Chapter 3

Manipulating Strings

PHP Programming with MySQL
2nd Edition

Objectives

In this chapter, you will:

Construct text strings

Work with single strings

Work with multiple strings and parse strings

Compare strings

Use regular expressions

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 "<PHP literal text string</p>";
$StringVariable = "<p>PHP literal text
  string</p>";
echo $StringVariable;
```

A string must begin and end with a matching quotation mark (single or double)

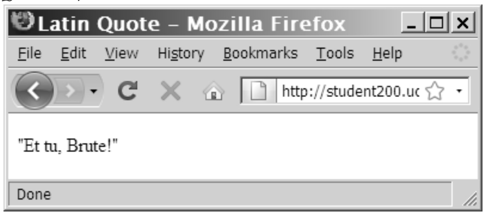
Constructing Text Strings (continued)

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

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

Constructing Text Strings (continued)

```
$LatinQuote = '<p>"Et tu, Brute!"</p>';
echo $LatinQuote;
```


Latin Quote – Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://student200.uc
Done

```
"Et tu, Brute!"
```

Figure 3-2 Output of a text string containing double quotation marks

Working with String Operators

In PHP, you use two operators to combine strings:

Concatenation operator (.) combines two strings and assigns the new value to a variable

```
$City = "Paris";
$Country = "France";
$Destination = <p>" . $City . " is in "
         . $Country . ".</p>";
echo $Destination;
```

Working with String Operators (continued)

You can also combine strings using the **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 (\)

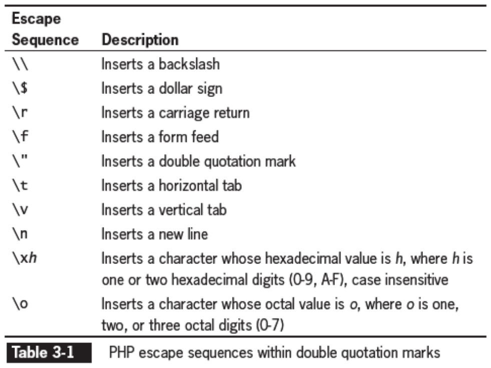
```
echo '<p>This code\'s going to work</p>';
```

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

```
echo "<p>This code's going to work.</p>";
```

Adding Escape Characters and Sequences (continued)

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

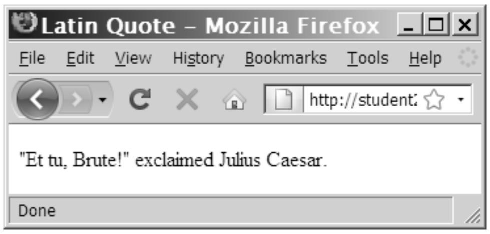


Escape Sequence	Description
`\\`	Inserts a backslash
`\$`	Inserts a dollar sign
`\r`	Inserts a carriage return
`\f`	Inserts a form feed
`\"`	Inserts a double quotation mark
`\t`	Inserts a horizontal tab
`\v`	Inserts a vertical tab
`\n`	Inserts a new line
`\x`*h*	Inserts a character whose hexadecimal value is *h*, where *h* is one or two hexadecimal digits (0-9, A-F), case insensitive
`\o`	Inserts a character whose octal value is *o*, where *o* is one, two, or three octal digits (0-7)

Table 3-1 PHP escape sequences within double quotation marks

Adding Escape Characters and Sequences (continued)

```
$Speaker = "Julius Caesar";
echo "<p>\"Et tu, Brute!\" exclaimed
$Speaker.</p>";
```


Latin Quote – Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://student
Done

"Et tu, Brute!" exclaimed Julius Caesar.

Figure 3-4 Output of literal text containing double quotation escape sequences

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>";
```

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>";
```

Working with a Single String

PHP provides a number of functions for analyzing, altering, and parsing text strings including:

- Counting characters and words
- Transposing, converting, and changing the case of text within a string

Counting Characters and Words in a String

The most commonly used string counting function is the `strlen()` function, which returns the total number of characters in a string

Escape sequences, such as `\n`, are counted as one character

