

Introduction to PHP

Part 1

Objectives

- Discuss the origin and use of server-side scripting using PHP
- Explain the syntax and basic constructs of PHP

PHP Origins and Uses

Overview of PHP

PHP is a **server-side** scripting language whose scripts are **embedded in HTML documents**

Similar to JavaScript, but on the server side

The PHP processor has two modes:

- copy (HTML)
- interpret (PHP)

PHP syntax is similar to that of JavaScript

Origins and Uses of PHP

PHP was originally developed by **Rasmus Lerdorf** in 1994

- Developed to allow him to track visitors to his Web site

PHP is an open-source product

PHP was originally an acronym for Personal Home Page, but later it became ***PHP: Hypertext Preprocessor***

PHP is used for **form handling**, file processing, and **database access**

PHP Syntax and Constructs

General Syntactic Characteristics

PHP code can be specified in an HTML document internally or externally:

Internally:

```
<?php
```

```
...
```

```
?>
```

Externally:

```
include ("myScript.inc")
```

A file can have both PHP and HTML

General Syntactic Characteristics

PHP has an extensive library of functions

A list of keywords:

<http://php.net/manual/en/reserved.keywords.php>

Comments - three different kinds (Java and Perl)

// . . .

. . .

/* . . . */

Statements end with *semicolons ;*

Compound statements are formed with *braces { }*

Identifiers

In PHP *identifiers* are used to name variables, functions, constants and classes

General rules:

- Identifiers can include letters, digits and the underscore
- First character must be either a letter or an underscore

Variable names

- Begin with a **dollar sign (\$)**
- **Case-sensitive**

Function names are **not case-sensitive**

Class names are **not case-sensitive**

Primitive types

There are **8 primitive types**:

- Four scalar types
 - **Integer**
 - **Double**
 - **Boolean**
 - **String**
- Two compound types
 - **Array**
 - **object**
- Two special types
 - **resource**
 - **NULL**

Scalar Types

Integer

- 4 bytes
- Can be written in decimal, octal or hexadecimal
- Use `is_int()` to test if a value is an integer

Double

- Can specified using standard notation or floating-point notation
- Use `is_float()` to test if a values is a floating-point number

Strings

String literals use single or double quotes

Single-quoted string literals

- Embedded variables are NOT interpolated
- Embedded escape sequences are NOT recognized

Double-quoted string literals

- Embedded variables ARE interpolated
- If there is a variable name in a double-quoted string but you don't want it interpolated, it must be backslashed
- Embedded escape sequences ARE recognized

Use `is_string()` to test whether a value is a string.

Boolean values

Boolean - values are `true` and `false`

- `case insensitive`

The following values are *false*

- `0`, `0.0` and `""` and `"0"`
- `Null`
- Arrays with zero elements
- Objects with no values or functions

Everything else will evaluate to *true*

Use `is_bool` to test whether a values is a Boolean

Resource and NULL

Resources is anything that is not PHP data

- Holds a handle to the actual data
- Example: database, image

NULL represents that a variable has no value

Variables

Variables in PHP are identifiers prefaced with a \$

There are **no type declarations**

There is **no explicit syntax for declaring variables**

- First time the value of variable is set the variable is declared

Variables may hold any type of data

- No compile-time or run-time checking
- Loosely typed

An unassigned (unbound) variable has the value, **NULL**

Variables (cont.)

The `unset` function sets a variable to `NULL`

The `isset` function is used to determine whether a variable is `NULL`

PHP has many *predefined variables*, including the **environment variables** of the host operating system

You can get a list of the predefined variables by calling `phpinfo()` in a script

Variables (cont.)

Variable variables

- You can reference the value of variable whose name is stored in another variable
- Use **\$\$**

Variable references

- Allow you to have two variables pointing to the same data
- Use **&** to create a reference

Constants

Constants are set using the *define statement*

Example:

```
define('NAME', "John");  
define ('PI', 3.1415);
```

Once set cannot be changed

Output

Output from a PHP script is HTML that is sent to the browser

HTML is sent to the browser through **standard output**

We will use `echo` for basic output (book uses `print`)

- **Echo is more efficient**

Example:

```
echo "This is too <br /> much fun <br />";  
echo 72;
```

Output (cont.)

For formatted output use `printf`

Works like in C++

```
printf(literal_string, param1, param2, ...)
```

Output (cont.)

