JavaScript, Sixth Edition

Chapter 11 Solutions

Short Quiz 1

1. Name two data formats that can be used with Ajax.

JSON and XML.

1. What does the XMLHttpRequest object do?

The XMLHttpRequest object—commonly referred to as the XHR object—uses HTTP to exchange data between a client computer and a web server. Unlike standard HTTP requests, which usually replace the entire page in a web browser, the XMLHttpRequest object can be used to request and receive data without reloading a web page.

1. Explain the relationship between a proxy and JavaScript’s same-origin policy when creating an Ajax request.

The same-origin policy restricts how JavaScript code in one tab (or window or frame) accesses a web page in another tab on a client computer. For tabs to view and modify the elements and properties of documents displayed in other tabs, they must use the same protocol (such as HTTP) and exist on the same web server. Historically, an Ajax app that used JavaScript could not use the XMLHttpRequest object to directly access content on another domain’s server; the data requested with the XMLHttpRequest object had to be located on the web server where the JavaScript program is running. In other words, you could not directly bypass your own web server and grab data off someone else’s web server. The same-origin policy applies only to JavaScript, and not to other programs running on a web server. This means that you can use a server-side script as a proxy to access data from another domain. In computer terms, a proxy refers to a server that acts for or performs requests for other clients and servers. The server-side proxy script can return the data to the client computer as it is requested with the XMLHttpRequest object. Using a proxy remains a common technique for working around the same-origin policy to access third-party content.

Short Quiz 2

1. How many lines does an HTTP message have, and what is the content of each line?

4 lines.

* *Start line (request method or status returned)*
* *Header lines (zero or more)*
* *Blank line*
* *Message body (optional)*

1. What is the function of the Cache-Control header, and what value should you generally specify for this header when requesting data with Ajax?

The Cache-Control header specifies how a web browser should cache any server content it receives. Caching refers to the temporary storage of data for faster access. Most web browsers try to reduce the amount of data that needs to be retrieved from a server by caching retrieved data on a local computer. If caching is enabled in a web browser, the browser will attempt to locate any necessary data in its cache before making a request from a web server. While this technique improves web browser performance, it goes against the reason for using Ajax, which is to dynamically update portions of a web page with the most recent data from a server. For this reason, you should always include the Cache-Control header when creating an Ajax connection, and you should assign it a value of no-cache.

1. Explain the meaning of the HTTP status codes 304 and 404.

304: Not Modified. The client already has the current version of the requested content.

404: Not Found. The requested URL was not found.

Short Quiz 3

1. What is the purpose of keeping an HTTP connection open and reusing it, rather than closing it?

Opening and closing HTTP connections represent a significant bottleneck in loading a web page, increasing the amount of time it takes for a document to load. To improve performance between client requests and server responses, HTTP/1.1 automatically keeps the client-server connection open until the client or server explicitly closes it by assigning a value of close to the Connection header. This means that you can make your Ajax programs faster by reusing an instantiated XMLHttpRequest object instead of re-creating it each time you send a server request.

1. What method should you call before beginning a new HTTP request using an existing XMLHttpRequest object, and why?

When you reuse an existing XMLHttpRequest object, it may already be in the process of sending a request to the server. To improve performance, you should call the abort() method of the XMLHttpRequest object to cancel any existing HTTP requests before beginning a new one.

1. What XMLHttpRequest property references the non-XML results of an HTTP request?

responseText

Short Quiz 4

1. What is the first step in working with the contents of a JSON string returned as the value of the responseText property?

To work with the contents of a JSON string, you first use the parse() method of the JavaScript JSON object to convert the string to an object.

1. What is the difference between a synchronous and an asynchronous request?

A synchronous request stops processing the JavaScript code until a response is returned from the server. An asynchronous request allows JavaScript to continue processing while it waits for a server response.

1. To ensure that your script continues running if a server problem occurs, should you use a synchronous or asynchronous request? Why?

To ensure that your script continues running if a server problem occurs, you should use asynchronous requests with the send() method.