```
$BookTitle = "The Cask of Amontillado";
     echo "<p>The book title contains " .
    strlen($BookTitle) . " characters.</p>";
```

Counting Characters and Words in a String (continued)

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

Pass the `str_word_count()` function a literal string or the name of a string variable whose words you want to count

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

Modifying the Case of a String

PHP provides several functions to manipulate the case of a string

- The `strtoupper()` function converts all letters in a string to uppercase
- The `strtolower()` function converts all letters in a string to lowercase
- The `ucfirst()` function ensures that the first character of a word is uppercase
- The `lcfirst()` function ensures that the first character of a word is lowercase

Modifying the Case of a String (continued)

Functions to manipulate the case of a string:

- The `ucwords()` function changes the first character of each word
  - Use the `strtolower()` function on a string before using the `ucfirst()` and `ucwords()` to ensure that the remaining characters in a string are in lowercase
  - Use the `strtoupper()` function on a string before using the `ucfirst()` and `ucwords()` to ensure that the remaining characters in a string are in uppercase

Encoding and Decoding a String

PHP has several built-in functions to use with Web pages:

Some characters in XHTML have a special meaning and must be encoded using HTML entities in order to preserve that meaning

- The `htmlspecialchars()` function converts special characters to HTML entities
- The `html_specialcharacters_decode()` function converts HTML character entities into their equivalent characters

Encoding and Decoding a String (continued)

The characters that are converted with the `htmlspecialchars()` function are:

- '&' (ampersand) becomes '&amp;'
- '"' (double quote) becomes '&quot;' when `ENT_NOQUOTES` is disabled.
- ''' (single quote) becomes '&#039;' only when `ENT_QUOTES` is enabled.
- '<' (less than) becomes '&lt;'
- '>' (greater than) becomes '&gt;'

Encoding and Decoding a String (continued)

If `ENT_QUOTES` is enabled in the PHP configuration, both single and double quotes are converted

If `ENT_QUOTES` is disabled in the PHP configuration, neither single nor double quotes are converted

Encoding and Decoding a String (continued)

The `md5()` function uses a strong encryption algorithm (called the Message-Digest Algorithm) to create a one-way hash

- A **one-way hash** is a fixed-length string based on the entered text, from which it is nearly impossible to determine the original text
- The `md5()` function does not have an equivalent decode function, which makes it a useful function for storing passwords in a database

Other Ways to Manipulate a String

PHP provides three functions that remove leading or trailing spaces in a string

- The `trim()` function will strip (remove) leading or trailing spaces in a string
- The `ltrim()` function removes only the leading spaces
- The `rtrim()` function removes only the trailing spaces

Other Ways to Manipulate a String (continued)

The `substr()` function returns part of a string based on the values of the `start` and `length` parameters

The syntax for the substr() function is:

```
substr(string, start, optional length);
```

A positive number in the `start` parameter indicates how many character to skip at the beginning of the string

A negative number in the `start` parameter indicates how many characters to count in from the end of the string

Other Ways to Manipulate a String (continued)

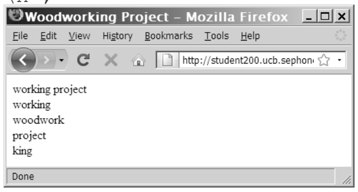
A positive value in the in the `length` parameter determines how many characters to return

A negative value in the `length` parameter skip that many characters at the end of the string and returns the middle portion

If the length is omitted or is greater than the remaining length of the string, the entire remainder of the string is returned

Other Ways to Manipulate a String (continued)

```
$ExampleString = "woodworking project";
echo substr($ExampleString,4) . "<br />\n";
echo substr($ExampleString,4,7) . "<br />\n";
echo substr($ExampleString,0,8) . "<br />\n";
echo substr($ExampleString,-7) . "<br />\n";
echo substr($ExampleString,-12,4) . "<br />\n";
```


Woodworking Project – Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://student200.ucb.sephon
Done