PHP code is placed in the body of an HTML document

```
<html>
  <head><title> Trivial php example </title>
  </head>
  <body>
    <?php
      echo "Welcome to my Web site!";
    ?>
  </body>
</html>
```

EXAMPLE: today.php

Arithmetic Operators and Expressions

Usual operators: +, -, *, /, %

PHP operators and operator precedence:

<http://php.net/manual/en/language.operators.php>

Arithmetic functions:

`floor, ceil, round, abs, min, max, rand, etc.`

String operators and functions

The only operator is period (.), for *concatenation*

Indexing - `$str{3}` is the fourth character

String Functions

- `strlen`, `strcmp`, `strpos`, `substr`, as in C
- `chop` - remove whitespace from the right end
- `trim` - remove whitespace from both ends
- `ltrim` - remove whitespace from the left end
- `strtolower`, `strtoupper`

Automatic type conversion

PHP will **automatically convert one type of variable to another** whenever possible

Implicit conversion rules:

- Float and integer
 - integer is converted to a floating-point number
- Integer and string
 - String is converted to a number

Explicit conversions

Even though PHP is loosely typed there are occasions when it's useful to **cast a value** as a specific type.

- Casting operator is type inside parenthesis
Ex: `(int)$total`
- Or can use functions
`intval($total)` or
`settype($total, "integer")`

The **type of a variable** can be determined with

- `gettype` or `is_type`
- `gettype($total)` - it may return "unknown"
- `is_integer($total)` - a predicate function

Relational operators

Relational operators compare numbers numerically and strings lexicographically

- If string is entirely numeric, a numeric comparison is made
- Otherwise a *lexicographic comparison* is made

Equality vs. identical

- **Equality** (==) compares if two values are equal
- **Identical** (===) compares if two values are the same type and are equal

Not-equal vs. Not identical

- **Not-equal** (!= or <>)
- **Not identical** (!==)

Logical operators

And: `&&`, `and`

Or: `||`, `or`

Exclusive or: `xor`

Not: `!`

Selection Statements

`if, if-else, elseif`

`switch` – like C++

The switch expression type must be **integer, double, or string**

Iteration

`while` - just like C

`do-while` - just like C

`for` - just like C

`foreach` - discussed later with arrays

Iteration (cont.)

Can use `break` - in any `for`, `foreach`, `while`, `do-while`, or `switch`

Can use `continue` - in any loop

EXAMPLE: `powers.php`

Output revisited

HTML can be intermingled with PHP script, e.g.:

```
<?php
```

```
$a = 7;
```

```
$b = 7;
```

```
if ($a == $b) {
```

```
    $a = 3 * $a;
```

```
?>
```

```
<br /> At this point, $a and $b are equal <br />
```

```
So, we change $a to three times $a
```

```
<?php
```

```
}
```

```
?>
```

Summary

- PHP is a server-side scripting language whose scripts are embedded in HTML
- Has two modes: copy and interpret
- The syntax is similar to C/C++ or JavaScript
- Scripts are included by `<?php ... ?>`
- Variables start with dollar sign (\$)
- There are no explicit type declarations

PHP Arrays and Functions

Objectives

- Discuss how PHP arrays are implemented and used
- Explain the use and implementation of PHP functions

PHP Arrays

PHP Arrays

PHP arrays are implemented differently than in most other programming languages

A **PHP array** is really a mapping of keys to values, where the keys can be numbers (to get a traditional array) or strings (to get a hash)

Example: mapping from student name to G.P.A.

"John" → 3.86

"Mary" → 2.75

"Alice" → 3.05

PHP Arrays

Two types:

- ***Indexed arrays***
 - Zero-subscripted
- ***Associative arrays***
 - **Keys are strings**
 - Like a two column table where the first column is the key and the second column is the value
 - All PHP arrays are stored internally as associative arrays

PHP arrays have an **internal order**, usually the order the elements were inserted

Storing data in arrays

Can use simple assignment to **initialize an array**

- **Indexed array**

```
$addresses[0]="Lewis University";  
$addresses[1]="Computer Science";  
$addresses[2]=3.85;
```

- **Associative array**

```
$addresses['univ']="Lewis University";  
$addresses['major']="Computer Science";  
$addresses['gpa']=3.85;
```

Note: storing a value in an array will create the array if it didn't already exist

(but trying to retrieve a value from an array that hasn't been defined won't create the array)

Storing data in arrays

Can also use the **array()** construct, which takes one or more **key => value** pairs as parameters and returns an array of them

- The **keys** are non-negative integer literals or string literals
- The **values** can be anything
- Example:

```
$list = array(0 => "apples",  
             1 => "oranges", 2 => "grapes")
```

