ISIT307 - WEB SERVER PROGRAMMING

LECTURE 3 – WORKING WITH FILES AND DIRECTORIES

LECTURE PLAN

- Understand file type and permissions
- Work with directories
- Upload and download files
- Write and Read data to files
- Open and close a file stream
- Manage files and directories

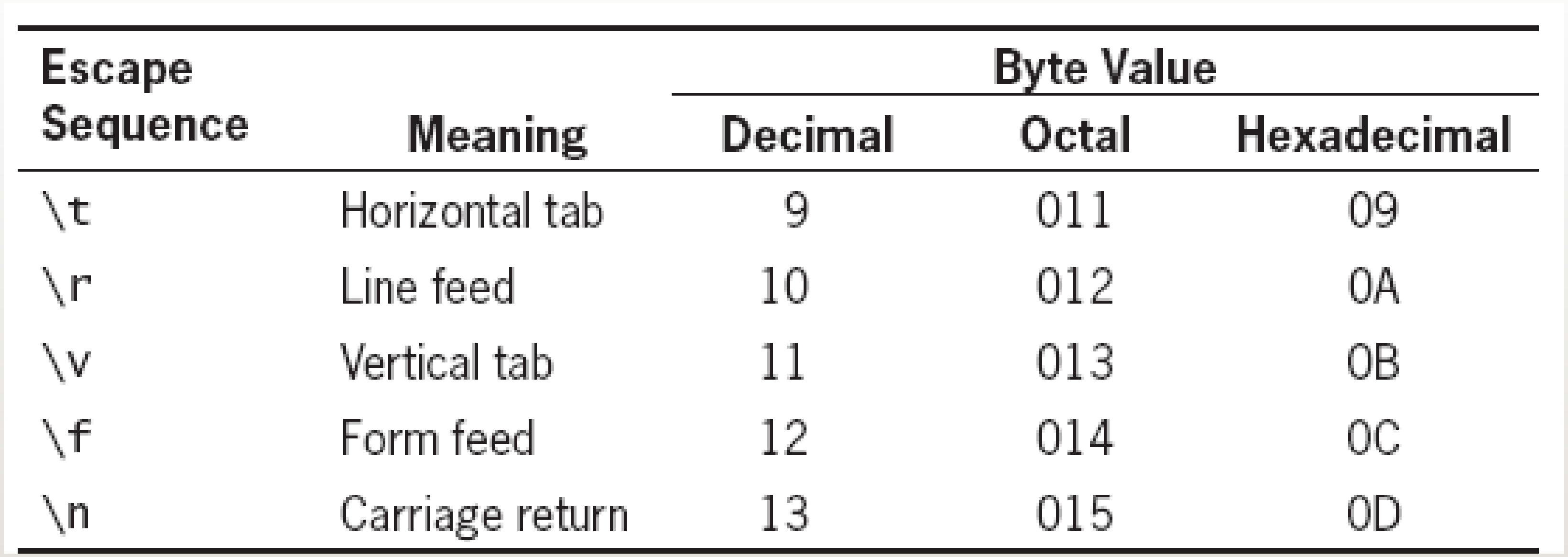
UNDERSTANDING FILE TYPES AND PERMISSIONS

- **File types** affect how information is stored in files and retrieved from them
- **File permissions** determine the actions that a specific user can and cannot perform on a file

UNDERSTANDING FILE TYPES

- A **binary file** is a series of characters or bytes for which PHP attaches no special meaning
  - Structure is determined by the application that reads or writes to the file
- A **text file** has only printable characters and a small set of control or formatting characters
  - Text files translate the end-of-line character sequences such as `\n` or `\r\n` to carriage returns

CONTROL CHARACTERS IN A TEXT FILE



Escape Sequence	Meaning	Byte Value		
		Decimal	Octal	Hexadecimal
\t	Horizontal tab	9	011	09
\r	Line feed	10	012	0A
\v	Vertical tab	11	013	0B
\f	Form feed	12	014	0C
\n	Carriage return	13	015	0D

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UNDERSTANDING FILE TYPES

- Different operating systems use different escape sequences to identify the end of a line:
  - Use the \n sequence to end a line on a UNIX/Linux operating system
  - Use the \n\r sequence to end a line on a Windows operating system
  - Use the \r sequence to end a line on a Mac operating system.
- Scripts written in a UNIX/Linux text editor display differently when opened in a Windows-based text editor

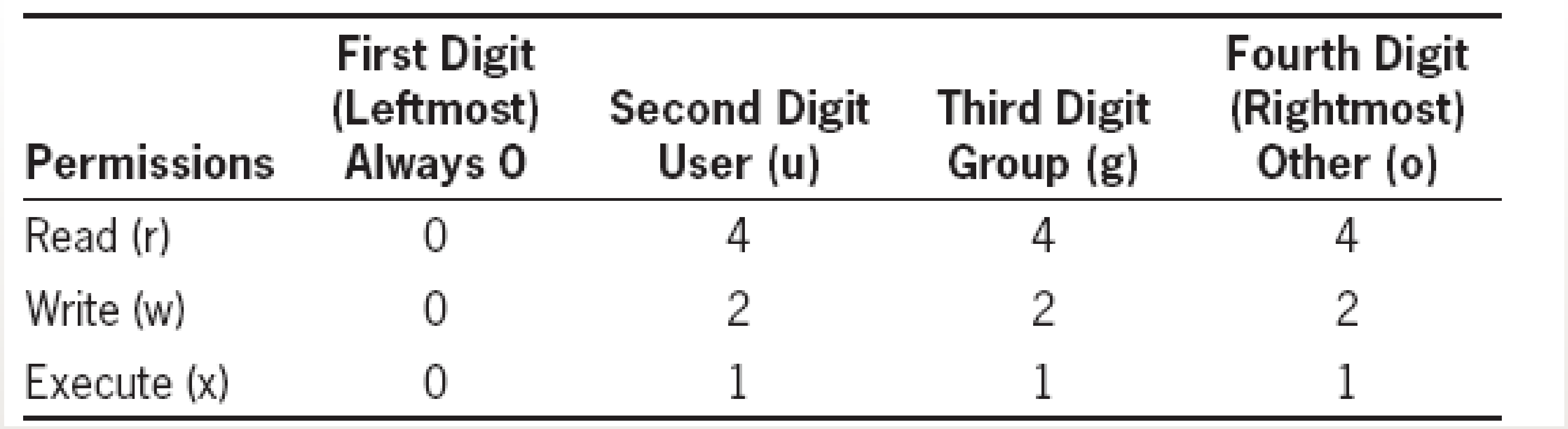
WORKING WITH FILE PERMISSIONS

- Files and directories have three levels of access:
  - User
  - Group
  - Other
- The three typical permissions for files and directories are:
  - Read (r)
  - Write (w)
  - Execute (x)

WORKING WITH FILE PERMISSIONS

- File permissions are calculated using a four-digit octal (base 8) value
  - Octal values encode three bits per digit, which matches the three permission bits per level of access
  - The first digit is always 0
  - To assign more than one value to an access level, add the values of the permissions together

WORKING WITH FILE PERMISSIONS



Permissions	First Digit (Leftmost) Always 0	Second Digit User (u)	Third Digit Group (g)	Fourth Digit (Rightmost) Other (o)
Read (r)	0	4	4	4
Write (w)	0	2	2	2
Execute (x)	0	1	1	1

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WORKING WITH FILE PERMISSIONS

- The `chmod()` function is used to change the permissions or modes of a file or directory
- The syntax for the `chmod()` function is

```
chmod($filename, $mode)
```

- Where `$filename` is the name of the file to change and `$mode` is an integer specifying the permissions for the file
- For example

```
chmod("myfile.txt", 0754)
```

