Talking to Other Websites and Services

Chapter 11

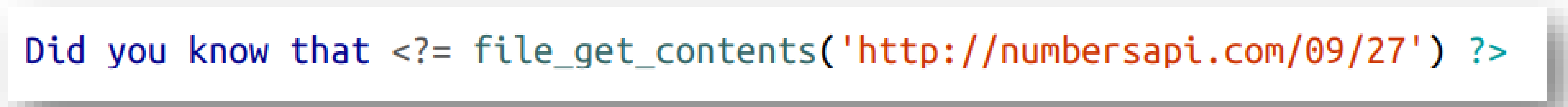
Data From Other Websites

- Databases and files are 2 sources of data
- another important external source of data: other websites.
- Your program can be client or server (provider) of data to other websites

- What is an API? (Application Programming Interface)
- It is a software Interface that allows two applications to talk to each other.
- Example:
  - When you use an App on your mobile phone, the App connects to the Internet and sends data to a server.
  - The server then retrieves that data, interprets it, performs the necessary actions and sends it back to your phone.
  - The App then interprets that data and presents you with the information you wanted in a readable way.

Simple URL Access with File Functions

- We can use file_get_contents() to access remote files by their URL



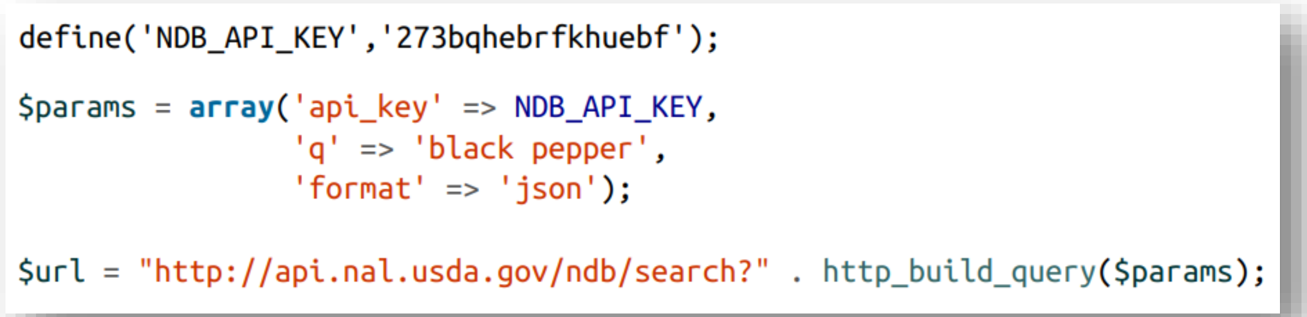
```
Did you know that <?= file_get_contents('http://numbersapi.com/09/27') ?>
```

- Check yourself: numbersapi.com/09/27

Simple URL Access with File Functions

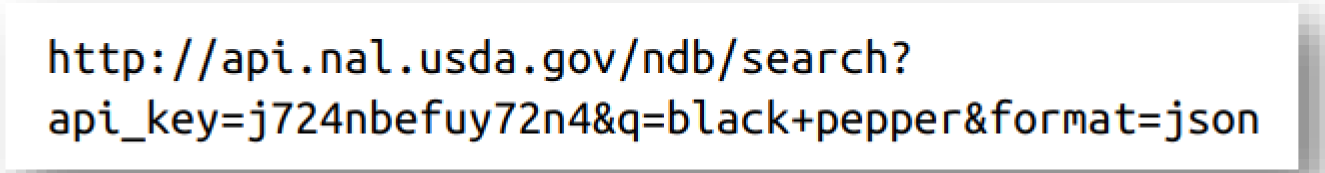
- http_build_query() is useful for building an API URL
  - Give it an associative array of parameter names and values and it gives you back a string of key=value pairs joined by & and properly encoded—exactly what you need for a URL.