If a **key is omitted** and there **have been integer keys**, the **default key** will be the **largest current key + 1**

- Example:

```
$days=array(1=> "Monday", "Tuesday",  
            "Wednesday", "Thursday", "Friday", "Saturday")
```

Storing data in arrays

If a **key is omitted** and there have been **no integer keys**, **0 is the default key**

If a key appears that **has already appeared**, the **new value will overwrite the old one**

To construct an **empty array**, pass no arguments to `array()`, e.g.: `$addresses = array();`

Storing data in Arrays

Arrays can have **mixed kinds of elements**, e.g.:

```
$list = array("make" => "Cessna",  
              "model" => "C210",  
              "year" => 1960,  
              3 => "sold");
```

```
$list = array(1, 3, 5, 7, 9);
```

```
$list = array(5, 3 => 7, 5 => 10,  
              "month" => "May");
```

```
$colors = array('red', 'blue', 'green',  
                'yellow');
```

Adding values to the end of an array

Empty square-brackets ([]) can be used to insert values to the end of the existing array

Example:

```
$animals[]="dog";  
$animals[]=array("dog", "cat")
```

You cannot use this construct with associative arrays

Accessing Array Elements

Access specific elements by using the **array variable's name** followed by the **key (index) enclosed in square brackets**

Examples:

```
$age["Fred"];  
$age[2];  
$list[4] = 7;  
$list["day"] = "Tuesday";  
$list[] = 17;
```

Note 1: If an element with the specified key does not exist, it is created

Note 2: If the array does not exist, the array is created

Accessing Array Elements

The **keys or values** can be extracted from an array, e.g.:

```
$highs = array("Mon" => 74, "Tue" => 70,  
               "Wed" => 67, "Thu" => 62,  
               "Fri" => 65);  
  
$days = array_keys($highs);  
$temps = array_values($highs);
```

Can **test whether an element exists** using

`array_key_exists`, e.g.:

```
if (array_key_exists("Wed", $highs)) ...
```

An array can be deleted with `unset`

```
unset($list);  
unset($list[4]); #Deletes index 4 element
```

Some Array Functions

`is_array($list)` returns true if `$list` is an array

`in_array(17, $list)` returns true if 17 is an element of `$list`

`sizeof(an_array)` returns the number of elements

- Also `count()`

`explode(" ", $str)` creates an array with the values of the words from `$str`, split on a space

`implode(" ", $list)` creates a string of the elements from `$list`, separated by a space

Extracting multiple values from an array

To **copy all of an array's values into variables**, use the **list()** function

Example:

```
$person=array("Cosmo", 38, "Jerry");  
list($name, $age, $friend) = $person;
```

If you have more values in the array than in the `list()`, **extra values are ignored**

If you have more values in the `list()` than in the array, **extra values are set to NULL**

Slicing an array

To extract a subset of the array,
use the `array_slice()` function

It returns a new array consisting of a consecutive series of
values from the original array

Arguments

- Array: name of the array being sliced
- Offset: initial element in the slice
- Length: number of values to copy

Example:

```
$simpsons = array("Homer", "Marge", "Bart", "Lisa",  
"Maggie", "Grandpa");  
$simpsons_kids = array_slice($simpsons, 2, 3);
```

`simpsons_kids` now contains ["Bart", "Lisa", "Maggie"]

Traversing arrays

The most common task with arrays is to do something to every element

There are several different ways to traverse arrays in PHP:

- The `foreach` construct
- The `iterator` functions
- Using a `for loop`

foreach

The most common way to loop over elements in array is to use the **foreach** construct

Elements are processed in their internal order

The construct **operates on a copy of the array** so **changes made during iteration are not reflected**

Syntax:

```
foreach($addresses as $addr)
    echo $addr . "<br>";
```

An alternative form gives you access to the current key, e.g.:

```
foreach($addresses as $key => $value)
    echo "$key address is $value <br>";
```

Iterator functions

An alternative way of accessing arrays is using iterators

Every PHP array keeps track of the **current element** that is being accessed

The pointer to this element is called an ***iterator***

PHP has functions to set, move and reset the iterator

Iterator functions

Iterator functions:

- `current()` – Returns the element currently pointed at by the iterator
- `reset()` – Moves the iterator to the first element in the array and returns it
- `next()` – Moves the iterator to the next element in the array and returns it
- `prev()` – Moves the iterator to the previous element and returns it
- `each()` – Returns the key and value of the current element as an array and moves the iterator to the next element in the array
- `key()` – Returns the key of the current element

Iterator functions (cont.)