```
working project
working
woodwork
project
king
```

Figure 3-10 Some examples using the `substr()` function

Working with Multiple Strings

Parsing is the act of dividing a string into logical component substrings or tokens

When programming, parsing refers to the extraction of information from string literals
and variables

Finding and Extracting Characters and Substrings

There are two types of string search and extraction functions:

- Functions that return a numeric position in a text string
- Functions that return a character or substring
  - Both functions return a value of `FALSE` if the search string is not found

Finding and Extracting Characters and Substrings (continued)

The `strpos()` function performs a case-sensitive search and returns the position of the first occurrence of one string in another string

Pass two arguments to the `strpos()` function:

- The first argument is the string you want to search
- The second argument contains the characters for which you want to search

If the search string is not found, the `strpos()` function returns a Boolean value of `FALSE`

Finding and Extracting Characters and Substrings (continued)

Pass to the `strchr()` and the `strrchr()` functions the string and the character for which you want to search

Both functions return a substring from the specified characters to the end of the string

`strchr()` function starts searching at the beginning of a string

`strrchr()` function starts searching at the
end of a string

Replacing Characters and Substrings

The `str_replace()` and `str_ireplace()` functions both accept three arguments:

- The string you want to search for
- A replacement string
- The string in which you want to replace characters

```
$Email = "president@whitehouse.gov";
$NewEmail = str_replace("president", "vice.president", $Email);
echo $NewEmail; // prints 'vice.president@whitehouse.gov'
```

Dividing Strings into Smaller Pieces

Use the `strtok()` function to break a string into smaller strings, called **tokens**

The syntax for the **`strtok()`** function is:

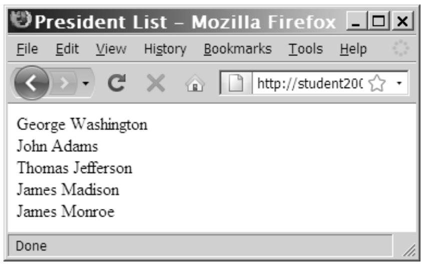
```
$variable = strtok(string, separators);
```

The `strtok()` function returns the entire string if:

- An empty string is specified as the second argument of the `strtok()` function
- The string does not contain any of the separators specified

Dividing Strings into Smaller Pieces (continued)

```
$Presidents = "George Washington;John Thomas Jefferson;James
 Madison;James Monroe";
$President = strtok($Presidents, ";");
while ($President != NULL) {
      echo "$President<br />";
      $President = strtok(";");
}
```

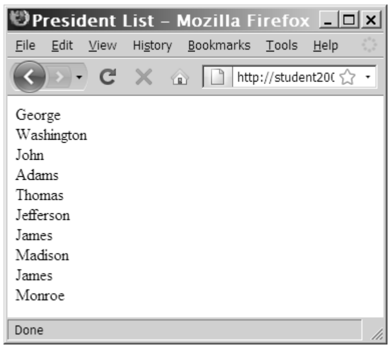

President List – Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://student20(

```
George Washington
John Adams
Thomas Jefferson
James Madison
James Monroe
```

Figure 3-15 Output of a script that uses the `strtok()` function

Dividing Strings into Smaller Pieces(continued)

```
$Presidents = "George Washington;John Adams;Thomas
 Jefferson;James Madison;James Monroe";
$President = strtok($Presidents, "; ");
while ($President != NULL) {
      echo "$President<br />";
      $President = strtok("; ");
}
```


President List – Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://student20(

```
George
Washington
John
Adams
Thomas
Jefferson
James
Madison
James
Monroe
```

Figure 3-16 Output of a script with a `strtok()` function that uses two separators

Converting between Strings and Arrays

The `str_split()` and `explode()` functions split a string into an indexed array

The `str_split()` function splits each character in a string into an array element using the syntax:

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

The *`length`* argument represents the number of characters you want assigned to each array element

Converting between Strings and Arrays (continued)

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

The syntax for the `explode()` function is:

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

The order of the arguments for the `explode()` function is the reverse of the arguments for the `strtok()` function

Converting between Strings and Arrays (continued)