- Some servers (e.g., usda.gov) need you to provide a key to access an API



```php
define('NDB_API_KEY','273bqhebrfkhuebf');

$params = array('api_key' => NDB_API_KEY,
                'q' => 'black pepper',
                'format' => 'json');

$url = "http://api.nal.usda.gov/ndb/search?" . http_build_query($params);
```

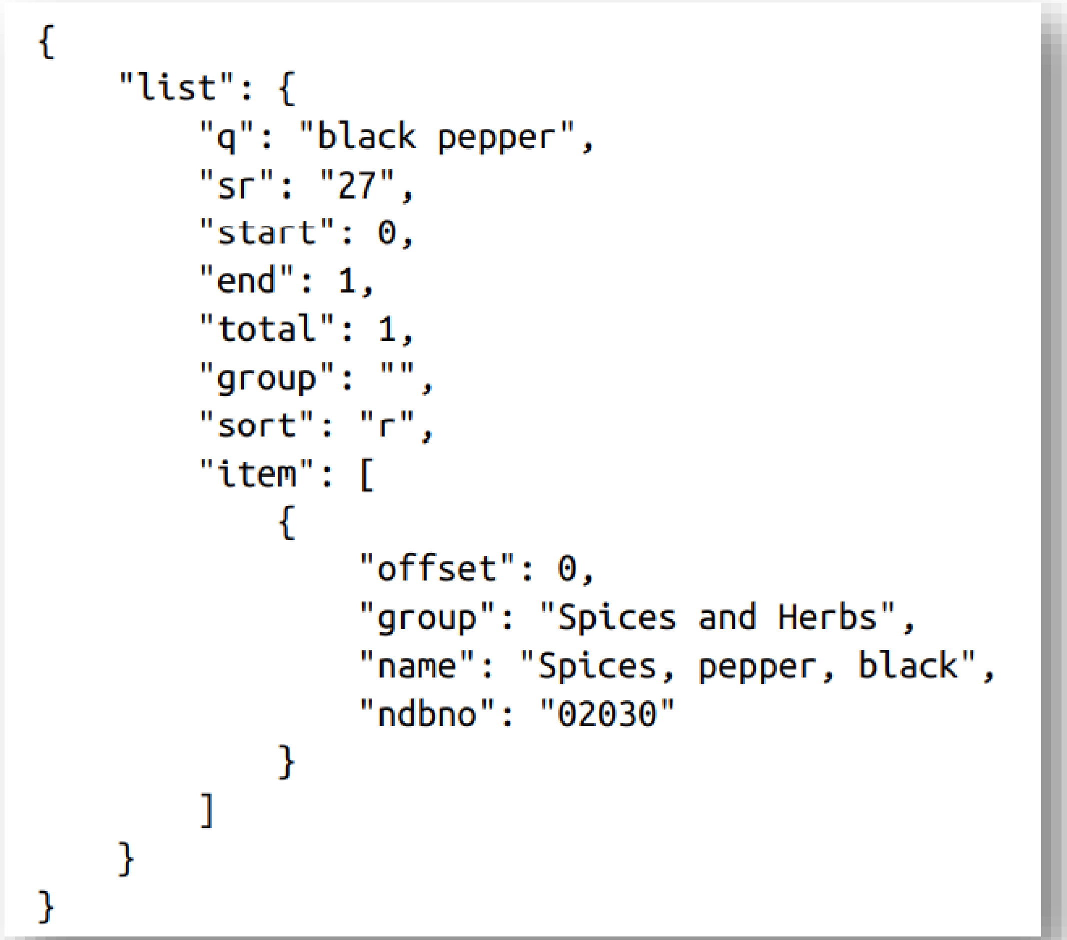
- The Built Query (URL):



```
http://api.nal.usda.gov/ndb/search?
api_key=j724nbefuy72n4&q=black+pepper&format=json
```

JSON as responce

- After calling file_get_contents($url), the API returns JSON



```
{
    "list": {
        "q": "black pepper",
        "sr": "27",
        "start": 0,
        "end": 1,
        "total": 1,
        "group": "",
        "sort": "r",
        "item": [
            {
                "offset": 0,
                "group": "Spices and Herbs",
                "name": "Spices, pepper, black",
                "ndbno": "02030"
            }
        ]
    }
}
```

What is JSON?