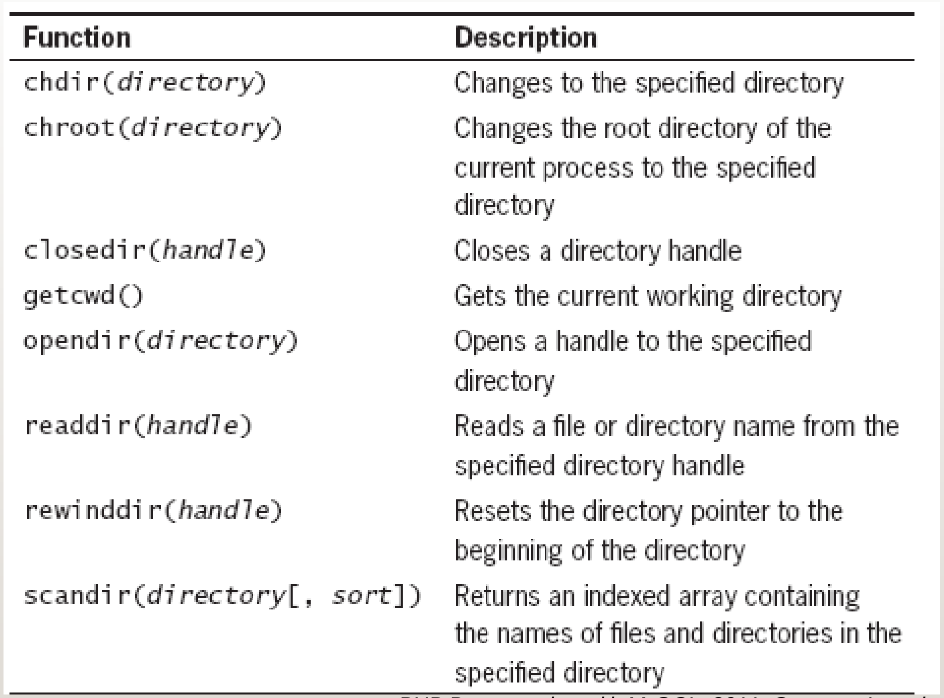
CHECKING PERMISSIONS

- The `fileperms()` function is used to read permissions associated with a file
- The `fileperms()` function takes one argument and returns an integer bitmap of the permissions associated with the file
- Permissions can be extracted using the arithmetic modulo operator with an octal value of 01000
- The `decoct()` function converts a decimal value to an octal value

```
$perms = fileperms($testfile);
$perms = decoct($perms % 01000);
echo "file permissions for $testfile: 0" .
                          $perms . "<br />\n";
```

READING DIRECTORIES

- The following table lists the PHP functions for working with directories



Function	Description
`chdir(directory)`	Changes to the specified directory
`chroot(directory)`	Changes the root directory of the current process to the specified 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

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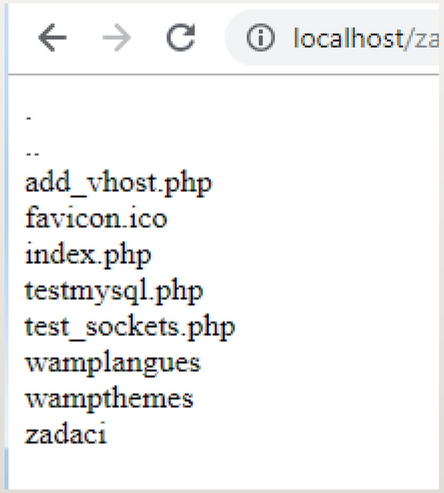
READING DIRECTORIES

- The `opendir()` function is used to open a directory and iterate through entries in a directory
- A **handle** is a special type of variable that PHP used to represent a resource such as a file or a directory
- The `readdir()` function returns the file and directory names of an open directory
- The **directory pointer** is a special type of variable that refers to the currently selected record in a directory listing
- Each time the `readdir()` is called, it returns the current file or directory name and move the directory pointer to the next

READING DIRECTORIES – EXAMPLE (1)

- The `closedir()` function is used to close the directory handle
- The following code lists the files in the open directory and closes the directory.

```
$Dir = ".";
$DirOpen = opendir($Dir);
while ($CurFile = readdir($DirOpen)) {
      echo $CurFile . "<br />\n";
}
closedir($DirOpen);
```



```
.
..
add_vhost.php
favicon.ico
index.php
testmysql.php
test_sockets.php
wamplangues
wampthemes
zadaci
```

READING DIRECTORIES

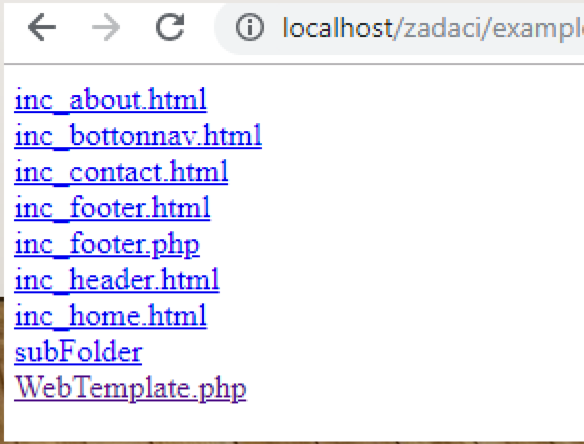
- The PHP scripting engine returns the navigation shortcuts ("." for current directory, and ".." for parent directory) when it reads a directory
- The `strcmp()` function can be used to exclude those entries

READING DIRECTORIES – EXAMPLE (2)

```
<?php
$Dir = ".";     //$Dir = "name_of_dir";
$DirOpen = opendir($Dir);
while ($CurFile = readdir($DirOpen)) {
   if ((strcmp($CurFile, '.') != 0) && (strcmp($CurFile, '..') != 0))

      echo "<a href=\"./" . $CurFile ."\">" . $CurFile . "</a><br/>\n";

      // echo "<a href=\"name_of_dir/" . $CurFile . "\">" . $CurFile .
            "</a><br />\n";
}
closedir($DirOpen);
?>
```

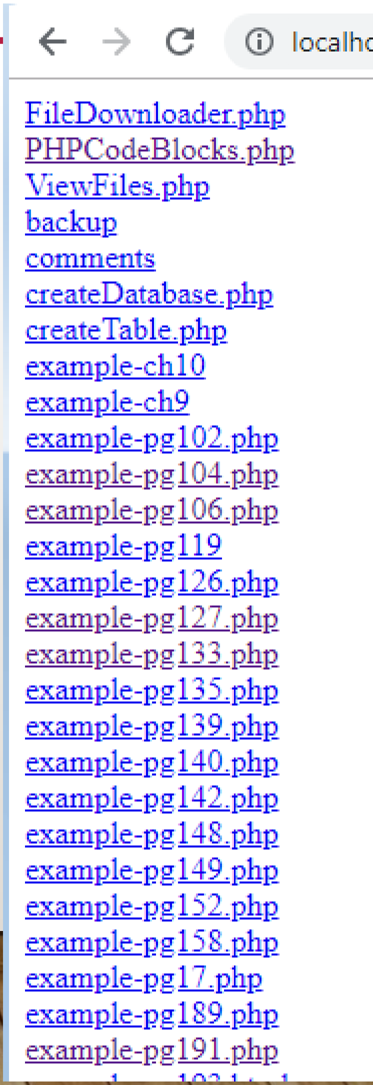


```
inc_about.html
inc_bottonnav.html
inc_contact.html
inc_footer.html
inc_footer.php
inc_header.html
inc_home.html
subFolder
WebTemplate.php
```

READING DIRECTORIES – EXAMPLE(3)