```
$Presidents = "George Washington;JohnAdams; Thomas
 Jefferson;James Madison;James Monroe";

$PresidentArray = explode(";", $Presidents);

foreach ($PresidentArray as $President) {

    echo "$President<br />";

}
```

If the string does not contain the specified separators, the entire string is assigned to the
first element of the array

Converting between Strings and Arrays (continued)

The `explode()` function

- Does not separate a string at each character that is included in the *separator* argument
- Evaluates the characters in the *separator* argument as a substring
- If you pass to the `explode()` function an empty string as the *separator* argument, the function returns a Boolean value of `FALSE`

Converting between Strings and Arrays (continued)

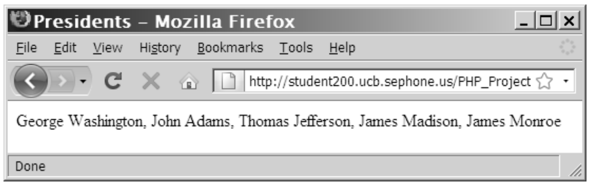
The `implode()` function combines an array's elements into a single string, separated by specified characters

The syntax is:

```
$variable = implode(separators, array);
```

Converting between Strings and Arrays (continued)

```
$PresidentsArray = array("George Washington", "John Adams",
"Thomas Jefferson", "James Madison", "James Monroe");
$Presidents = implode(", ", $PresidentsArray);
echo $Presidents;
```


Presidents – Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://student200.ucb.sephone.us/PHP_Project
Done

George Washington, John Adams, Thomas Jefferson, James Madison, James Monroe

Figure 3-18 Output of a string created with the `implode()` function

Comparing Strings

Comparison operators compare individual characters by their position in the **American Standard Code for Information Interchange** (ASCII), which are numeric representations of English characters

```
$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>";
```

Comparing Strings (continued)

American Standard Code for Information Interchange (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”)

String Comparison Functions

The `strcasecmp()` function performs a case-insensitive comparison of strings

The `strcmp()` function performs a case-sensitive comparison of strings

Both functions accept two arguments representing the strings you want to compare

Most string comparison functions compare strings based on their ASCII values

Determining the Similarity of Two Strings

The `similar_text()` and `levenshtein()` functions are used to determine the similarity between two strings

The `similar_text()` function returns the number of characters that two strings have in common

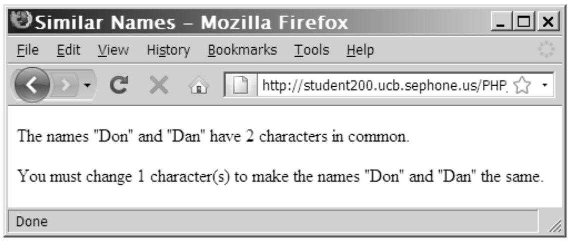
The `levenshtein()` function returns the number of characters you need to change for two strings to be the same

Determining the Similarity of Two Strings (continued)

Both functions accept two string arguments representing the values you want to compare

```
$FirstName = "Don";
$SecondName = "Dan";
echo "<p>The names \"$FirstName\" and \"$SecondName\" have " .
similar_text($FirstName, $SecondName) . " characters in
common.</p>";
echo "<p>You must change " . levenshtein($FirstName, $SecondName)
. " character(s) to make the names \"$FirstName\" and
\"$SecondName\" the same.</p>";
```

Determining the Similarity of Two Strings (continued)


Similar Names – Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://student200.ucb.sephone.us/PHP
Done

```
The names "Don" and "Dan" have 2 characters in common.

