directory status functions



Function	Description
file_exists(*filename*)	Determines whether a file or directory exists
is_dir(*filename*)	Determines whether a filename is a directory
is_executable(*filename*)	Determines whether a file is executable
is_file(*filename*)	Determines whether a file is a regular file
is_readable(*filename*)	Determines whether a file is readable
is_writable(*filename*)	Determines whether a file is writable

Common file and directory information functions



Function	Description
fileatime(*filename*)	Returns the last time the file was accessed
filectime(*filename*)	Returns the last time the file was modified
fileowner(*filename*)	Returns the name of the file's owner
filetype(*filename*)	Returns the file type
filesize(*filename*)	Returns the size of the file in bytes

Copying, Renaming and Removing

- Use the **`copy()`** function to copy a file with PHP, it returns true if successful or false if not

```
copy(source, destination)
```

- Use the **`rename()`** function to rename a file or directory with PHP, it returns true if successful or false if not

```
rename(old_name, new_name)
```

- Use the **`unlink()`** function to delete a file and the **`rmdir()`** function to delete a directory, they return true if successful or false if not
- Use the **`file_exists()`** function to determine whether a file or directory name exists before you attempt to copy/rename/delete it

Opening and Closing a File

- A **stream** is a channel used for accessing a resource that you can read from and write to
- The **input stream** *reads* data from a resource (such as a file)
- The **output stream** *writes* data to a resource
- Usually a three stage process:
  1. Open the file stream with the `fopen()` function
  2. Write data to or read data from the file stream
  3. Close the file stream with the `fclose()` function

Opening and Closing a File

- A **handle** is a special type of variable that PHP uses to represent a resource such as a file
- The **`fopen()`** function opens a handle to a file stream

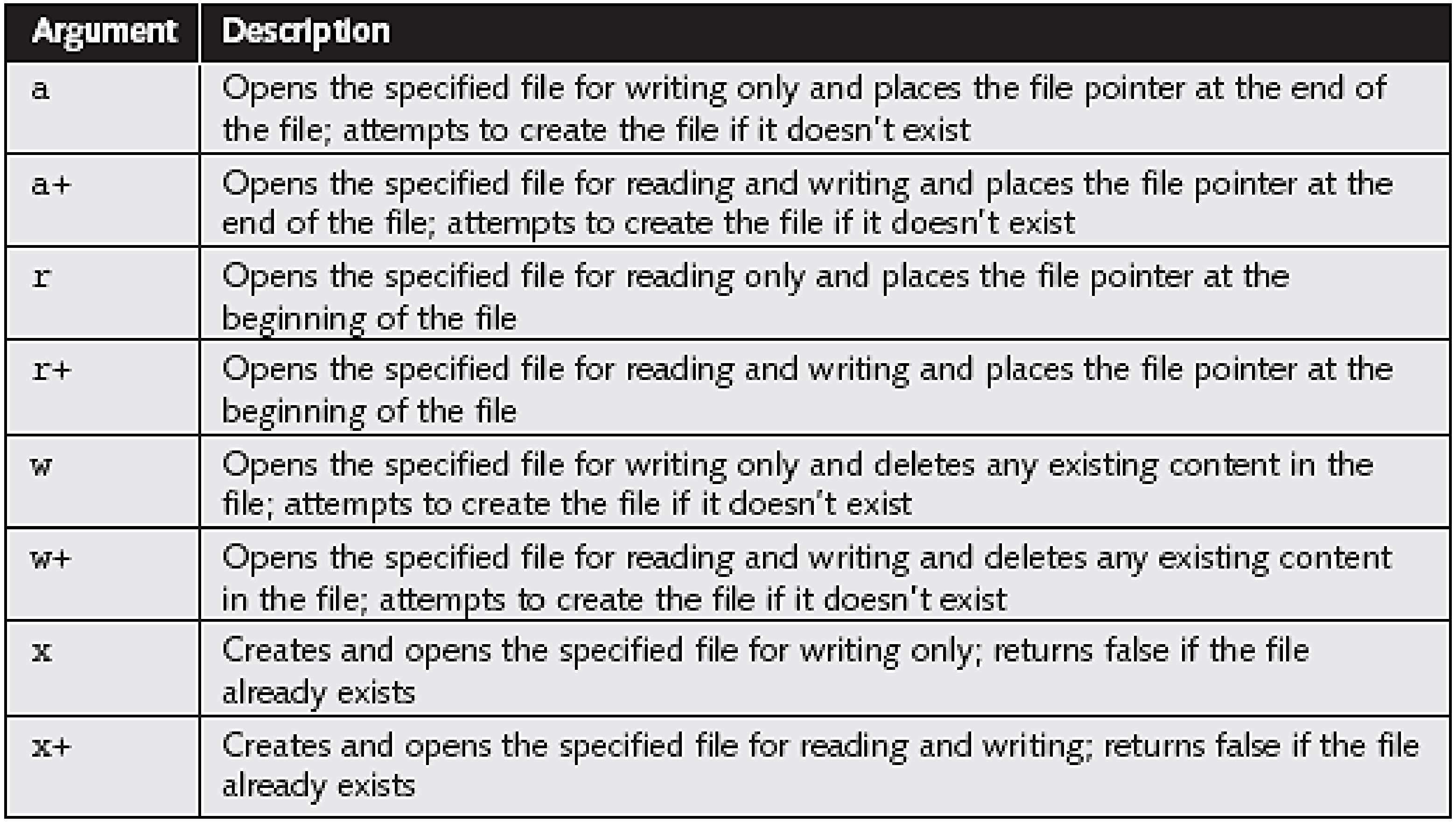
```
$open_file = fopen("text file", "mode");
```

