Exploration — HTTP Status Code

Introduction

In this exploration, we will study HTTP status codes in more detail.

Response Status Codes

The first line of an HTTP response is the status line with the format `HTTP/Version Status-code Reason-phrase`. The status code indicates whether a specific HTTP request completed successfully or if it encountered an error or if some further action needs to be taken.

PowerPoint Slide Show - Module 8 E2 Response Codes.pptx - PowerPoint
HTTP Response
CS 290
Oregon State University
Slide 1 of 6
0:00 / 20:06
1x

The status codes are 3 digit numbers with the first digit defining the category of the response. The HTTP standard groups the status codes in the following 5 categories:

100-199: Informational responses

- Status codes in this category indicate that the request was received and the server is continuing to process it.
- You are unlikely to encounter informational response codes.

200-299: Successful responses

- Status codes in this category indicate that the request was successfully processed by the server.
- For example, if a CRUD operation was successfully executed to process the request, the response code should be in 200s.
- Here are some commonly used response codes in this category:

Code	Reason-Phrase	Notes
200	OK	The request succeeded and the response body has the needed information. The server will send this response code for successful requests in many cases, e.g., `GET` requests, `DELETE` and `PUT` requests if information about deleted/updated resources is being sent back in the body.
201	Created	The request succeeded and a new resource was created. Typically, a `POST` request will return 201 status code on success. Typically, the response with 201 status code includes the URL of the newly created resource in the response header `Content-Location`.
204	No content	The request succeeded. However, there is no content to return in the body. A typical use case is when the server has successfully processed a `DELETE` or `PUT` request, but there is no other information that the server is sending back beyond reporting the success of the request.

300-399: Redirection

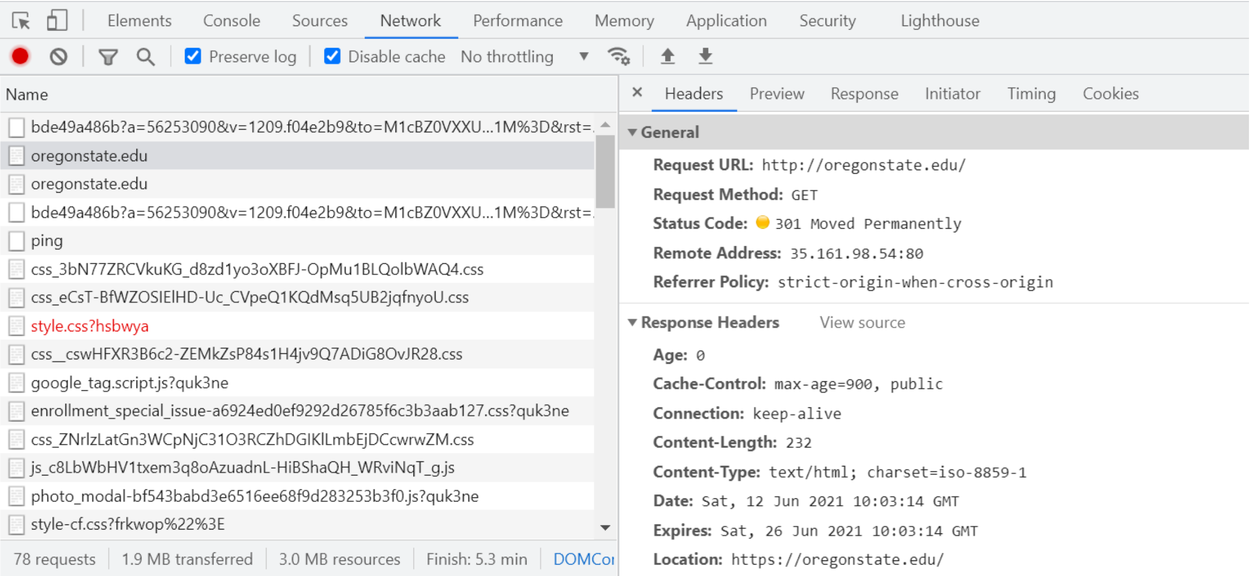
- The server sends back status codes in this category when the client needs to take additional action to complete the request.
- These codes are mostly used for URL redirection.
- For example, now most websites are configured to redirect requests that use `http` as the scheme in the URL to instead use a URL with `https` as the scheme. The URL to use is in the response header `Location`. By default, browsers automatically follow the redirect and send a request for the `https` URL, making the redirect transparent to the end-user.
- Here are some commonly used response codes in this category:

Code	Reason-Phrase	Notes

Code	Reason-Phrase	Notes
301	Moved Permanently	The resource has permanently moved. Follow the URI in the location header and in future send requests to that URI.
302	Found	The resource has temporarily moved. Follow the URI in the location header, but do not change the request URI in future requests.
303	See Other	Server is redirecting to another resource whose URI is in the location header. For example, a resource was created and its URI is in the location header.
304	Not Modified	The resource has not modified. Essentially the server is telling the client to use the cached copy of the resource.

Example: Redirection

- Open your browser and "Dev Tools," and go to the "Network" tab in "Dev Tools"
- Enter the URL `http://oregonstate.edu/` in the browser.
- You will see a lot of network traffic logged in the "Network" tab.
- Towards the top you should see a response with status code `301 Moved Permanently`.
- The `Location` header in this response has the value `https://oregonstate.edu/`.
- The URL in the browser is now `https://oregonstate.edu/` because the browser automatically sent a request for this URL after receiving the response with `301` status code.