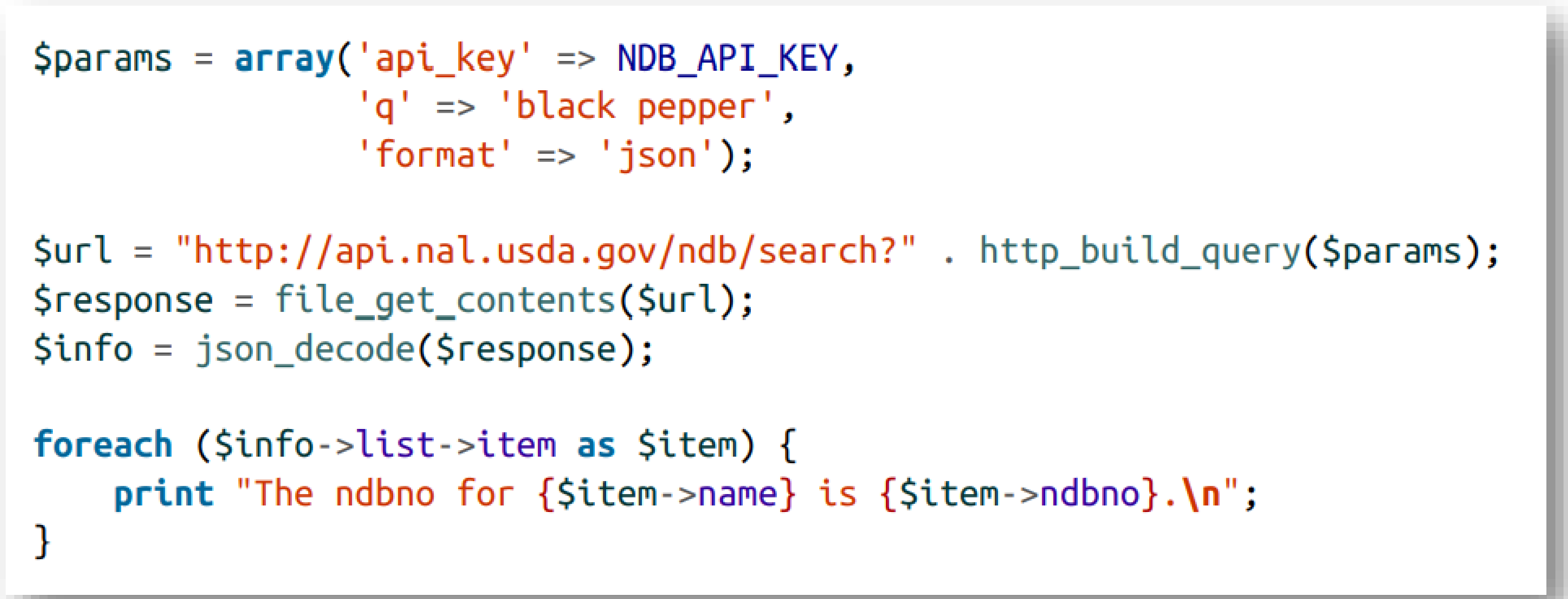
- JSON: JavaScript Object Notation

- JSON is a text format for storing and transporting data
- JSON is "self-describing" and easy to understand
- Data is written in JavaScript Object notation
- JSON Syntax is derived from JavaScript but JSON is supported by many programming languages.