- A **file pointer** is a special type of variable that refers to the currently selected line or character in a file
- Use the **`fclose()`** function when finished working with a file stream to save space in memory

```
$bowlersFile = fopen("bowlers.txt", "a");
$newBowler = "Doe, John\n";
fwrite($bowlersFile, $newBowler);
fclose($bowlersFile);
```

Mode of `fopen()`

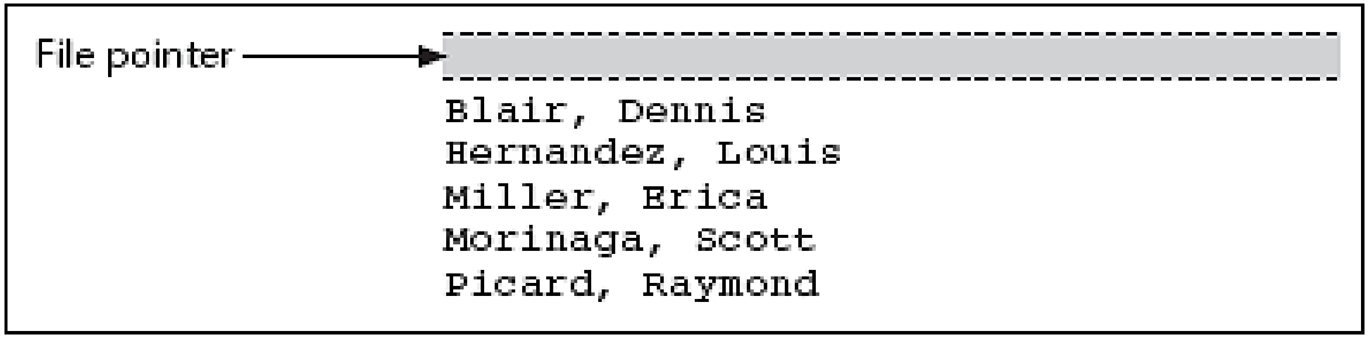
Mode parameter of the `fopen()` function



Argument	Description
`a`	Opens the specified file for writing only and places the file pointer at the end of the file; attempts to create the file if it doesn't exist
`a+`	Opens the specified file for reading and writing and places the file pointer at the end of the file; attempts to create the file if it doesn't exist
`r`	Opens the specified file for reading only and places the file pointer at the beginning of the file
`r+`	Opens the specified file for reading and writing and places the file pointer at the beginning of the file
`w`	Opens the specified file for writing only and deletes any existing content in the file; attempts to create the file if it doesn't exist
`w+`	Opens the specified file for reading and writing and deletes any existing content in the file; attempts to create the file if it doesn't exist
`x`	Creates and opens the specified file for writing only; returns false if the file already exists
`x+`	Creates and opens the specified file for reading and writing; returns false if the file already exists