The **each()** function can be used to loop over the elements of an array

Example:

```
$colors = array("red", "yellow", "green",  
"purple", "blue");  
reset($colors);  
while ($element = each($colors))  
    echo($element['value'] . "<br />");
```

Note: this function does not make a copy of the array when traversing

for loop

If you are working with an indexed array where indexes are consecutive integers beginning at zero you can use a **for** loop

Example:

```
$colors = array("red", "yellow", "green",  
"purple", "blue");  
for($i=0; $i < count($colors); $i++){  
    echo $colors[$i] . "<br>";  
}
```

Searching for values

The **`in_array()`** function returns true or false, depending on whether the first argument is an element in the array (second argument)

PHP indexes the values in arrays so `in_array()` is much faster than looping through the array and checking every value

The **`array_search()`** function takes the same arguments but returns the key of the value instead of true or false

Sorting

PHP provides three ways to sort arrays:

1. Sorting by keys
2. Sorting by values without changing keys
3. Sorting by values and then changing keys

Sorting by values - 1

The following functions sort by values and **reassign the keys starting at 0**:

- `sort()` for ascending order
- `rsort()` for descending order
- `usort` for user-defined order

These functions are **designed to work on indexed arrays**

Example:

```
$list = ('h', 100, 'c', 20, 'a');  
sort($list);  
// Produces ('a', 'c', 'h', 20, 100)
```


Sorting by values - 2

The following functions sort by values but **leave keys alone**:

- `asort()` for ascending order
- `arsort()` for descending order
- `ausort()` for user-defined order

The sorted order can only be accessed by using traversal functions such as `foreach` and `next`

Sorting by keys

The following functions sort **by key**

- `ksort()` for ascending order
- `krsort()` for descending order
- `uksort()` for user-defined order

Example:

```
$list("Fred" => 17, "Mary" => 21,  
      "Bob"  => 49, "Jill"  => 28);  
ksort($list);  
// $list is now ("Bob" => 49,  
// "Fred" => 17, "Jill" => 28, "Mary" => 21)
```

The sorted order can only be accessed by using traversal functions such as `foreach` and `next`

User-defined sorting

Requires that you provide a function that **takes two values** and **returns a value that specifies the order of the two values in the sorted array**

Return values should be

- 1** : if $\text{first} > \text{second}$
- 1** : if $\text{first} < \text{second}$
- 0** : if $\text{first} = \text{second}$

Natural sorting order

PHP's built-in sort functions **correctly sort strings and numbers** but they **don't correctly sort strings that contain numbers**

To sort strings that contain numbers use

- `natsort()`
- `natcasesort()`

Reversing arrays

The **array_reverse()** function reverses the internal order of elements in an array

Numeric keys are renumbered starting at 0, string keys are not changed

Swapping keys and values

The `array_flip()` function returns an array that reverses the order of each original element's key-value pairs

Works best when the original array has unique values

Randomizing order

To traverse the elements in an array in random order, use the **shuffle()** function

All existing keys are replaced with consecutive integers starting at 0

PHP Functions

Functions

A **function** is a named block of code that performs a specific task (possibly given some input parameters)

Functions improve **readability** and **reliability**

- The code only needs to be written a single time

Functions in PHP can either be **predefined** (part of the language) or **user-defined**

Calling a function

Syntax:

`$some_value = function_name(param1, param2, ...)`

Examples

```
$length = strlen("PHP")    //sets $length to 3
```

```
$result = abs(ceil(-9.2))  //sets $result to 9
```

PHP functions

A complete list of functions can be found at:
<http://php.net/quickref.php>

Some interesting functions:

- Math functions
- Date functions
- String functions

Math functions

`abs(number num)`

`ceil(float num)`

`cos(float num)`

`bindec(string binary_number) and decbin(int num)`

`hexdec(string hex_number) and dechex(int num)`

`floor(float num)`

`pow(number base, number exponent)`

`rand(int min, int max)`

`round(float num, int precision)`

`sin(float num)`

`sqrt(float num)`

Date functions

date(string *date_format*, int *timestamp*)

- Check out the online reference for details
<http://php.net/manual/en/function.date.php>
- Example:

```
$time = date("H:I");  
// $time is current time in hours and minutes
```
- Example

```
$today = date("F j, Y");
```

mktime(int *hour*, int *min*, int *second*, int *month*,
int *day*, int *year*, int *is_dst*)