- JSON Introduction (w3schools.com)

JSON as responce

- Pass the JSON response above to json_decode() to transform the JSON into a PHP data structure you can manipulate.



```php
$params = array('api_key' => NDB_API_KEY,
                'q' => 'black pepper',
                'format' => 'json');

$url = "http://api.nal.usda.gov/ndb/search?" . http_build_query($params);
$response = file_get_contents($url);
$info = json_decode($response);

foreach ($info->list->item as $item) {
    print "The ndbno for {$item->name} is {$item->ndbno}.\n";
}
```

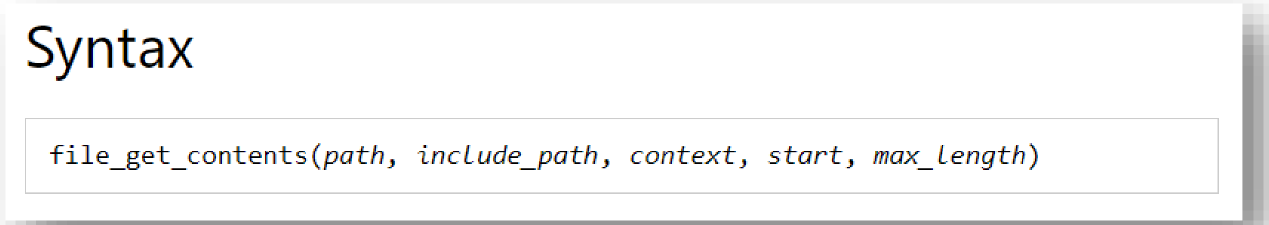
JSON to a PHP Data Structure

- The json_decode() function turns:
  - JSON objects into PHP objects
  - JSON arrays into PHP arrays
  - The top-level item in the response is an object.

- The NDB API call returns JSON because of the format=json query string parameter.
- The API also supports specifying the response format by sending a Content-Type header.
  - A header value of application/json tells the server to format the response as JSON.
  - The context is also how you send a POST request

Setting the Header for POST request

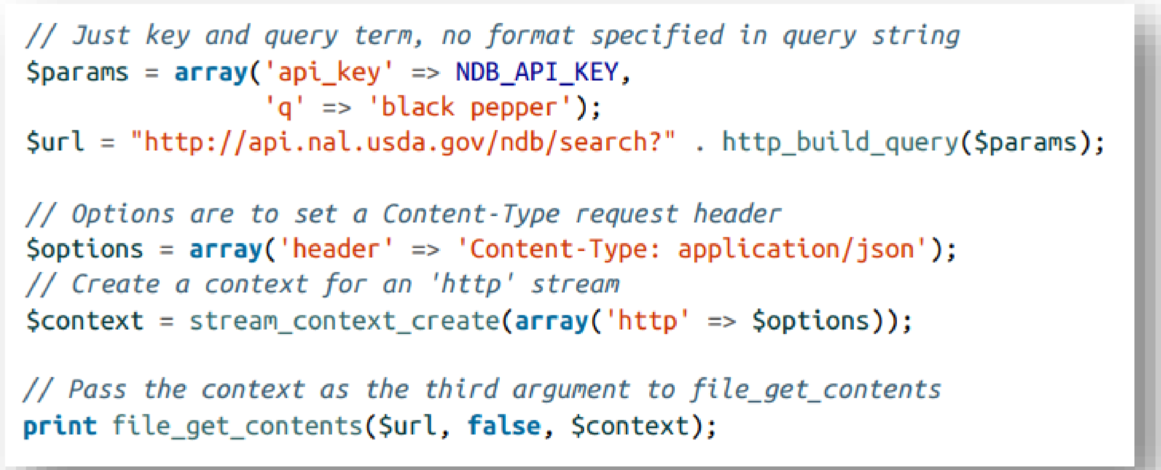
- stream_context_create() function is used for setting the header