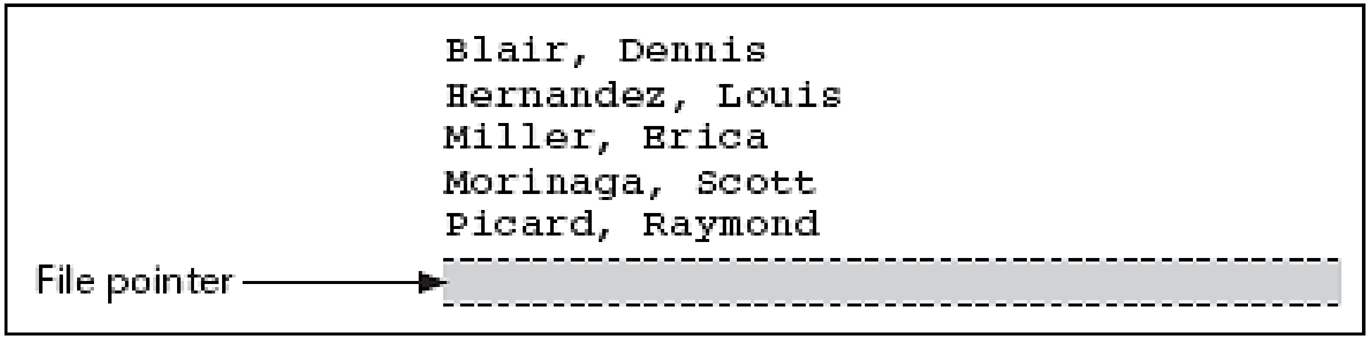
File Pointer

```
$bowlersFile = fopen("bowlers.txt", "r+");
```



Location of the file pointer when the `fopen()` function uses *mode* "r+"

```
$bowlersFile = fopen("bowlers.txt", “a+");
```



Location of the file pointer when the `fopen()` function uses *mode* "a+"

Writing Data to a File

- PHP supports two basic functions for writing data to text files:
  - `file_put_contents()` function *writes an entire file* or *appends* a text string to a file
  - `fwrite()` function *incrementally writes* data to a text file
- Escape sequences used to identify the end of a line:
  - UNIX/Linux platforms use the `\n` carriage return
  - Macintosh platforms use `\r` carriage return *(OS X is Linux based)*
  - Windows uses both the `\n` newline and the `\r` carriage return escape sequence `\n\r`