Although synchronous responses are easier to handle than asynchronous responses, one major drawback is that a script will not continue processing until a synchronous response is received. Therefore, if the server doesn’t respond for some reason (perhaps because it is running slowly due to high traffic or maintenance requirements), your web page will appear to be unresponsive. Users can stop the script by clicking the browser’s Stop button. However, a synchronous request with the send() method does not contain any mechanism for specifying the length of time allowed for receiving a response.

Short Quiz 5

1. What is JSON-P? What is CORS?

JSON with padding, or JSON-P, requests JSON content using a script element rather than an XMLHttpRequest object. With Cross-Origin Resource Sharing, or CORS, the server for a web service sends a special HTTP response header that indicates that the response data may be used on other domains.

1. List at least one advantage and one disadvantage of using XHR with a proxy, JSON-P, and CORS.

|  |  |  |
| --- | --- | --- |
| **Strategy** | **Advantages** | **Disadvantages** |
| XHR with proxy | Enables use of XHR object for any request.  Can be used with XML, JSON, or other text data.  Supported by almost all browsers in use. | Requires web server configuration.  Requires knowledge of PHP. |
| JSON-P | Allows direct request without a proxy.  Supported by almost all browsers in use. | Response data must be JSON.  Any password or API key is exposed to the end user. |
| CORS | Allows direct request without a proxy.  Can be used with XML, JSON, or other text data.  Purpose-built, not a workaround.  Supported by current versions of all modern browsers. | Not yet widely supported by web services.  Not supported by IE8 or IE9. |

1. Describe the potential security implications of using JSON-P.

It’s important to recognize that incorporating content from another domain using JSON-P opens a potential security hole in your website. If the site from which you’re requesting data is compromised by malicious code, the content you receive from that site is a potential route to attack your site as well. For this reason, it’s important to use JSON-P only with a web service that you trust.

In addition, a JSON-P request that requires authentication such as a password or API key exposes these sensitive credentials to end users. For this reason, you should generally use JSON-P that requires authentication only with trusted users, such as in an app that is used only by your organization’s employees.

# Review Questions

* + - 1. Which object uses HTTP to exchange data between a client computer and a web server?
         1. JSON
         2. Math
         3. XMLHttpRequest
         4. Ajax
      2. A server that acts for or performs requests for other clients and servers is a(n) \_\_\_\_\_\_\_\_\_\_\_.
         1. proxy
         2. Ajax
         3. request
         4. response
      3. A data source made available on one domain for use on other domains across the web is a(n) \_\_\_\_\_\_\_\_\_\_.
         1. server
         2. web service
         3. HTTP server
         4. HTTP client
      4. Which of the following is the first step in using Ajax to update data?
         1. Receive the response from the server, containing the requested data.
         2. Process the data returned from the server and incorporate the data into the app.
         3. Use the XMLHttpRequest object to send a request to the server.
         4. Instantiate an XMLHttpRequest object for the web browser where the script will run.
      5. When a user’s browser asks a web server for a web page, the process is known as a(n) \_\_\_\_\_\_\_\_\_\_.
         1. header
         2. request
         3. response
         4. host
      6. A web server’s reply when a user’s browser asks for a web page is known as a(n) \_\_\_\_\_\_\_\_\_\_.
         1. header
         2. request
         3. response
         4. host
      7. The temporary storage of data for faster access is known as \_\_\_\_\_\_\_\_\_\_.
         1. parsing
         2. caching
         3. a request
         4. a response
      8. An HTTP response code indicating a successful request begins with which digit?
         1. 1
         2. 2
         3. 3
         4. 4
      9. Which property of an XMLHttpRequest object contains a JSON string returned from a web service?
         1. value
         2. innerHTML
         3. responseXML
         4. responseText
      10. Which type of request stops processing JavaScript code until a response is returned from the server?
          1. Synchronous
          2. Asynchronous
          3. JSON
          4. XML
      11. Which type of request allows JavaScript to continue processing while it waits for a server response?
          1. Synchronous
          2. Asynchronous
          3. JSON
          4. XML
      12. When using an asynchronous request, you cannot process the response until the readyState property is assigned a value of \_\_\_\_\_\_\_\_\_\_.
          1. 1
          2. 2
          3. 3
          4. 4
      13. Which method of updating content involves the server for a web service explicitly indicating that data may be used on other domains?
          1. Ajax
          2. Ajax with a proxy
          3. JSON-P
          4. CORS
      14. Which of the following does a JSON-P request use?
          1. An XMLHttpRequest object
          2. A script element
          3. A proxy
          4. A meta element
      15. Which response header is used by CORS?
          1. Vary
          2. Server
          3. Access-Control-Allow-Origin
          4. Location
      16. Explain how a proxy is used for an Ajax request.