Syntax

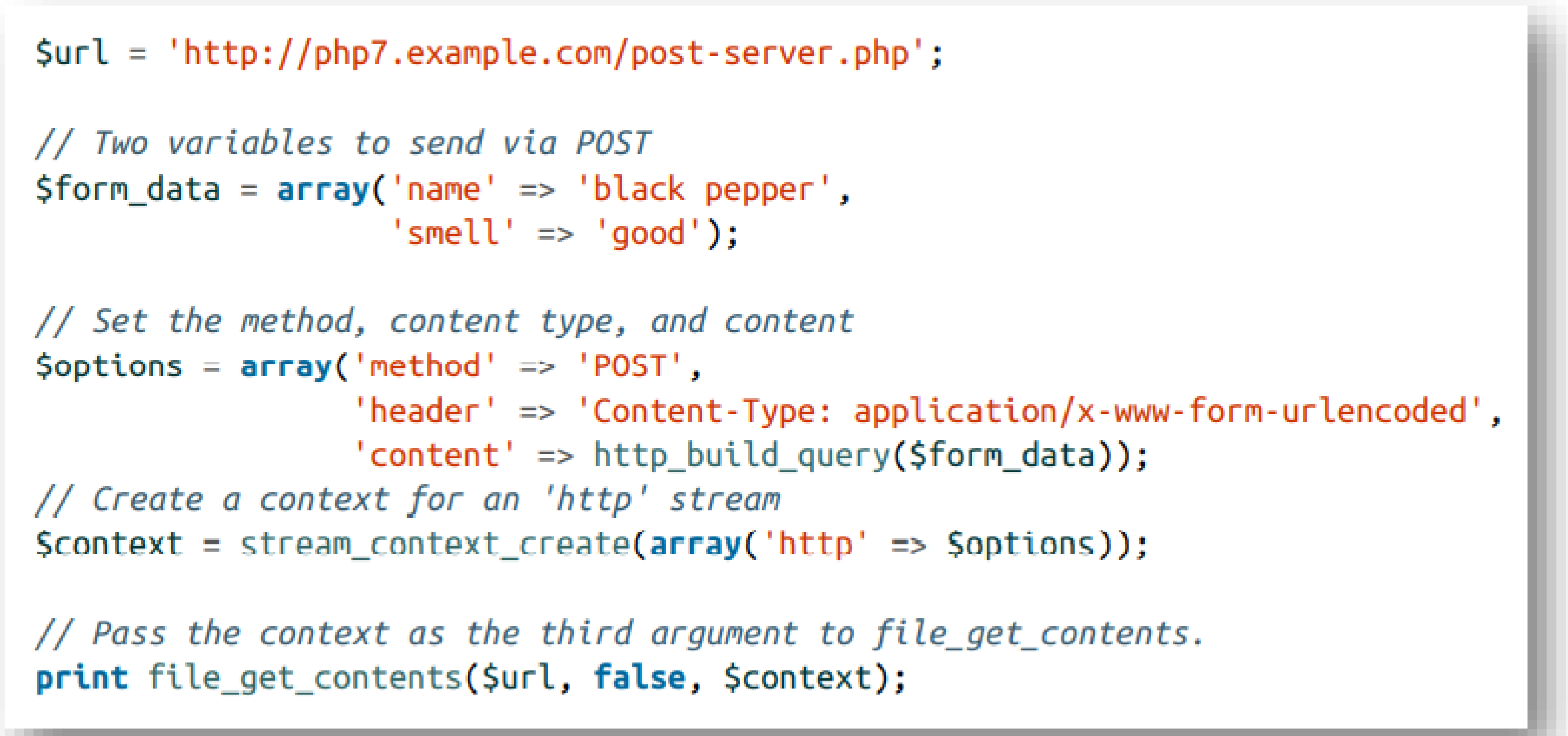
```
file_get_contents(path, include_path, context, start, max_length)
```

- include_path is optional, but mandatory if you want to set context
  - Set it to true or '1' if you want to search for the file in the include_path (in php.ini) as well, else set it to false



```
// Just key and query term, no format specified in query string
$params = array('api_key' => NDB_API_KEY,
                'q' => 'black pepper');
$url = "http://api.nal.usda.gov/ndb/search?" . http_build_query($params);

// Options are to set a Content-Type request header
$options = array('header' => 'Content-Type: application/json');
// Create a context for an 'http' stream
$context = stream_context_create(array('http' => $options));

// Pass the context as the third argument to file_get_contents
print file_get_contents($url, false, $context);
```