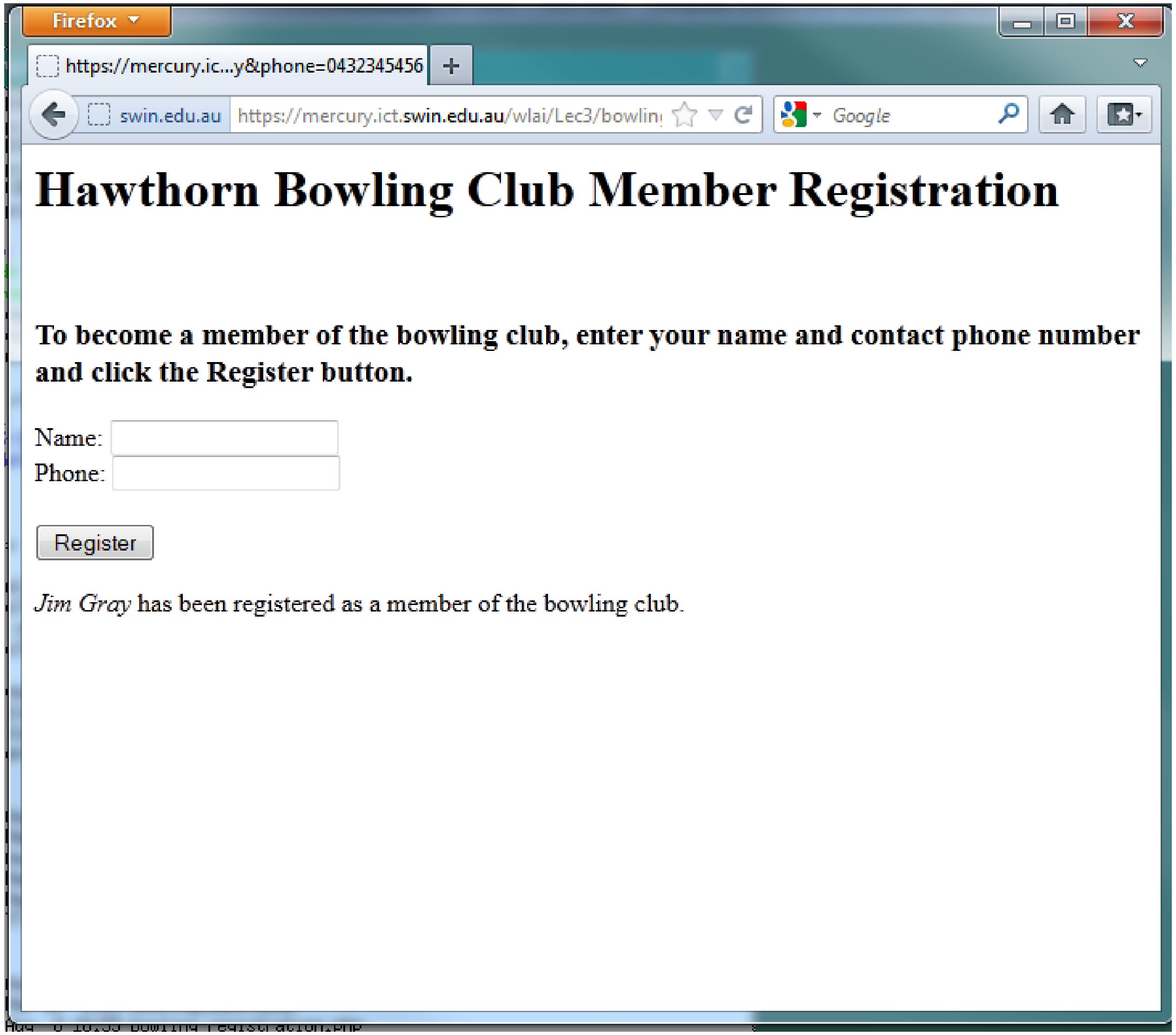
Writing Data Once into a File

- The **`file_put_contents()`** function *writes an entire file* or *appends* a text string to a file

  `file_put_contents(`*`filename`*`, `*`string`*`[, `*`options`*`])`

- Note: no file open/close needed - integrated
- For the 3rd parameter
  - The `FILE_USE_INCLUDE_PATH` constant searches for the specified filename in the path that is assigned to the `include_path` directive in your php.ini configuration file
  - The `FILE_APPEND` constant appends data to any existing contents in the specified filename instead of overwriting it

Example – Bowling Registration


Firefox
https://mercury.ic...y&phone=0432345456
swin.edu.au
https://mercury.ict.swin.edu.au/wlai/Lec3/bowlin
Google

Hawthorn Bowling Club Member Registration

To become a member of the bowling club, enter your name and contact phone number and click the Register button.

Name:
Phone:

Register

Jim Gray has been registered as a member of the bowling club.

https://mercury.swin.edu.au/wlai/Lec3/bowling_registration.php

Recording Member Info

```
<HTML XMLns="http://www.w3.org/1999/xHTML">
<body>
<H1>Hawthorn Bowling Club Member Registration</H1><br/>
<H3>To become a member … … click the Register button.</H3>
<form> Name: <input type="text" name="name"> <br/>
       Phone: <input type="text" name="phone"> <br/><br/>
       <input type="submit" value="Register" /> <br/>
</form>
</body>
<?php
  if(isset($_GET['name']) && isset($_GET['phone'])) {
    $bowlerName = $_GET['name']; $bowlerPhone = $_GET['phone'];
    $bowlerInfo = $bowlerName .", " . $bowlerPhone ."\n";
    $file = "../../data/bowlers.txt";
    if(file_put_contents($file, $bowlerInfo, FILE_APPEND) > 0)
      echo "<p>{$_GET['name']} has been registered as a member
         of the bowling club.</p>";
    else echo "<p>Registration error!</p>";
  }
?>
</HTML>
```