- The `scandir()` function returns the names of the entries in a directory to an array sorted in ascending alphabetical order (if we pass 1 as second argument the entries will be sorted in descending alphabetical order)

```
…
$Dir = ".";
$DirEntries = scandir($Dir);    // scandir($Dir, 1);
foreach ($DirEntries as $Entry) {
    if ((strcmp($Entry, '.') != 0) && (strcmp($Entry, '..') != 0))
        echo "<a href=\"./" . $Entry . "\">" . $Entry .
                                                      "</a><br />\n";
}
```



localhc

FileDownloader.php
PHPCodeBlocks.php
ViewFiles.php
backup
comments
createDatabase.php
createTable.php
example-ch10
example-ch9
example-pg102.php
example-pg104.php
example-pg106.php
example-pg119
example-pg126.php
example-pg127.php
example-pg133.php
example-pg135.php
example-pg139.php
example-pg140.php
example-pg142.php
example-pg148.php
example-pg149.php
example-pg152.php
example-pg158.php
example-pg17.php
example-pg189.php
example-pg191.php

CREATING DIRECTORIES

- The `mkdir()` function creates a new directory
- To create a new directory within the current directory:
  - Pass the name of the directory you want to create to the `mkdir()` function

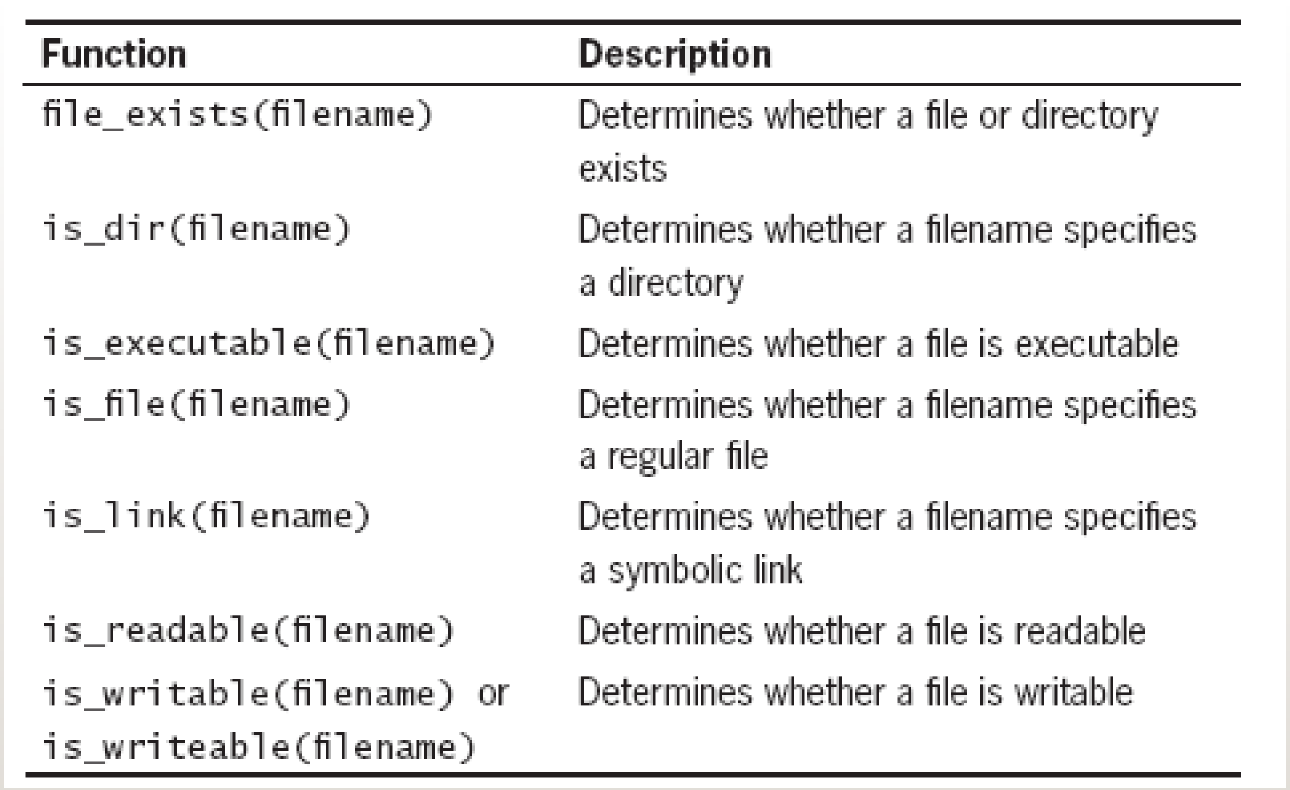
```
mkdir("volunteers");
```

CREATING DIRECTORIES

- To create a new directory in a location other than the current directory:
    - Use a relative or an absolute path

```
mkdir("../event");
mkdir("/bin/PHP/utilities");
```

PHP FILE AND DIRECTORY FUNCTIONS



Function	Description
`file_exists(filename)`	Determines whether a file or directory exists
`is_dir(filename)`	Determines whether a filename specifies a directory
`is_executable(filename)`	Determines whether a file is executable
`is_file(filename)`	Determines whether a filename specifies a regular file
`is_link(filename)`	Determines whether a filename specifies a symbolic link
`is_readable(filename)`	Determines whether a file is readable
`is_writable(filename)` or `is_writeable(filename)`	Determines whether a file is writable

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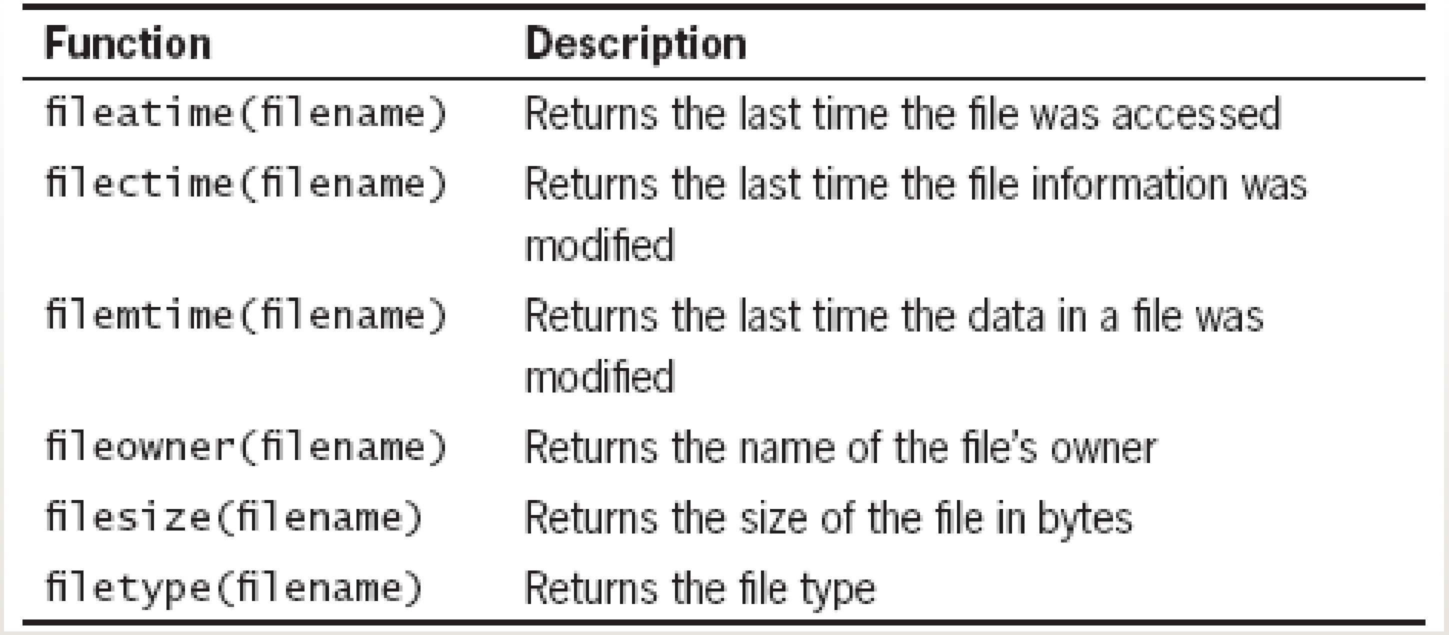
FILE AND DIRECTORY INFORMATION FUNCTIONS