The same-origin policy applies only to JavaScript, and not to other programs running on a web server. This means that you can use a server-side script as a proxy to access data from another domain. The server-side proxy script can return the data to the client computer as it is requested with the XMLHttpRequest object. Using a proxy remains a common technique for working around the same-origin policy to access third-party content.

* + - 1. What is the difference between a standard HTTP request and a request that uses the XMLHttpRequest object?

Unlike standard HTTP requests, which usually replace the entire page in a web browser, the XMLHttpRequest object can be used to request and receive data without reloading a web page.

* + - 1. Why do you need to run an app using Ajax from a web server to test it rather than opening it as a local file?

Opening a local file in a web browser requires the use of the file:/// protocol. Because Ajax relies on the XMLHttpRequest object to retrieve data, you must open your Ajax files from a web server with the HTTP (http://) or HTTPS (https://) protocol.

* + - 1. Why do you not normally send a Connection header with a value of close?

Opening and closing HTTP connections represent a significant bottleneck in loading a web page, increasing the amount of time it takes for a document to load. To improve performance between client requests and server responses, HTTP/1.1 automatically keeps the client-server connection open until the client or server explicitly closes it by assigning a value of close to the Connection header. This means that you can make your Ajax programs faster by reusing an instantiated XMLHttpRequest object instead of re-creating it each time you send a server request.

* + - 1. Explain why incorporating content from another domain using JSON-P opens a potential security hole in your website.

If the site from which you’re requesting data is compromised by malicious code, the content you receive from that site is a potential route to attack your site as well. For this reason, it’s important to use JSON-P only with a web service that you trust. In addition, a JSON-P request that requires authentication such as a password or API key exposes these sensitive credentials to end users. For this reason, you should generally use JSON-P that requires authentication only with trusted users, such as in an app that is used only by your organization’s employees.

## Individual Case Project

Identify data provided by an Ajax service that you’d like to include in your personal website. You should choose a web service other than those used in the chapter and the Hands-on Projects. If you have an idea for data you’d like to access but are unsure what service might provide that data, perform a web search on a description of the data plus “API.” For instance, if you were looking for a source of tide tables, you might search for “tide tables API.” Use the documentation for the web service to construct an Ajax request and to display selected data from the service on your website. Note that if you don’t have experience with writing PHP, you may need to examine a number of potential APIs to identify one that allows JSON-P or CORS requests, which don’t require you to run a proxy.

**Grading rubric:** Students should submit a revised version of their individual website that’s been enhanced with data retrieved via Ajax. Students may use a PHP proxy, JSON-P, or CORS. The API used should not be one of those used in the chapter or in the Hands-On Projects.

## Group Case Project

Identify data provided by an Ajax service that you’d like to include in your group website. You should choose a web service other than those used in the chapter, the Hands-on Projects, or the Individual Case Project of any group member. If you have an idea for data you’d like to access but are unsure what service might provide that data, perform a web search on a description of the data plus “API.” For instance, if you were looking for a source of tide tables, you might search for “tide tables API.” Use the documentation for the web service to construct an Ajax request and to display selected data from the service on your website. Note that if no one in your group has experience with writing PHP, you may need to examine a number of potential APIs to identify one that allows JSON-P or CORS requests, which don’t require you to run a proxy.

**Grading rubric:** Students should submit a revised version of their group website that’s been enhanced with data retrieved via Ajax. Students may use a PHP proxy, JSON-P, or CORS. The API used should not be one of those used in the chapter, in the Hands-On Projects, or in any group member’s Individual Case Project.