`addslashes()` Function

```
if (isset($_GET['first_name']) && isset($_GET['last_name'])){
  $bowlerFirst = addslashes($_GET['first_name']);
  $bowlerLast = addslashes($_GET['last_name']);
  $newBowler = $bowlerLast . ", " . "$bowlerFirst" . "\n";
  $bowlersFile = "bowlers.txt";
  if (file_put_contents($bowlersFile, $newBowler, FILE_APPEND) > 0)
      echo "<p>{$_GET['first_name']}{$_GET['last_name']}
           has been registered for the bowling tournament!</p>";
  else
      echo "<p>Registration error!</p>";
} else {
  echo "<p>To sign up for the bowling tournament, enter your
      first and last name and click the Register button.</p>";
}
```

Note: ‘mercury’ PHP settings currently use *magic_quotes_gpc* which applies magic quotes, i.e., adds a backslash (\) to a quote in any user-submitted data so do not need addslashes()

`stripslashes()` Function

- To prevent the display of escaped characters, use the `stripslashes()` function

```
if (file_put_contents($BowlersFile, $NewBowler, FILE_APPEND) > 0)
      echo "<p>" . stripslashes($_GET['first_name']) . " "
         . stripslashes($_GET['last_name'])
         . " has been registered for the bowling tournament!</p>";
else
      echo "<p>Registration error!</p>";
```

Writing Data Incrementally

- Use the **`fwrite()`** function to *incrementally write* data to a text file. **`fputs()`** is an alias for **`fwrite()`**

```
fwrite($handle, data[, length]);
```

- The `fwrite()` function returns the number of bytes that were written to the file
- If no data was written to the file, the function returns a value of 0

```
<?php
$file = fopen("test.txt","w");
echo fwrite($file,"Hello World. Testing!");
fclose($file);
?>
```

Output:

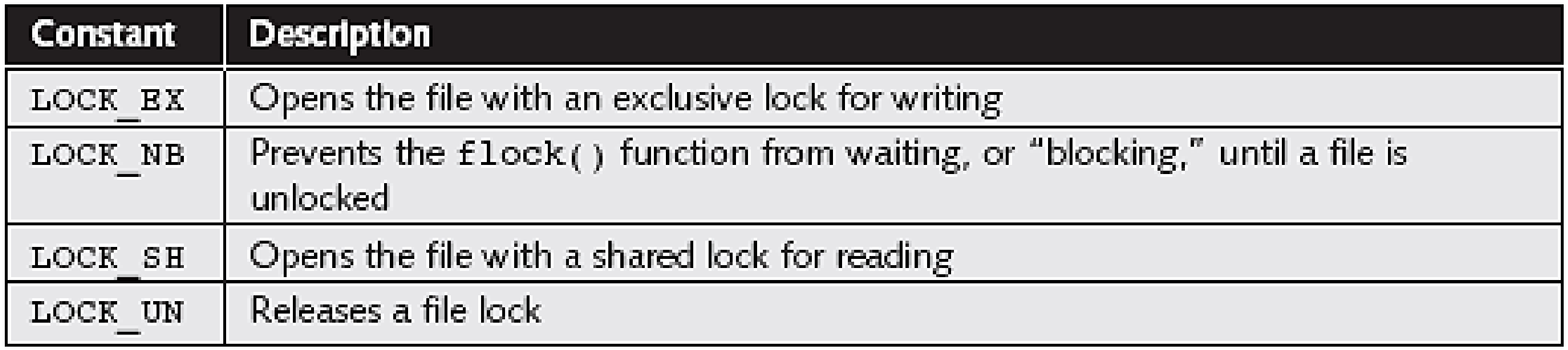
```
21
```

Locking Files

- Use the **`flock()`** function, to prevent multiple users from modifying a file simultaneously

```
flock($handle, operation)
```

Operational constants of the `flock()` function



Constant	Description
`LOCK_EX`	Opens the file with an exclusive lock for writing
`LOCK_NB`	Prevents the `flock()` function from waiting, or "blocking," until a file is unlocked
`LOCK_SH`	Opens the file with a shared lock for reading
`LOCK_UN`	Releases a file lock