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

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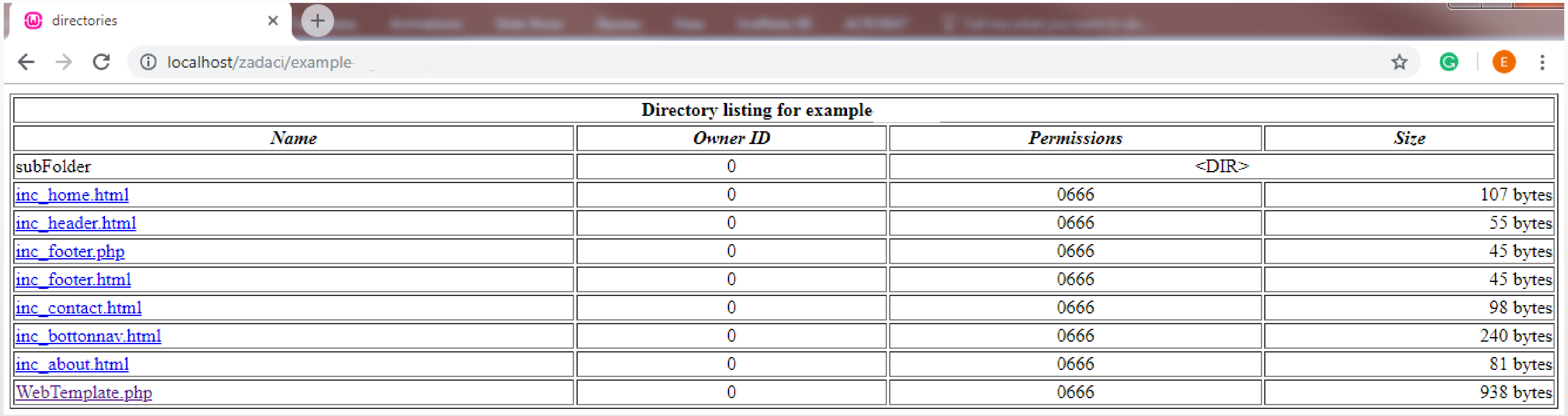
OBTAINING FILE AND DIRECTORY INFORMATION - EXAMPLE



Directory listing for example			
Name	***Owner ID***	***Permissions***	***Size***
subFolder	0	<DIR>	
inc_home.html	0	0666	107 bytes
inc_header.html	0	0666	55 bytes
inc_footer.php	0	0666	45 bytes
inc_footer.html	0	0666	45 bytes
inc_contact.html	0	0666	98 bytes
inc_bottonnav.html	0	0666	240 bytes
inc_about.html	0	0666	81 bytes
WebTemplate.php	0	0666	938 bytes

UPLOADING AND DOWNLOADING FILES

- Web applications allow visitors to upload/download files to and from their local computer (often referred to as the **client**)
- The files that are uploaded and downloaded may be simple text files or more complex file types, such as images, documents, or spreadsheets

SELECTING THE FILE

- Files are uploaded through an HTML form using the "post" method
- An `enctype` attribute in the opening form tag must have a value of "multipart/form-data," which instructs the browser to post multiple sections – one for regular form data and one for the file contents

SELECTING THE FILE

- The `file` input field creates a Browse button for the user to navigate to the appropriate file to upload

```
<input type="file" name="picture_file" />
```

- The `MAX_FILE_SIZE` (uppercase) attribute of a hidden input field specifies the maximum number of bytes allowed in the uploaded file
    - The `MAX_FILE_SIZE` hidden field must appear before the file input field

RETRIEVING THE FILE INFORMATION

- When the form is posted, information for the uploaded file is stored in the `$_FILES` autoglobal array
- The `$_FILES[]` array element contains five elements:
  - `$_FILES['picture_file']['error']`
    `//Contains the error code associated with the file`
  - `$_FILES['picture_file']['tmp_name']`
    `// Contains the temporary location of the file contents`
  - `$_FILES['picture_file']['name']`
    `// Contains the name of the original file`
  - `$_FILES['picture_file']['size']`
    `// Contains the size of the uploaded file in bytes`
  - `$_FILES['picture_file']['type']`
    `// Contains the type of the file`

STORING THE UPLOADED FILE

- Uploaded files have two considerations, before are moved to permanent position:
  - whether the file should be immediately available or verified first
  - is the file public (freely available to anyone visiting the Web site) or private (only available to authorized visitors)

STORING THE UPLOADED FILE

- The `move_uploaded_file()` function moves the uploaded file from its temporary location to a permanent destination with the following syntax:

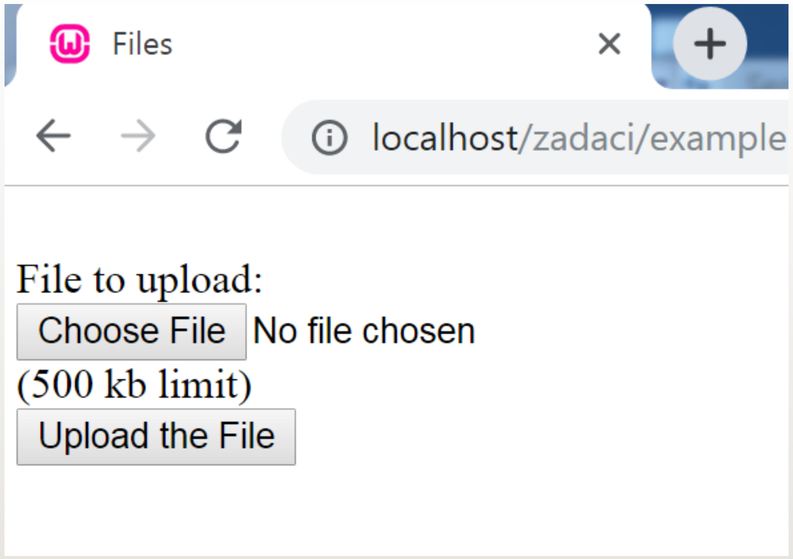
```
move_uploaded_file($filename, $destination)
```

- where *`$filename`* is the contents of

```
$_FILES['filefield']['tmp_name']
```

and *`$destination`* is the path and filename of the location where the file will be stored

STORING THE UPLOADED FILE - EXAMPLE



File to upload:

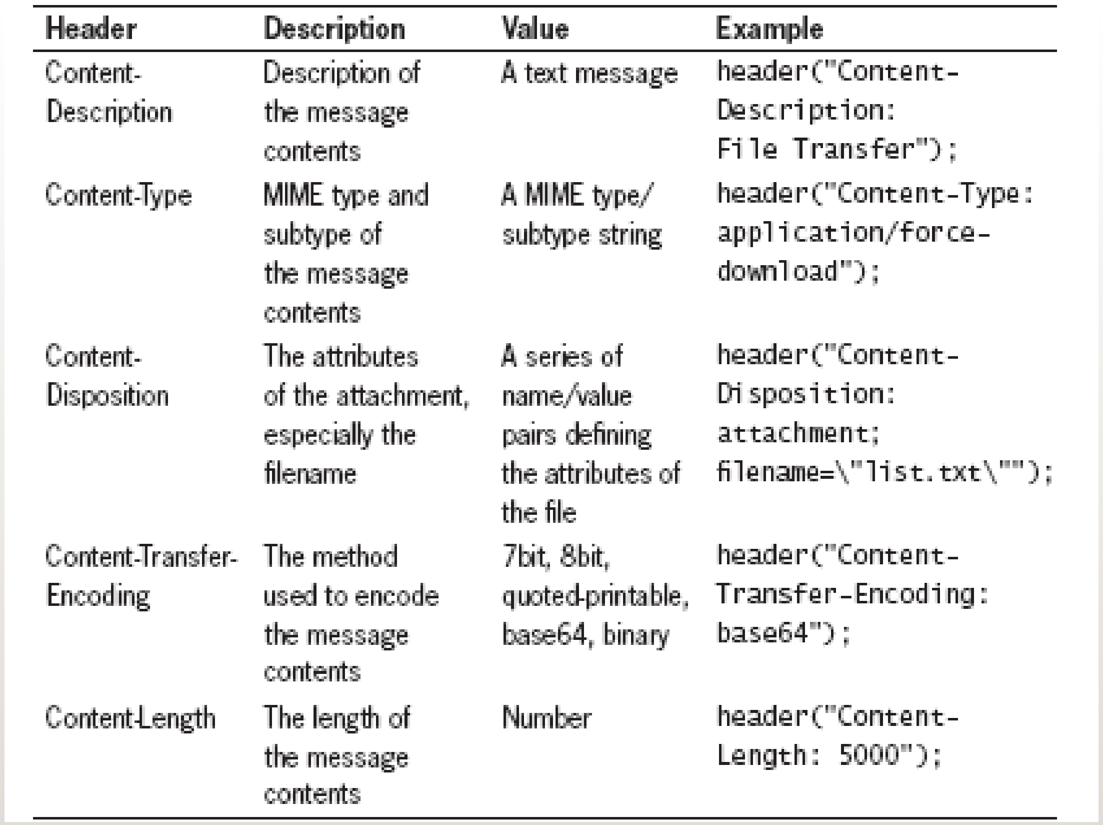
No file chosen

(500 kb limit)

DOWNLOADING FILES

- Files in the public HTML directory structure can be downloaded with an HTML hyperlink
- Files outside the public HTML directory require a three-step process:
  - Tell the script which file to download (can be used URL tokens)
  - Provide the appropriate headers
  - Send the file
- The headers must be send prior to any web content
- The `header()` function can be used to return header information to the Web browser

CONTENT HEADERS FOR DOWNLOADING A FILE



Header	Description	Value	Example
Content-Description	Description of the message contents	A text message	`header("Content-Description: File Transfer");`
Content-Type	MIME type and subtype of the message contents	A MIME type/subtype string	`header("Content-Type: application/force-download");`
Content-Disposition	The attributes of the attachment, especially the filename	A series of name/value pairs defining the attributes of the file	`header("Content-Disposition: attachment; filename=\"list.txt\"");`
Content-Transfer-Encoding	The method used to encode the message contents	7bit, 8bit, quoted-printable, base64, binary	`header("Content-Transfer-Encoding: base64");`
Content-Length	The length of the message contents	Number	`header("Content-Length: 5000");`

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DOWNLOADING FILES - EXAMPLE

WRITING AN ENTIRE FILE

- The `file_put_contents()` function writes or appends a text string to a file and returns the number of bytes written to the file
- The syntax is:

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

WRITING AN ENTIRE FILE - EXAMPLE

```
$EventVolunteers = "Blair, Dennis\n";
$EventVolunteers .= "Hernandez, Louis\n";
$EventVolunteers .= "Miller, Erica\n";
$EventVolunteers .= "Morinaga, Scott\n";
$EventVolunteers .= "Picard, Raymond\n";
$VolunteersFile = "volunteers.txt";
file_put_contents($VolunteersFile,
  $EventVolunteers);
```

WRITING AN ENTIRE FILE (CONTINUED)

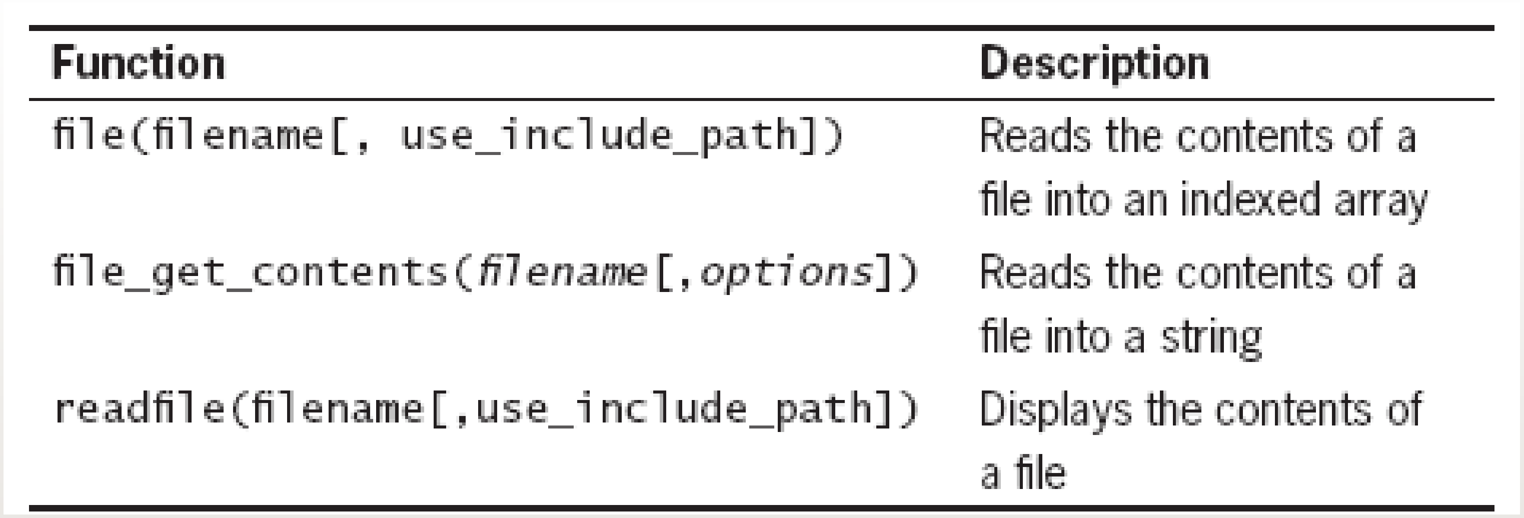
- If no data was written to the file, the function returns a value of `0`
- We can use the return value to determine whether data was successfully written to the file

```
if (file_put_contents($VolunteersFile, $EventVolunteers) > 0)
   echo "<p>Data was successfully written to the
                                     $VolunteersFile file.</p>";
else
   echo "<p>No data was written to the $VolunteersFile file.</p>";
```

WRITING AN ENTIRE FILE

- There are other arguments that can be pass to the `file_put_contents()`
  - The `FILE_USE_INCLUDE_PATH` constant searches for the specified filename in the path that is assigned to the `include_path` directive in the php.ini configuration file
  - The `FILE_APPEND` constant appends data to any existing contents in the specified filename instead of overwriting it

READING AN ENTIRE FILE



Function	Description
`file(filename[, use_include_path])`	Reads the contents of a file into an indexed array
`file_get_contents(`*`filename`*`[,`*`options`*`])`	Reads the contents of a file into a string
`readfile(filename[,use_include_path])`	Displays the contents of a file

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READING AN ENTIRE FILE (CONTINUED)