- Everything after hours is optional, but must provide some value
- Example:

```
$pearl = mktime(0, 0, 0, 12, 7, 1941);  
echo "<p>Pearl Harbor was attacked on " .  
    date("m/d/y", $pearl) . "</p>";
```

Date functions (cont.)

strtotime (string *time*, int *now*)

- Now is optional
- Uses American dates
- Returns a timestamp on success, FALSE otherwise
- Examples:

```
strtotime("now");  
strtotime("10 September 2000");  
strtotime("next Thursday");  
strtotime("last Monday");
```

time ()

- Returns the current time

String functions

Length: `strlen(str) ;`

Removing whitespace

- `chop(str)` – remove whitespace from the right end
- `trim(str)` – remove whitespace from both ends
- `ltrim(str)` – remove whitespace from the left end

Changing case

- `strtolower(str)` – converts *str* to lowercase
- `strtoupper(str)` – converts *str* to uppercase
- `ucfirst(str)` – capitalizes the first character of *str*
- `ucwords(str)` – capitalizes the first character of each word in *str*

HTML

htmlentities (*str*)

- Converts all characters with HTML entity equivalents into those equivalents

htmlspecialchars (*str*)

- Converts HTML special characters into entity equivalents

strip_tags (*str*, *tags_to_preserve*)

- Removes HTML tags from a string
- Optional second argument specifies tags to leave in the string
- Example:

```
$input="<strong>The <em>bold</em> tags  
stay<strong>";  
$output = strip_tags($input, "<strong>");
```


Comparing strings

== casts non-string operators to strings
3 and "3" are equal

=== does not cast
3 and "3" are not equal

Other relational operators work

- If comparing numbers and strings, strings are cast to the number 0 unless the string starts with a number
- Example:

```
$str="PHP";  
$num = 8;  
if($str < $num)  
    echo ("{$str} < {$num}");
```

Comparing strings (cont.)

strcmp (*str1*, *str2*)

- returns a number less than 0 if *str1* < *str2*
- returns a number greater than 0 if *str1* > *str2*
- returns 0 if *str1* = *str2*

strcasecmp (*str1*, *str2*)

- works like `strcmp` but converts the strings to lowercase first

Substrings

substr (*str*, *start*, *length*)

- *length* is optional
- otherwise goes from start to end of string

Other substring functions

- `substr_count` - counts the number of substring occurrences
- `substr_replace` - replaces text within a portion of a string

Miscellaneous string functions

strrev(*str*)

- Returns a reversed copy of *str*

str_repeat(*str*, *count*)

- Returns a string that repeats *str* *count* times

str_pad(*str*, *length*, *with*, *pad_type*)

- Returns *str* padded to *length* using *with*
- *with* is optional; the default is space
- *pad_type* is optional and can be STR_PAD_RIGHT, STR_PAD_LEFT or STR_PAD_BOTH

Decomposing a string

explode (*separator, str*)

- Returns an array of strings

implode (*separator, array*)

- Returns a string created from other strings

PHP User-Defined Functions

User-Defined Functions

Syntax:

```
function function_name (formal_parameters) {  
    ...  
}
```

The function names can be any string that starts with a letter or underscore followed by zero or more letters, underscores and digits

General Characteristics of Functions

Functions need **not be defined before they are called**

Function **overloading is not supported**

- If you try to redefine a function, it is an error

Functions can have a **variable number of parameters**

Default parameter values are supported

General Characteristics of Functions

Function **definitions** can be nested

Function names are **NOT** case sensitive

The `return` statement is used to return a value

- If there is no `return`, there is no returned value

Function example

```
function strcat($left, $right){  
    $combined_string = $left . $right;  
    return $combined_string;  
}
```

```
$first= "Today is ";  
$second = "Tuesday";
```

```
echo strcat($first, $second);
```

Variable scope

Variables defined in a functions, including parameters, are **not available outside of the function**

By default, variables defined outside a function are **not available inside a function**

Example:

```
$a= 3;  
function foo() {  
    $a += 2;  
}  
foo();  
echo($a);
```

Global variables

To use a variable in the global scope within a function, use the keyword **global**

Example:

```
$a= 3;  
function foo() {  
    global $a;  
    $a += 2;  
}  
foo();  
echo($a);
```

Lifetime of Variables

Normally, the lifetime of a variable in a function is **from its first appearance to the end of the function's execution**

Can define ***static variables***, that **retain their state between function calls**, e.g.:

```
static $sum = 0;    # $sum is static
```

Parameters

By default, parameters are **passed by value**

To **pass by reference**, precede the parameter name with an ampersand, e.g.:

```
function set_max(&$max, $first, $second) {  
    if ($first >= $second)  
        $max = $first;  
    else  
        $max = $second;  
}
```

Parameters (cont.)