You must change 1 character(s) to make the names "Don" and "Dan" the same.
```

Figure 3-20 Output of a script with the `similar_text()` and `levenshtein()` functions

Determining if Words are Pronounced Similarly

The `soundex()` and `metaphone()` functions determine whether two strings are pronounced similarly

Both functions return a value representing how words sound

The `soundex()` function returns a value representing a name's phonetic equivalent

The `metaphone()` function returns a code representing an English word's approximate sound

Determining if Words are Pronounced Similarly (continued)

```
$FirstName = "Gosselin";
$SecondName = "Gauselin";
$FirstNameSoundsLike = metaphone($FirstName);
$SecondNameSoundsLike = metaphone($SecondName);

if ($FirstNameSoundsLike == $SecondNameSoundsLike)
       echo "<p>The names are pronounced the same.</p>";
else
       echo "<p>The names are not pronounced the same.</p>";
```

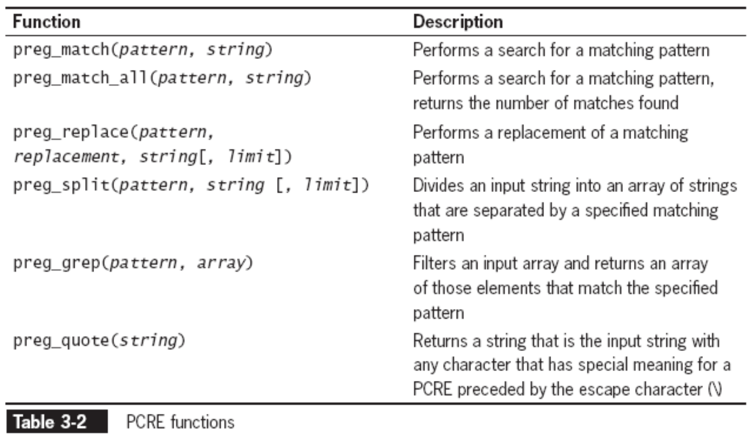
Working with Regular Expressions

Regular Expressions are patterns that are used for matching and manipulating strings according to specified rules

PHP supports two types of regular expressions:

- POSIX Extended
- Perl Compatible Regular Expressions

Working with Regular Expressions (continued)



Function	Description
`preg_match(pattern, string)`	Performs a search for a matching pattern
`preg_match_all(pattern, string)`	Performs a search for a matching pattern, returns the number of matches found
`preg_replace(pattern, replacement, string[, limit])`	Performs a replacement of a matching pattern
`preg_split(pattern, string [, limit])`	Divides an input string into an array of strings that are separated by a specified matching pattern
`preg_grep(pattern, array)`	Filters an input array and returns an array of those elements that match the specified pattern
`preg_quote(string)`	Returns a string that is the input string with any character that has special meaning for a PCRE preceded by the escape character (\)

Table 3-2 PCRE functions

Working with Regular Expressions (continued)

Pass to the `preg_match()` the regular expression pattern as the first argument and a string containing the text you want to search as the second argument

```
preg_match(pattern, string);
```

Writing Regular Expression Patterns

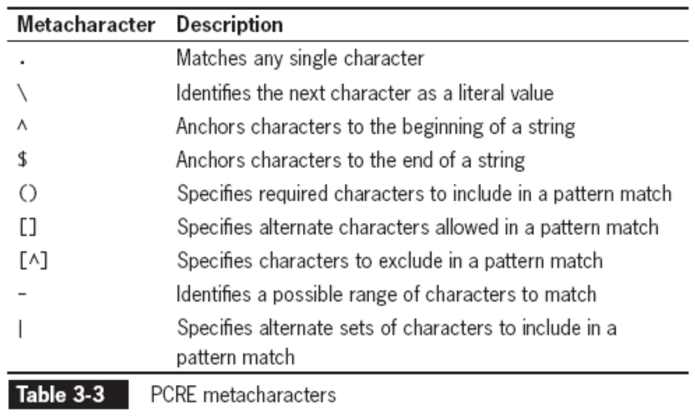
A **regular expression pattern** is a special text string that describes a search pattern

Regular expression patterns consist of literal characters and **metacharacters**, which are special characters that define the pattern-matching rules

Regular expression patterns are enclosed in opening and closing **delimiters**

- The most common character delimiter is the forward slash (/)

Writing Regular Expression Patterns (continued)



Metacharacter	Description
.	Matches any single character
\	Identifies the next character as a literal value
^	Anchors characters to the beginning of a string
$	Anchors characters to the end of a string
()	Specifies required characters to include in a pattern match
[]	Specifies alternate characters allowed in a pattern match
[^]	Specifies characters to exclude in a pattern match
-	Identifies a possible range of characters to match
|	Specifies alternate sets of characters to include in a pattern match

Table 3-3 PCRE metacharacters

Matching Any Character

A period (`.`) in a regular expression pattern specifies that the pattern must contain a value at the location of the period

A return value of `0` indicates that the string does not match the pattern and `1` if it does