- The `file_get_contents()` function reads the entire contents of a file

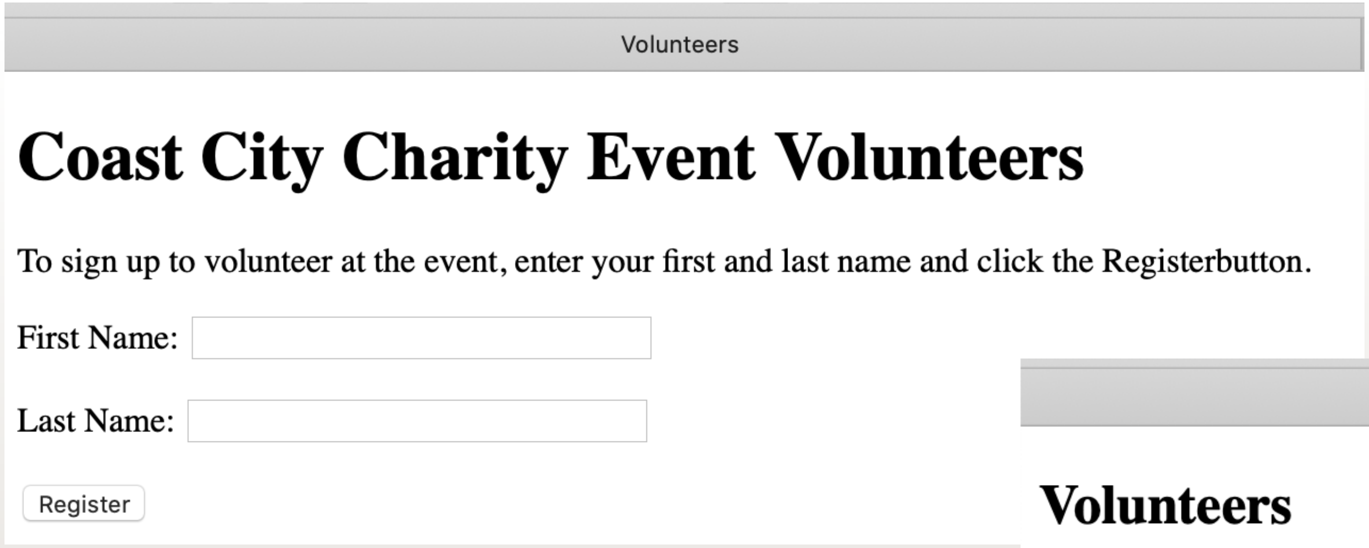
```
$myfile = file_get_contents("my_file.txt");
echo $ myfile;
```

- The `readfile()` function displays the contents of a text file to a Web browser

```
readfile(”my_file.txt");
```

- The `file()` function reads the entire contents of a file into an indexed array
  - Automatically recognizes whether the lines in a text file end in `\n`, `\r`, or `\r\n`, to assign the lines into the elements in the array

WRITING/READING AN ENTIRE FILE - EXAMPLE

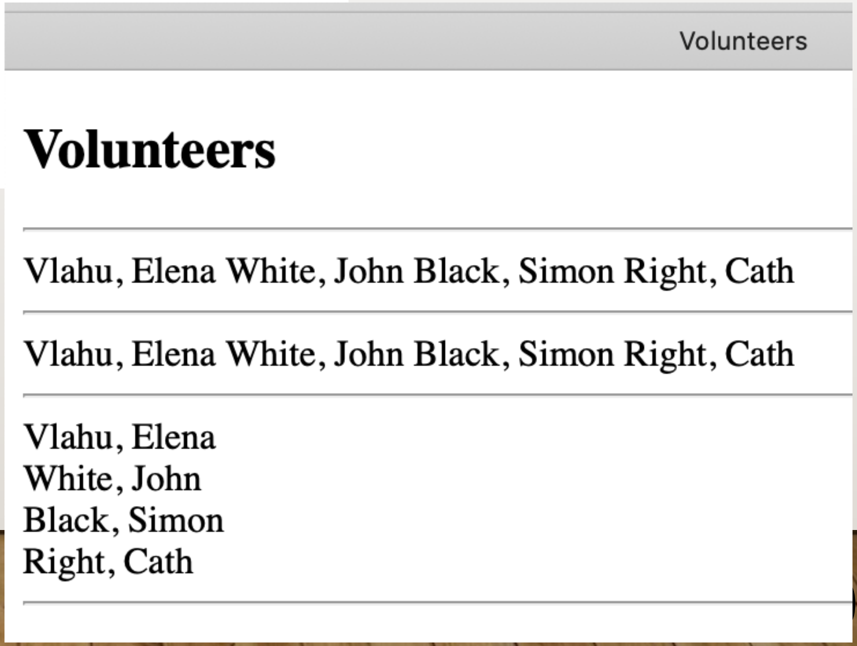


Coast City Charity Event Volunteers

To sign up to volunteer at the event, enter your first and last name and click the Registerbutton.

First Name:

Last Name:



Volunteers

Vlahu, Elena White, John Black, Simon Right, Cath

Vlahu, Elena White, John Black, Simon Right, Cath

Vlahu, Elena
White, John
Black, Simon
Right, Cath

OPENING AND CLOSING FILE STREAMS

- 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
- Using a file stream involves 3 steps:
  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

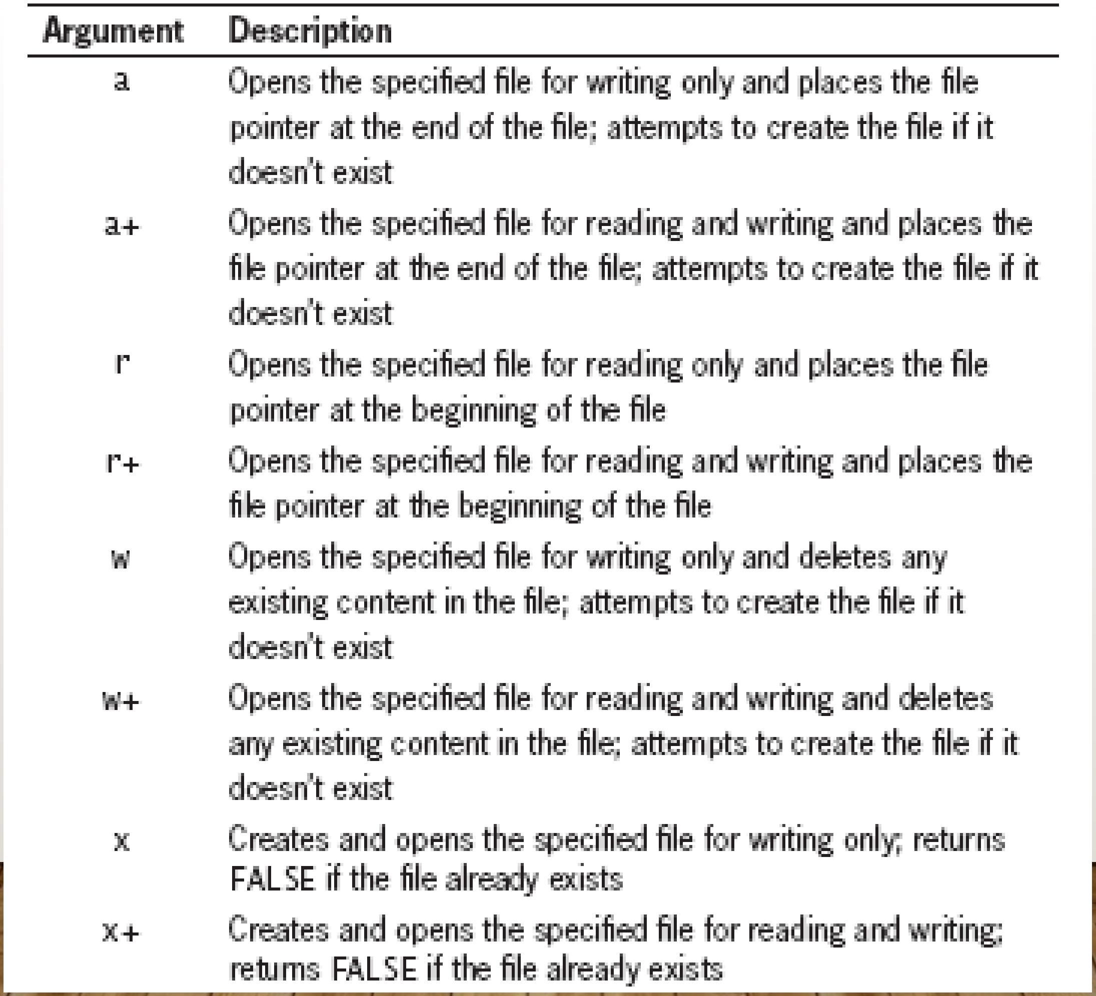
OPENING A FILE STREAM

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

```
open_file = fopen("text file", "method");
```