Reading an Entire File

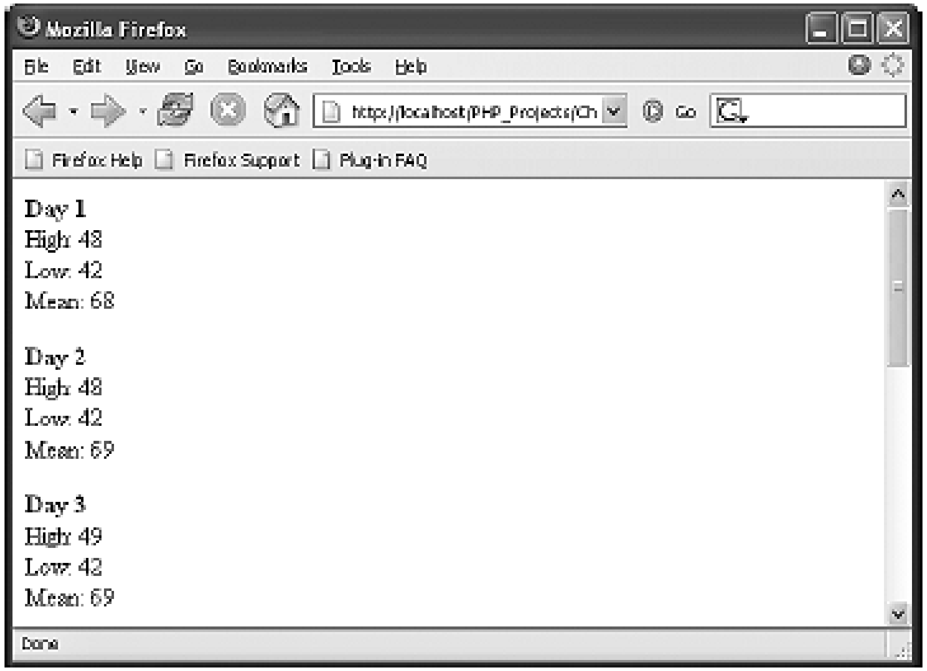
- The `file_get_contents()` function reads the contents of a file into a string, e.g.,

```
$sfWeather = file_get_contents("sfweather.txt");
```

- The `file()` function reads the contents of a file into an ***indexed array***. It automatically recognises whether the lines in a text file end in `\n`, `\r`, or `\r\n`
- The `fread()` function reads the contents of a file into a string up to a maximum number of bytes

Example of `file()` Function

```
$january = "48, 42, 68\n";  $january .= "48, 42, 69\n";
$january .= "49, 42, 69\n"; $january .= "49, 42, 61\n";
$january .= "49, 42, 65\n"; $january .= "49, 42, 62\n";
$january .= "49, 42, 62\n";
file_put_contents("sfjanaverages.txt", $january);
$januaryTemps = file("sfjanaverages.txt");
for ($i=0; $i<count($januaryTemps); $i++) {
  $curDay = explode(", ", $januaryTemps[$i]);
  echo "<p><strong>Day " . ($i + 1)
       . "</strong><br/>";
  echo "High: {$curDay[0]}<br />";
  echo "Low: {$curDay[1]}<br />";
  echo "Mean: {$curDay[2]}</p>";
}
```


Mozilla Firefox
File Edit View Go Bookmarks Tools Help
http://localhost/PHP_Projects/Ch
Go
Firefox Help Firefox Support Plug-in FAQ
Done