```
$ZIP = "015";
preg_match("/...../", $ZIP); // returns 0

$ZIP = "01562";
preg_match("/...../", $ZIP); // returns 1
```

Matching Characters at the Beginning or End of a String

An **anchor** specifies that the pattern must appear at a particular position in a string

The ^ metacharacter anchors characters to the beginning of a string

The $ metacharacter anchors characters to the end of a string

```
 $URL = "http://www.dongosselin.com";
  preg_match("/^http/", $URL); //
returns 1
```

Matching Characters at the Beginning or End of a String (continued)

To specify an anchor at the beginning of a string, the pattern must begin with a ^ metcharacter

```
$URL = "http://www.dongosselin.com";
 eregi("^http", $URL); // returns 1;
```

To specify an anchor at the end of a line, the pattern must end with the $ metacharacter

```
$Identifier = "http://www.dongosselin.com";
eregi("com$", $Identifier); // returns 1
```

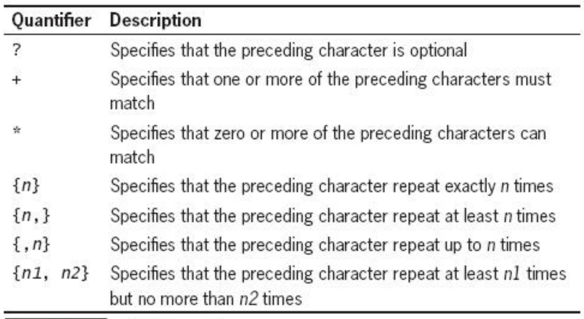
Matching Special Characters

To match any metacharacters as literal values in a regular expression, escape the character with a backslash
(in the following example, the last four characters in the string must be '.com')

```
$Identifier = http://www.dongosselin.com";
 preg_match("/gov$/", $Identifier);//returns 0
```

Specifying Quantity

Metacharacters that specify the quantity of a match are called **quantifiers**



Quantifier	Description
?	Specifies that the preceding character is optional
+	Specifies that one or more of the preceding characters must match
*	Specifies that zero or more of the preceding characters can match
{*n*}	Specifies that the preceding character repeat exactly *n* times
{*n*,}	Specifies that the preceding character repeat at least *n* times
{,*n*}	Specifies that the preceding character repeat up to *n* times
{*n1*, *n2*}	Specifies that the preceding character repeat at least *n1* times but no more than *n2* times

Table 3-4 PCRE quantifiers

Specifying Quantity (continued)

A question mark `(?)` quantifier specifies that the preceding character in the pattern is optional
(in the following example, the string must begin with 'http' or 'https')

```
 $URL = "http://www.dongosselin.com";
   preg_match("/^https?/", $URL); //
returns 1
```

Specifying Quantity (continued)

The addition `(+)` quantifier specifies that one or more sequential occurrences of the preceding characters match

(in the following example, the string must have at least one character)