Sending a POST request

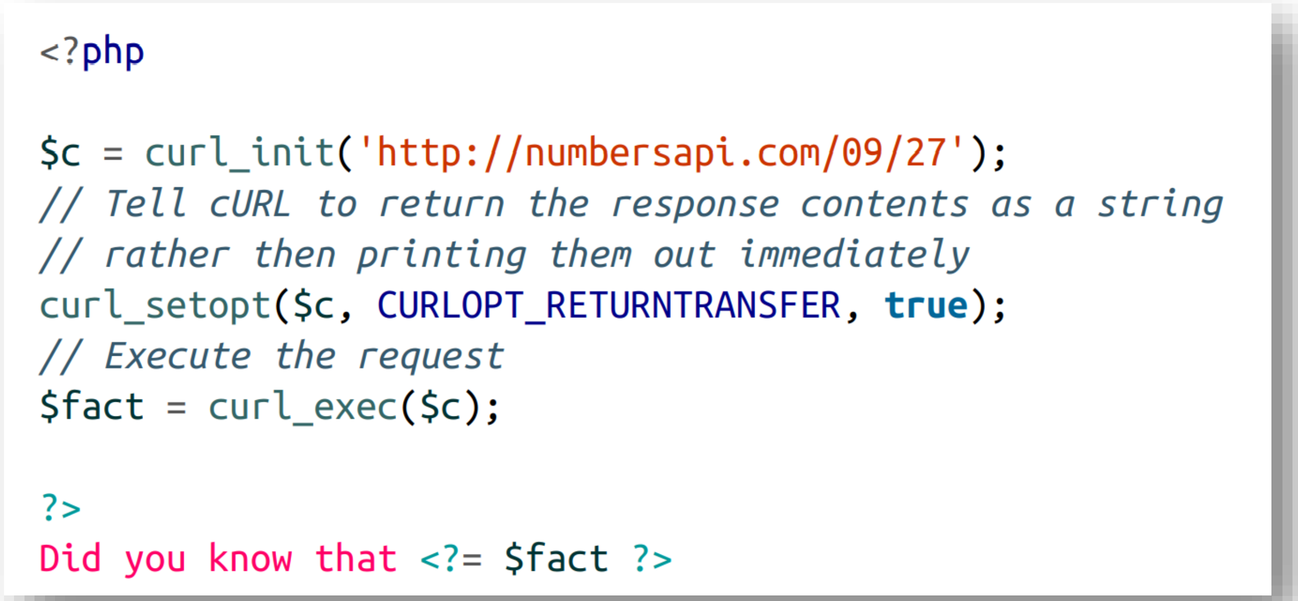


```php
$url = 'http://php7.example.com/post-server.php';

// Two variables to send via POST
$form_data = array('name' => 'black pepper',
                   'smell' => 'good');

// Set the method, content type, and content
$options = array('method' => 'POST',
                 'header' => 'Content-Type: application/x-www-form-urlencoded',
                 'content' => http_build_query($form_data));
// Create a context for an 'http' stream
$context = stream_context_create(array('http' => $options));

// Pass the context as the third argument to file_get_contents.
print file_get_contents($url, false, $context);
```

Using cURL

- PHP's **cURL functions** using **libcurl** provides powerful HTTP requests and responses
- Three steps:
  - curl_init() : returns a handle
  - curl_setopt() : set options
  - curl_exec() : the request is retrieved

- **CURLOPT_RETURNTRANSFER** option asks cURL to return the response as a string, otherwise it is printed out.



```php
<?php

$c = curl_init('http://numbersapi.com/09/27');
// Tell cURL to return the response contents as a string
// rather then printing them out immediately
curl_setopt($c, CURLOPT_RETURNTRANSFER, true);
// Execute the request
$fact = curl_exec($c);

?>
Did you know that <?= $fact ?>
```