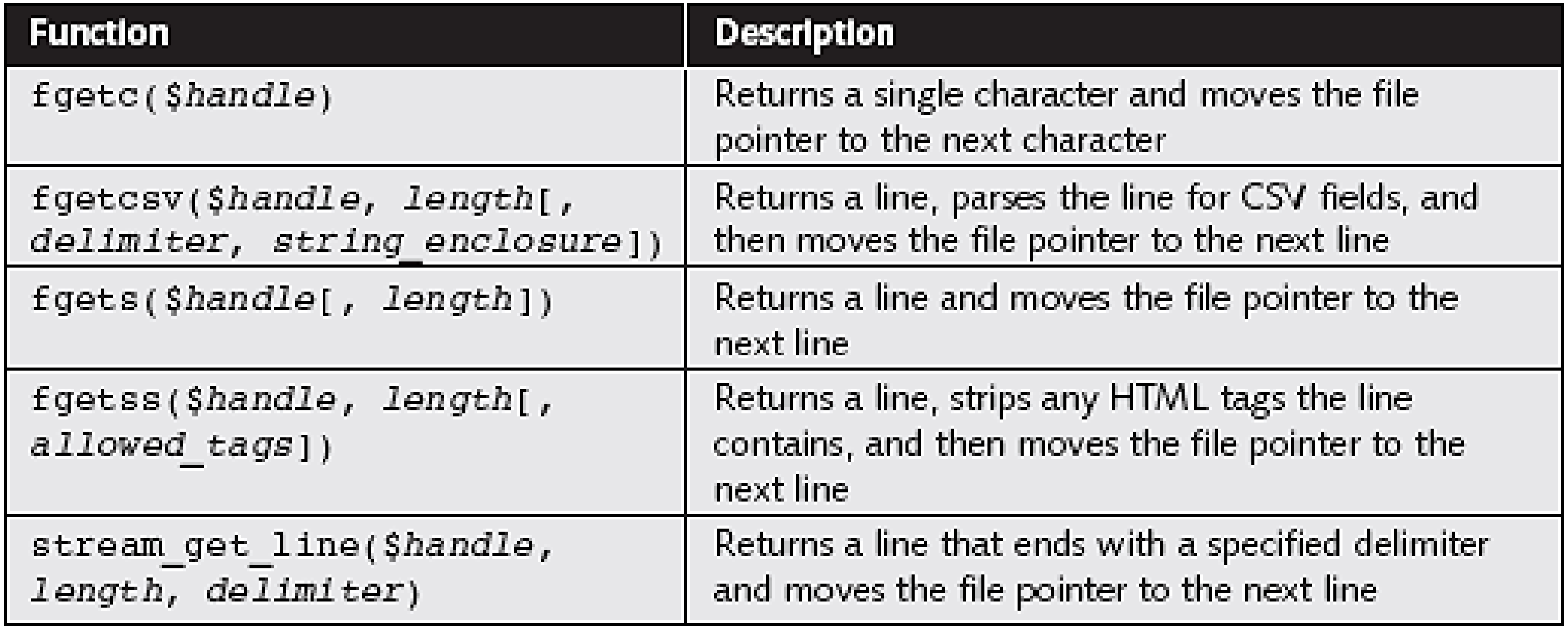
```
Day 1
High: 48
Low: 42
Mean: 68

Day 2
High: 48
Low: 42
Mean: 69

Day 3
High: 49
Low: 42
Mean: 69
```

Reading Data Incrementally

PHP functions that iterate through a text file



Function	Description
`fgetc($handle)`	Returns a single character and moves the file pointer to the next character
`fgetcsv($handle, length[, delimiter, string_enclosure])`	Returns a line, parses the line for CSV fields, and then moves the file pointer to the next line
`fgets($handle[, length])`	Returns a line and moves the file pointer to the next line
`fgetss($handle, length[, allowed_tags])`	Returns a line, strips any HTML tags the line contains, and then moves the file pointer to the next line
`stream_get_line($handle, length, delimiter)`	Returns a line that ends with a specified delimiter and moves the file pointer to the next line