- A **file pointer** is a special type of variable that refers to the currently selected line or character in a file

METHOD ARGUMENTS FOR 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

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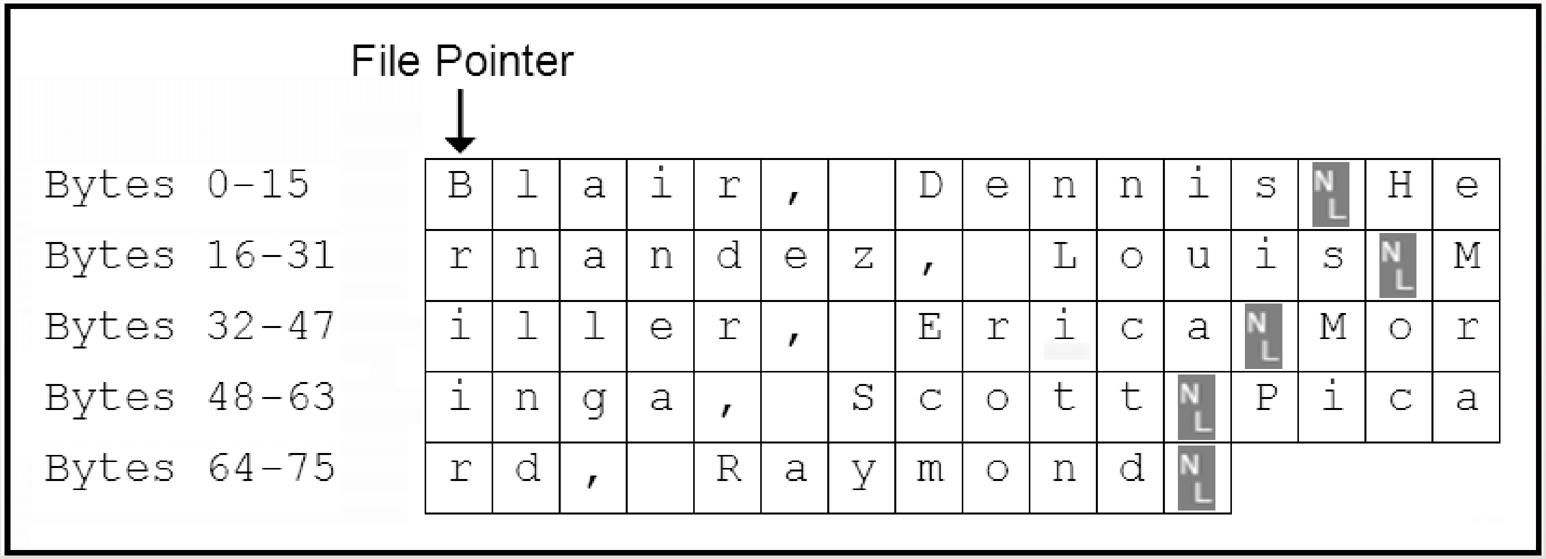
OPENING A FILE STREAM (CONTINUED)

```
$VolunteersFile = fopen("volunteers.txt", "r+");
```



Bytes 0-15	B	l	a	i	r	,		D	e	n	n	i	s	NL	H	e
Bytes 16-31	r	n	a	n	d	e	z	,		L	o	u	i	s	NL	M
Bytes 32-47	i	l	l	e	r	,		E	r	i	c	a	NL	M	o	r
Bytes 48-63	i	n	g	a	,		S	c	o	t	t	NL	P	i	c	a
Bytes 64-75	r	d	,		R	a	y	m	o	n	d	NL				

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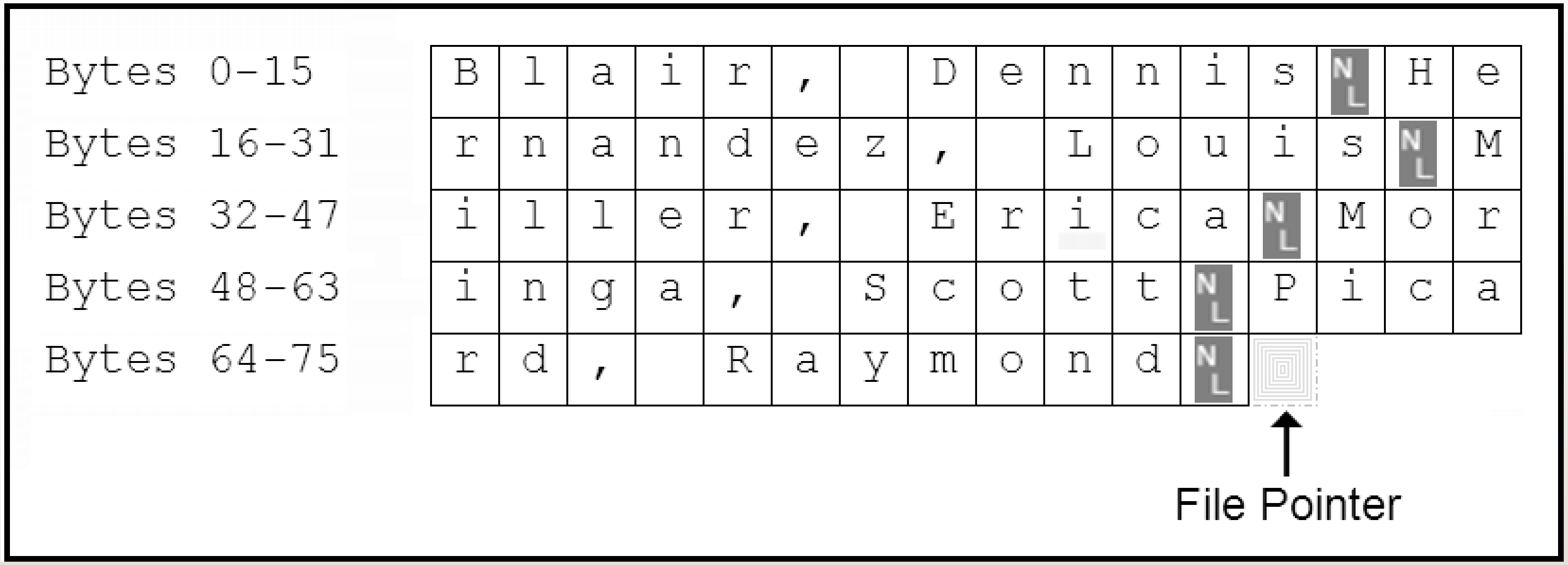
OPENING A FILE STREAM (CONTINUED)

```
$VolunteersFile = fopen(“volunteers.txt", “a+");
```