If the caller sends too many actual parameters, the **subprogram ignores the extra ones**

If the caller does not send enough parameters, the **unmatched formal parameters are unbound**

To **specify a default parameter**, assign the parameter value in the function declaration

- The assigned value **must be a constant**
- A function can have any number of parameters with default values
- They must be listed after all parameters that do not have default values

Variable parameters

A function may require a variable number of arguments

To do this leave out the parameter block and then use one of three functions to retrieve the parameters:

```
$array = func_get_args();
```

```
$count = func_num_args();
```

```
$value = func_get_arg(argument_number);
```


Variable parameters (cont.)

Example:

```
function count_list() {  
    if(func_num_args()==0) {  
        return false;  
    } else {  
        $count = 0;  
        for($i=0; $i<func_num_args(); $i++)  
            $count++;  
    }  
    return $count;  
}  
  
echo count_list(1, 3, 5);
```

Return values

PHP can only return a single value with the keyword **return** (return multiple values using an array)

Any type may be returned, including objects and arrays, using `return`

By default, values are copied out of the function

To return a reference precede the function name with `&`

Example:

```
function &foo($n) ...
```

Summary

- PHP arrays are implemented as mapping of keys to values
- Arrays can be indexed by numeric keys or string keys
- Arrays can be traversed using foreach, iterators, or for loops
- There exist many functions for searching and sorting arrays
- PHP supports a range of functions for a variety of tasks, including dealing with dates, strings, HTML code, and others
- Function parameters can be passed and returned by value or by reference

PHP for Server Side Scripting

Part 3

Objectives

- Review the HTTP protocol
- How to access HTTP message data from PHP
- How to access and write files within PHP
- Explain solutions for maintaining state

HTTP Protocol Review

HTTP Protocol Review

When a web browser **requests** a web page, it sends an HTTP request message to a web server.

Message includes:

- **Header information, e.g.:**

```
GET /index.html HTTP/1.1
```

- **Optional header information**

```
User-Agent: Mozilla/5.0 (Windows 2000; U) Opera 6.0 [en]
```

```
Accept: image/gif, image/jpg, text/*, */*
```

- **Optionally a body**

HTTP Protocol Review (cont.)

The web server then **receives** the request, processes it and sends a response

- First line is the status, e.g.:

```
HTTP/1.1 200 OK
```

- Additional headers, e.g.:

```
Date: Sat 22 Jan 2006 20:25:12 GMT
```

```
Server: Apache 1.2.22 (Unix) mod_perl/1.26 PHP/5.0.4
```

```
Content-Type: text/html
```

```
Content-Length: 141
```


HTTP Methods

The two most common **methods** are GET and POST

GET is designed for retrieving information from the server

- A GET **request** encodes gathered information as part of the URL
- Users can bookmark GET requests
- Get requests **can pass a limited amount of data**

POST is meant for posting information to the server

- Actually is used for retrieving information (like GET)
- A POST **request** passes gathered information in the body of the HTML request
- Users cannot bookmark POST requests

A HTTP get Request

method

request



```
GET http://www.google.com/search?q=php HTTP/1.1
```

Sent as part of the URL:

- `Search` is the name of Google's server-side form handler
- `?` Is a query string
 - Name/value pair
 - Multiple search strings are separated by `&`

Post Requests

A POST request is different from a GET request in the following ways:

- There's a **block of data sent with the request**, in the message body.
- There are usually extra headers to describe this message body, like **Content-Type:** and **Content-Length:**
- The *request URI* is not a resource to retrieve; it's usually a script to handle the data you're sending.
- The HTTP response is normally script output, not a static file.

A Post Request

The most common use of POST, by far, is to submit HTML form data to scripts.