Using cURL

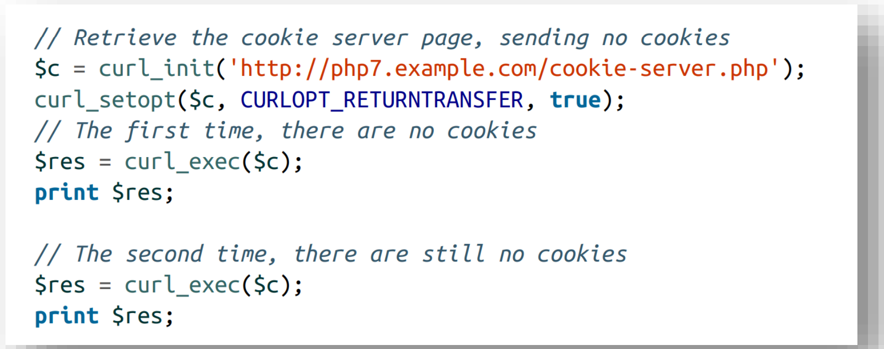
Two kinds of **errors** when using cURL:

- **Error from cURL itself:** not **finding the host**, or **not being able to connect** to the remote server
  - *curl_exec() returns false*
  - *curl_errno() reurns an error code*
  - *curl_error() returns the error message corresponding to the code*
- **Error from the remote server:** the **URL not found** by the server, or it **has a problem producing a response**
  - NOTE *cURL consider this case successful because the server returns something*
  - *You need to check the HTTP response code*
  - *curl_getinfo() returns an **array** about the request. One in that array is the **HTTP response code**.*

```php
// A pretend API endpoint that doesn't exist
$c = curl_init('http://api.example.com');
curl_setopt($c, CURLOPT_RETURNTRANSFER, true);
$result = curl_exec($c);
// Get all the connection info, whether or not it succeeded
$info = curl_getinfo($c);

// Something went wrong with the connection
if ($result === false) {
    print "Error #" . curl_errno($c) . "\n";
    print "Uh-oh! cURL says: " . curl_error($c) . "\n";
}
// HTTP response codes in the 400s and 500s mean errors
else if ($info['http_code'] >= 400) {
    print "The server says HTTP error {$info['http_code']}.\n";
}
else {
    print "A successful result!\n";
}
// The request info includes timing statistics as well
print "By the way, this request took {$info['total_time']} seconds.\n";
```

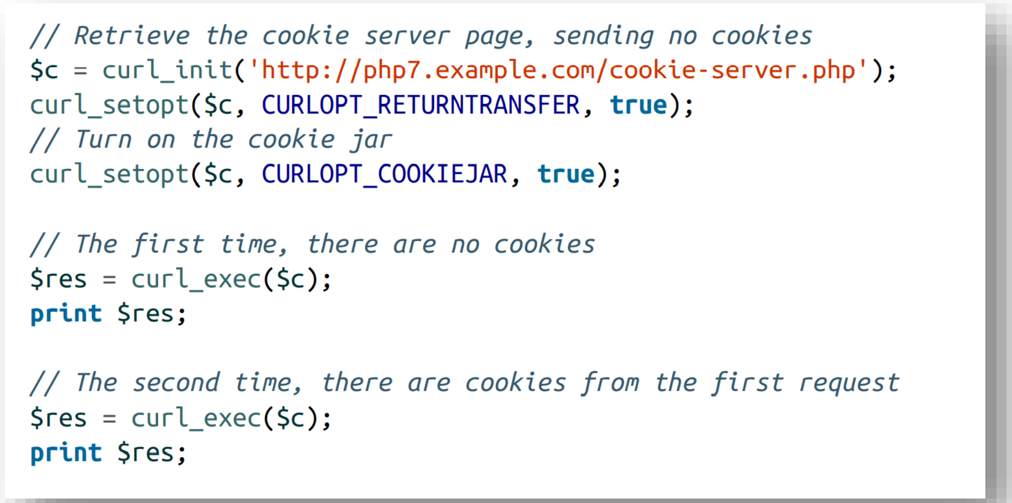
Using Cookies with cURL

- By default, If the response to a cURL request includes a header that sets a cookie, cURL ignores it.



```php
// Retrieve the cookie server page, sending no cookies
$c = curl_init('http://php7.example.com/cookie-server.php');
curl_setopt($c, CURLOPT_RETURNTRANSFER, true);
// The first time, there are no cookies
$res = curl_exec($c);
print $res;

// The second time, there are still no cookies
$res = curl_exec($c);
print $res;
```