Bytes 0-15	B	l	a	i	r	,		D	e	n	n	i	s	NL	H	e
Bytes 16-31	r	n	a	n	d	e	z	,		L	o	u	i	s	NL	M
Bytes 32-47	i	l	l	e	r	,		E	r	i	c	a	NL	M	o	r
Bytes 48-63	i	n	g	a	,		S	c	o	t	t	NL	P	i	c	a
Bytes 64-75	r	d	,		R	a	y	m	o	n	d	NL				

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CLOSING A FILE STREAM

- Use the `fclose` function when finished working with a file stream to save space in memory
- Use the statement

```
fclose($handle);
```

to ensure that the file doesn't keep taking up space in your computer's memory and allow other processes to read to and write from the file

WRITING DATA INCREMENTALLY

- Use the `fwrite()` function to incrementally write data to a text file
- The syntax for the `fwrite()` function is:

  ```
  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`

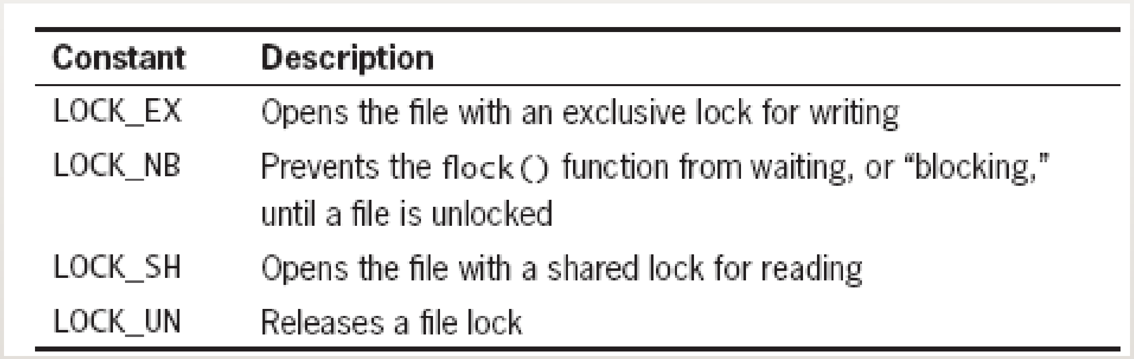
EXAMPLE

```php
$VolunteersFile = fopen("volunteers.txt", "ab");
fwrite($VolunteersFile, "Blair, Dennis\n");
fwrite($VolunteersFile, "Hernandez, Louis\n");
fwrite($VolunteersFile, "Miller, Erica\n");
fwrite($VolunteersFile, "Morinaga, Scott\n");
fwrite($VolunteersFile, "Picard, Raymond\n");
fclose($VolunteersFile);
```

LOCKING FILES

- To prevent multiple users from modifying a file simultaneously use the `flock()` function
- The syntax for the `flock()` function is:

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



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

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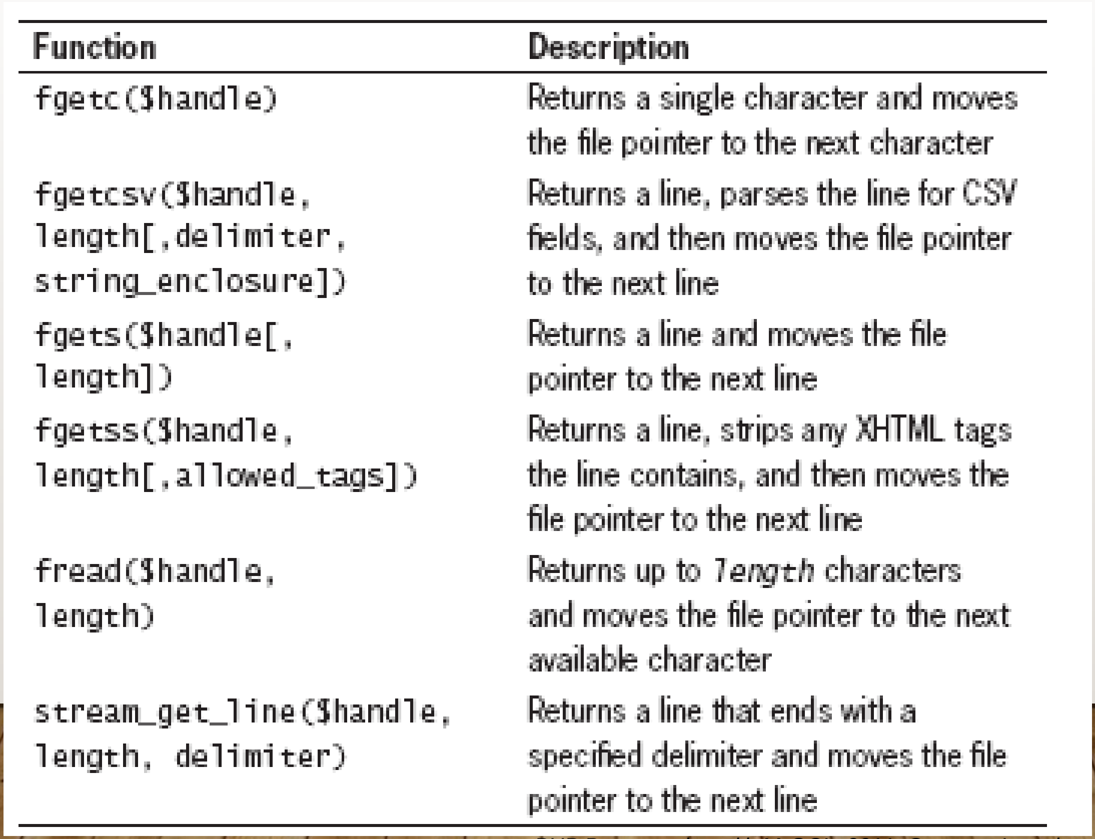
READING DATA INCREMENTALLY

- The `fgets()` function uses the file pointer to 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 XHTML tags the line contains, and then moves the file pointer to the next line
`fread($handle, length)`	Returns up to *length* characters and moves the file pointer to the next available character
`stream_get_line($handle, length, delimiter)`	Returns a line that ends with a specified delimiter and moves the file pointer to the next line

PHP Programming with MySQL, 2011, Cengage Learning.

READING DATA INCREMENTALLY (CONTINUED)

- You must use `fopen()` and `fclose()` with the functions listed in Table
- The `feof()` function returns a value of TRUE when a file pointer reaches the end of a file
  - it accepts a single argument containing the handle for the open file

READING/WRITING INCREMENTALLY IN THE FILE – EXAMPLE

- Visitors feedback

MANAGING FILES AND DIRECTORIES

- PHP can be used to manage files and the directories that store them
- Among the file directory and management tasks for files and directories are
  - Copying
  - Moving
  - Renaming
  - Deleting

COPYING AND MOVING FILES

- Use the `copy()` function to copy a file with PHP
- The function returns a value of `TRUE` if it is successful or `FALSE` if it is not
- The syntax for the `copy()` function is:

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

- For the *source* and *destination* arguments:
  - Include just the name of a file to make a copy in the current directory, or
  - Specify the entire path for each argument

COPYING AND MOVING FILES - EXAMPLE

```
if (copy("$Source/$Entry", "$Destination/$Entry"))
   echo "One file copied\n";
else
   echo "Could not copy the file \n";
```

RENAMING FILES AND DIRECTORIES

- Use the `rename()` function to rename a file or directory with PHP
- The `rename()` function returns a value of true if it is successful or false if it is not
- The syntax for the `rename()` function is:

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

REMOVING FILES AND DIRECTORIES

- Use the `unlink()` function to delete files and the `rmdir()` function to delete directories (it does not work unless the directory is empty)
- Pass the name of a file to the `unlink()` function and the name of a directory to the `rmdir()` function
- Both functions return a value of 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 delete it