Example:



The diagram shows an example of an HTTP POST request. It includes color-coded labels for 'method' (blue), 'request' (orange), and 'protocol' (orange). A blue bracket on the left groups the first four lines as the 'header'. A blue bracket at the bottom groups the last line as the 'data'.

```
method      request      protocol
POST /path/script.cgi HTTP/1.0
From: frog@jmarshall.com User-Agent: HTTPTool/1.0
Content-Type: application/x-www-form-urlencoded
Content-Length: 32
home=Cosby&favorite+flavor=flies
```

Accessing HTTP Message Data from PHP

Superglobal Variables

Superglobals are **built-in variables** that are always available in all scopes

Collectively this information is referred to as **EGPCS** (environment, GET, POST, cookies and server):

- `$_COOKIE`
- `$_GET`
- `$_POST`
- `$_FILES`
- `$_SERVER`
- `$ENV`

Processing Forms

Use the `$_POST`, `$_GET` and `$_FILES` arrays to access form parameters from your PHP code

- Keys are parameter names
- Values are the values of those parameters

Usually copy the values from the array to a variable for processing, e.g.:

```
$title = $_POST['title'];
```

The type of method used to request a PHP page is available through `$_SERVER['REQUEST_METHOD']`

Automatic quoting of parameters

PHP ships with the `magic_quotes_GPC` option enabled

- This instructs PHP to automatically call `addslashes()` on all cookie data and `GET` and `POST` parameters
 - Makes it easy to use form parameters in database queries
 - Causes a problem with other uses because all single quotes, double quotes and backslashes are **escaped with backslashes**
- To get rid of the slashes uses the function `stripslashes()`, e.g.:

```
$name = stripslashes($_POST['name']);
```


Handling newlines

A user can enter text over multiple lines in a form element such as a text area

To create the equivalent of these newlines in a webpage use the **nl2br()** function, e.g.:

```
$comments = nl2br($_POST['comments']);
```

Multi-valued parameters

HTML selection lists and checkboxes can **allow multiple selections**

To ensure that PHP **recognizes the multiple values** that the browser passes to a form-processing script, **make the name of the field in HTML end with []**

Example:

```
<select name="languages[]">
  <input name = "c">C</input>
  <input name = "c++">C++</input>
  <input name = "php">PHP</input>
  <input name = "perl">Perl</input>
</select>
```

When the user submits the form, `$_POST['languages']` contains an array instead of a string

Form Validation

Need to **validate user data before storing or using it!**

Can use JavaScript, but...

- User can disable JavaScript
- Browser might not support it

PHP provides **a more secure way** to do the validation

Some important validation functions/operators

empty() : tests whether a value was provided

is_numeric() : tests whether a value is a number

relational operators: **!=, ==, >, <**

strpos(haystack, needle) : returns the position of needle in haystack or false if needle is not found

preg_match(regex, str [,array]) : for testing regular expressions

Validating with PHP

Similar to validating with JavaScript, i.e.:

provide the user with error messages

Output buffering

In a normal PHP script, **any echo statement is sent to the browser as soon as it is executed**

With ***output buffering*** the HTML and data will instead be put into a buffer

Turn on output buffering with the ***ob_start()*** function

- All echos will send data into a buffer instead of to the browser
- HTTP calls (like `header()` and `setcookie()`) won't be buffered

Output buffering (cont.)

To discard the data in the buffer use the `ob_end_clean()` function

To send the buffer to the browser use the `ob_end_flush()` function

PHP Files

PHP Files

PHP can:

- Deal with any files on the server
- Deal with any files on the Internet, using either http or ftp

PHP associates a variable with a file, called the *file variable*

A file has a file pointer (where to read or write), e.g.:

```
$fptr = fopen(filename, use_indicator)
```

Use indicators: `r, r+, w, w+, a, a+`

PHP Files (cont.)

Since `fopen` could fail, use it with `die`, e.g.:

```
$file=fopen("welcome.txt","r")  
    or die("Unable to open file!");
```

Use `file_exists`(*filename*) to determine whether file exists before trying to open it

Use `fclose`(*file_var*) to close a file

Reading Files

To read all or part of the file into a string variable, use **fread**, e.g.:

```
$str = fread(file_var, #bytes)
```

(note: to read the whole file, use `filesize(file_name)` as the second parameter)

To read all of the lines of the file into an array, use **file**, e.g.:

```
$file_lines = file(file_name)
```

(need not open or close the file)

Reading Files (cont.)

To **read one line** from the file use **fgets**, e.g.:

```
$line = fgets(file_var, #bytes)
```

- It reads characters until `eoln`, `eof`, or *#bytes*- chars been read

To **read one character** at a time use **fgetc**, e.g.:

```
$ch = fgetc(file_var)
```

You can **control reading lines** or characters with eof detection using **feof** (TRUE for eof; FALSE otherwise), e.g.:

```
while(!feof($file_var)) {  
    $ch = fgetc($file_var);  
}
```

Writing Files

To write to files, use **fwrite**, e.g.:

```
$bytes_written = fwrite(file_var, string)
```

`fwrite` returns the number of bytes it wrote

Files can be locked (to avoid interference from concurrent accesses) with **flock**

Maintaining State

Maintaining State

HTTP is a *stateless protocol*

Once a web server completes a client's request the **connection goes away**

No way for a server to recognize that a sequence of requests all *originates from the same client*

Why would we want to maintain state?