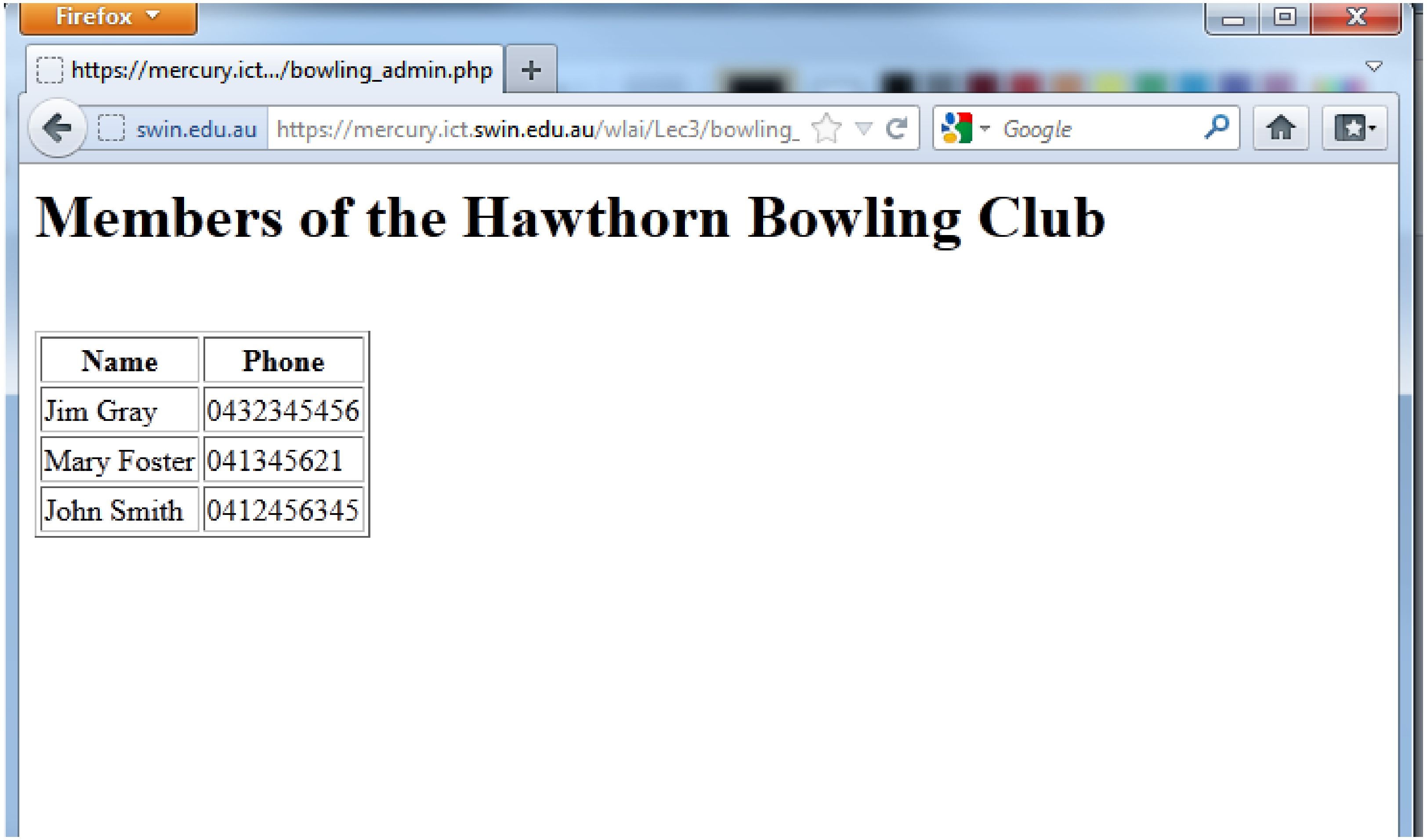
Reading Data Incrementally

- You must use `fopen()` and `fclose()` with the functions listed in the table in the previous slide.
- The commonly used `fgets()` function uses the file pointer to iterate through a text file
- Each time you call any of these functions, the file pointer automatically moves to the next ***line*** in the text file (except for `fgetc()`)
- Each time you call the `fgetc()` function, the file pointer moves to the next ***character*** in the file
- Often combined with the **`feof()`** function

Example - Reading Data Incrementally

```
$handle = fopen("sfjanaverages.txt", "r");
while (! feof($handle) ) {
  $curLine = fgets ($handle);
   $curDay = explode(", ", $curLine);
      echo "<p><strong>Day " . ($i + 1)
               . "</strong><br/>";
      echo "High: {$curDay[0]}<br />";
      echo "Low: {$curDay[1]}<br />";
      echo "Mean: {$curDay[2]}</p>";
}
fclose ($handle);
```

Back to the Bowling Club


Firefox
https://mercury.ict.../bowling_admin.php
swin.edu.au
https://mercury.ict.swin.edu.au/wlai/Lec3/bowling_
Google

Members of the Hawthorn Bowling Club

Name	Phone
Jim Gray	0432345456
Mary Foster	041345621
John Smith	0412456345

Listing all Members

```
<HTML XMLns="http://www.w3.org/1999/xHTML">
<body>
<H1>Members of the Hawthorn Bowling Club</H1>
<br/>
<?php
  $file = "../../data/bowlers.txt";
  if(!file_exists($file))
    echo "No registered member found!";
  else {
    $bowlers=file($file);
    echo "<table border='1'><th>Name</th><th>Phone</th>";
    for($i=0;$i<count($bowlers);$i++) {
      $curBowler = explode(",",$bowlers[$i]);
      echo "<tr><td>".$curBowler[0]."</td>";
      echo "<td>".$curBowler[1]."</td></tr>";
    }
    echo "</table>";
  }
?>
</body>
</HTML>
```