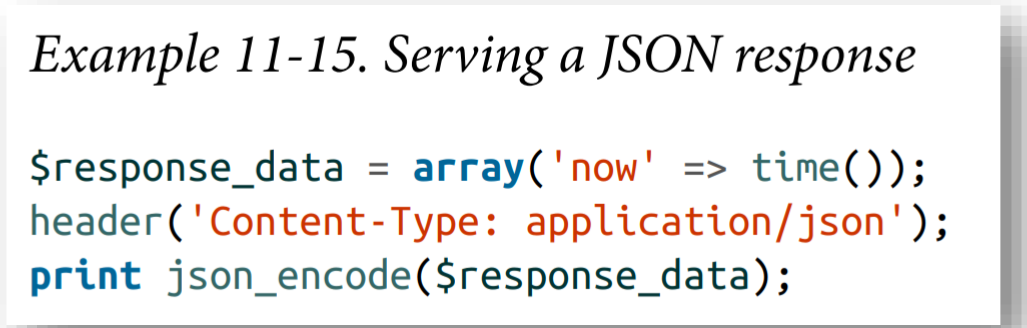
- Enable cURL's cookie jar to keep track of cookies. set CURLOPT_COOKIEJAR to true
  - In this mode, the cookie jar only tracks cookies within a handle.



```php
// Retrieve the cookie server page, sending no cookies
$c = curl_init('http://php7.example.com/cookie-server.php');
curl_setopt($c, CURLOPT_RETURNTRANSFER, true);
// Turn on the cookie jar
curl_setopt($c, CURLOPT_COOKIEJAR, true);

// The first time, there are no cookies
$res = curl_exec($c);
print $res;

// The second time, there are cookies from the first request
$res = curl_exec($c);
print $res;
```

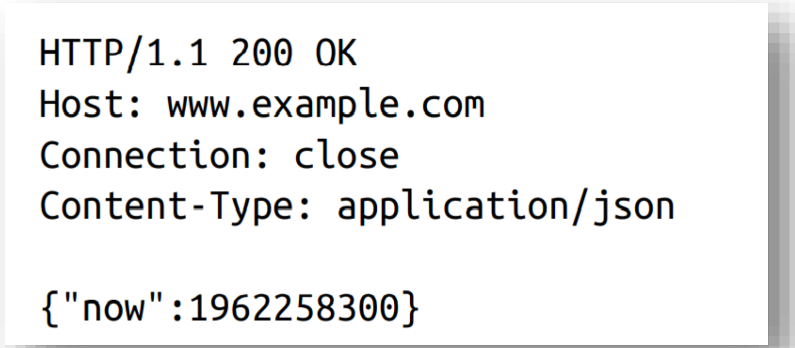
Serving API Requests

- Your PHP program can serve API requests to clients.
- You can generate data for the client, also HTTP response header
- To send an HTTP header along with your response, use the header().



Example 11-15. Serving a JSON response

```php
$response_data = array('now' => time());
header('Content-Type: application/json');
print json_encode($response_data);
```



```
HTTP/1.1 200 OK
Host: www.example.com
Connection: close
Content-Type: application/json

{"now":1962258300}
```

Exercises

1. *http://php.net/releases/?json* is a JSON feed of the latest PHP releases. Write a program that uses `file_get_contents()` to retrieve this feed and print out the latest version of PHP released.
2. Modify your program from the previous exercise to use cURL instead of `file_get_contents()`.
3. Write a web page that uses a cookie to tell the user when he last looked at the web page (you may find the date-and-time-handling functions described in Chapter 15 useful).
4. A GitHub *gist* is a snippet of text or code that is easy to share. The GitHub API allows you to create gists without logging in. Write a program that creates a gist whose contents are the program you're writing to create a gist. Note that the GitHub API requires you to set a `User-Agent` header in your HTTP API requests. The `CURLOPT_USERAGENT` setting can be used to set this header.