PHP has two main methods for tracking data:

- Cookies
- Sessions

Cookies

A **cookie** is a **name/value pair** that is passed between a browser and a server in the HTTP header

In PHP, cookies are created with **setcookie**

```
setcookie(cookie_name, cookie_value, lifetime)
```

Example:

```
setcookie("voted", "true", time() + 86400);
```

Cookies are implicitly deleted when their lifetimes are over

Cookies (cont.)

Few notes about cookies:

- Cookies are stored in a Web browser but only the site that originally sent a cookie can read it
- Cookies are read by a site when the page on that site is requested by the web browser
- Cookies are generally limited to about 4kb of total data
- Cookies **must be created before** any other HTML is created by the script
- Cookies are obtained in a script the same way form values are gotten, using the `$_COOKIES` array

Accessing cookies

When the browser sends a cookie back to the server, you can access the cookie through `$_COOKIE` array.

- Key is the cookie name
- Value is the cookie's value field

A cookie is **never accessible immediately** after it's been set

The page must be requested or reloaded for the cookie to be available

Deleting cookies

You can use the `setcookie()` function to delete a cookie

- It requires only one value, name
- Set the remaining parameters to blank or for expiration, a time in the past
- Example:

```
setcookie('user', '', time()-3600);
```

Sessions

Sessions provide a way to track data for a user over a series of pages

When you **start a session**, PHP generates a random session ID -- a reference to that particular session and its stored data

Session ID is sent to the Web browser as a cookie

Subsequent PHP pages will **use this cookie** to retrieve the session ID and access the session information

Creating a session

Create a session using the `session_start()` function

This **function sends a cookie** so it **must be called prior to any HTML or white space**

The first time a session is started a random session ID is generated and a **cookie** is sent to the Web browser with the name **PHPSESSID** and a value

Recording session data

Record data by assigning values to the `$_SESSION` array, e.g.:

```
$_SESSION['name'] = 'John';
```

Each time you do this, PHP writes the data to a temporary file stored on the server

Accessing session variables

Begin the session by calling the `session_start()` function

Access values by retrieving them from the `$_SESSION` array

Session Tracking Example

Example using sessions - counting number of pages visited

```
session_start();  
if (!isset($_SESSION['count'])) {  
    $_SESSION['count'] = 0;  
} else {  
    $_SESSION['count']++;  
}  
$count = $_SESSION['count'];  
echo "Visited $count times<br>";
```


Deleting a session

To delete a session, start with the `session_start()` function

Then delete the session variables by **unsetting** the `$_SESSION` array, e.g.:

```
unset($_SESSION);
```

Then **remove the session data** from the server, e.g.:

```
session_destroy();
```

Other session functions

Some other useful functions:

- Function `session_is_registered` returns true if the given variable is registered
- Function `session_id()` returns the current session ID.

Session life

By default **PHP session ID cookies expire when the browser closes**

Sessions don't persist after the browser ceases to exist

You **can use cookies** to allow some session information to persist after the browser is closed

Benefits of sessions over cookies

- **Session are generally more secure** because the data isn't repeatedly transmitted back and forth between the client and the server
- **Sessions let you store more information** than you can in a cookie
- **Session can be made to work even if the user doesn't accept cookies in their browser**

Benefits of cookies over sessions

- Marginally **easier to create and retrieve**
- Require slightly **less work from the server**
- Normally **persist over a longer period of time**

How to choose

Use cookies in situations where:

- Security is less of an issue
- A minimum amount of data is being stored

Otherwise use sessions

- May require more effort when writing scripts

Summary

- HTTP protocol is used to send data between client and server using either GET or POST methods
- In PHP, form data from client can be accessed using superglobals `$_GET` and `$_POST`
- PHP needs to validate all input received before storing or using it
- Several PHP functions can be used to read and write from/to files: `fread`, `fwrite`, `file`, `fgets`, `fgetc`, etc.
- Maintaining state can be implemented using cookies or sessions
- Cookies are easier to implement, but sessions are more secure and allow for storing more data