```
 $Name = "Don";
  preg_match("/.+/", $Name); // returns 1
```

Specifying Quantity (continued)

A asterisk `(*)` quantifier specifies that zero or more sequential occurrences of the preceding characters match
(in the following example, the string must begin with one or more leading zeros)

```
NumberString = "00125";
 preg_match("/^0*/", $NumberString);//returns 1
```

Specifying Quantity (continued)

The `{ }` quantifiers specify the number of times that a character must repeat sequentially
(in the following example, the string must contain at least five characters)

```
    preg_match("/ZIP: .{5}$/", " ZIP:
01562");
         // returns 1
```

The `{ }` quantifiers can also specify the quantity as a range
(in the following example, the string must contain between five and ten characters)

```
 preg_match("/(ZIP: .{5,10})$/", "ZIP:
      01562-2607");// returns 1
```

Specifying Subexpressions

When a set of characters enclosed in parentheses are treated as a group, they are referred to as a **subexpression** or **subpattern**
(in the example below, the 1 and the area code are optional, but if included must be in the following format:)

1 (707) 555-1234

```
preg_match("/^(1 )?(\(.{3}\)
)?(.{3})(\.{4})$/
```

Defining Character Classes

Character classes in regular expressions treat multiple characters as a single item

Characters enclosed with the (`[]`) metacharacters represent alternate characters that are allowed in a pattern match

```
preg_match("/analy[sz]e/", "analyse");//returns 1
preg_match("/analy[sz]e/", "analyze");//returns 1


preg_match("/analy[sz]e/", "analyce");//returns 0
```

Defining Character Classes (continued)

The hyphen metacharacter (`-`) specifies a range of values in a character class (the following example ensures that A, B, C, D, or F are the only values assigned to the `$LetterGrade` variable)

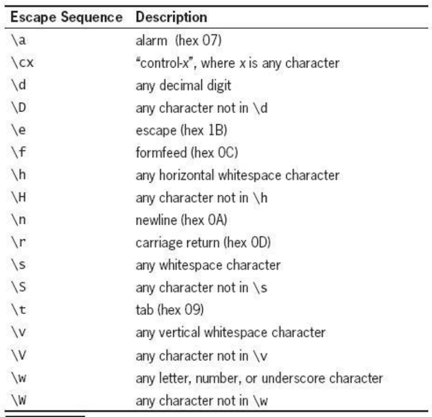
```
$LetterGrade = "B";
echo ereg("[A-DF]", $LetterGrade); //
  returns true
```

Defining Character Classes (continued)

The `^` metacharacter (placed immediately after the opening bracket of a character class) specifies optional characters to exclude in a pattern match (the following example excludes the letter `E` and `G-Z` from an acceptable pattern match in the `$LetterGrade` variable)

```
$LetterGrade = "A";
echo ereg("[^EG-Z]", $LetterGrade); //
    returns true
```

Defining Character Classes (continued)



Escape Sequence	Description
\a	alarm (hex 07)
\cx	"control-x", where x is any character
\d	any decimal digit
\D	any character not in \d
\e	escape (hex 1B)
\f	formfeed (hex 0C)
\h	any horizontal whitespace character
\H	any character not in \h
\n	newline (hex 0A)
\r	carriage return (hex 0D)
\s	any whitespace character
\S	any character not in \s
\t	tab (hex 09)
\v	any vertical whitespace character
\V	any character not in \v
\w	any letter, number, or underscore character
\W	any character not in \w

Table 3-5 PCRE character types

Matching Multiple Pattern Choices

The | metacharacter is used to specify an alternate set of patterns

- The | metacharacter is essentially the same as using the OR operator to perform multiple evaluations in a conditional expression

Pattern Modifiers

Pattern modifiers are letters placed after the closing delimiter that change the default rules for interpreting matches

- The pattern modifier, `i`, indicates that the case of the letter does not matter when searching
- The pattern modifier, `m`, allows searches across newline characters
- The pattern modifier, `s`, changes how the . (period) metacharacter works