Name
- bde49a486b?a=56253090&v=1209.f04e2b9&to=M1cBZ0VXXU...1M%3D&rst=
- oregonstate.edu
- oregonstate.edu
- bde49a486b?a=56253090&v=1209.f04e2b9&to=M1cBZ0VXXU...1M%3D&rst=
- ping
- css_3bN77ZRCVkuKG_d8zd1yo3oXBFJ-OpMu1BLQolbWAQ4.css
- css_eCsT-BfWZOSIElHD-Uc_CVpeQ1KQdMsq5UB2jqfnyoU.css
- style.css?hsbwya
- css__cswHFXR3B6c2-ZEMkZsP84s1H4jv9Q7ADiG8OvJR28.css
- google_tag.script.js?quk3ne
- enrollment_special_issue-a6924ed0ef9292d26785f6c3b3aab127.css?quk3ne
- css_ZNrlzLatGn3WCpNjC31O3RCZhDGIKlLmbEjDCcwrwZM.css
- js_c8LbWbHV1txem3q8oAzuadnL-HiBShaQH_WRviNqT_g.js
- photo_modal-bf543babd3e6516ee68f9d283253b3f0.js?quk3ne
- style-cf.css?frkwop%22%3E

78 requests | 1.9 MB transferred | 3.0 MB resources | Finish: 5.3 min | DOMCo

▾ General

Request URL: `http://oregonstate.edu/`
Request Method: `GET`
Status Code: ● `301 Moved Permanently`
Remote Address: `35.161.98.54:80`
Referrer Policy: `strict-origin-when-cross-origin`

▾ Response Headers   View source

Age: `0`
Cache-Control: `max-age=900, public`
Connection: `keep-alive`
Content-Length: `232`
Content-Type: `text/html; charset=iso-8859-1`
Date: `Sat, 12 Jun 2021 10:03:14 GMT`
Expires: `Sat, 26 Jun 2021 10:03:14 GMT`
Location: `https://oregonstate.edu/`

An HTTP request for http://oregonstate.edu/ receives a response with 301 status code. In the response, the value of the Location header is set to https://oregonstate.edu/.

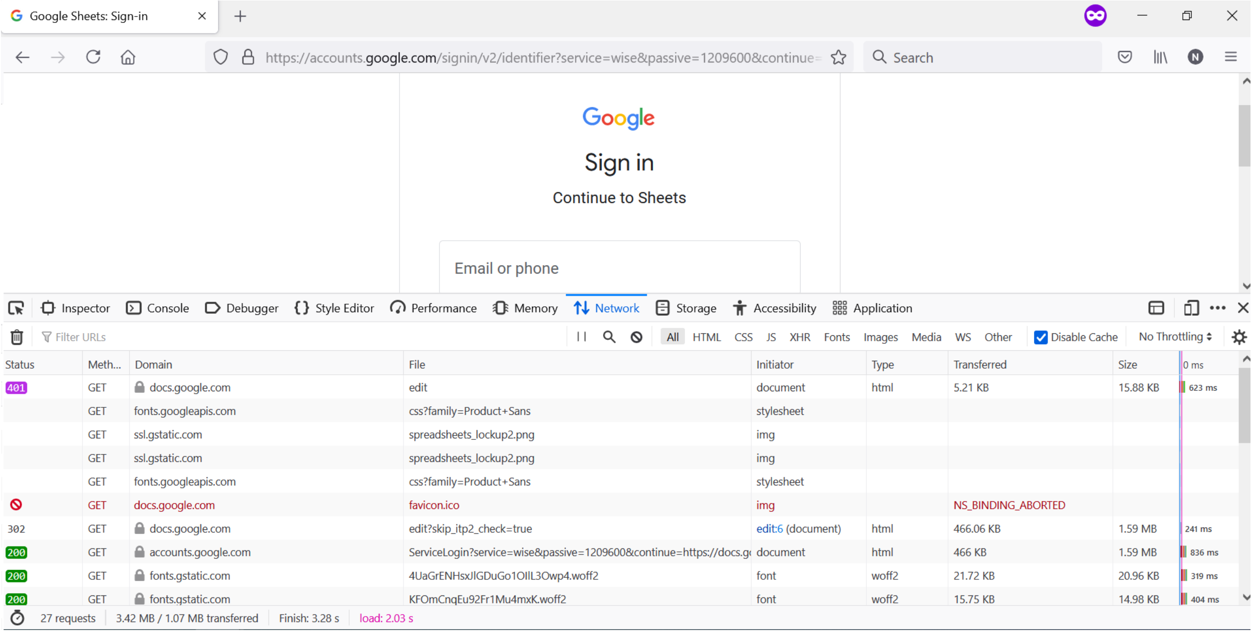
400-499: Client errors

- The server program sends back a response in this category when the request was not valid and the server program could not fulfill it.
- Here are some commonly used response codes in this category:

Code	Reason-Phrase	Notes
400	Bad Request	The server cannot process the request because of a client error. For example, when a request is missing some required parameter.
401	Unauthorized	The requested resource requires authentication, but the client is not authenticated, i.e., the server does not know who is making the request.
403	Forbidden	The client is authenticated but is not authorized to access the requested resource. In other words, the server knows who is making the request, but the requestor does not have privileges to carry out the requested operation on the resource.
404	Not Found	The requested resource is not found on the server.

Example: 401

- Find the URL of an existing document in Google Drive.
- Open a Firefox browser and “Dev Tools,” and go to the “Network” tab in “Dev Tools.”
- Without being logged into Google (e.g., using a private window), enter the URL of the document.
- You will see a lot of network traffic logged in the “Network” tab.
- Towards the top, you should see a response with status code `401`.
- This status code is being returned because:
  - Google Drive needs to know who is accessing this document to verify if they are authorized to access the document,
  - However, the identity of who is making the request is not known.



Status	Meth...	Domain	File	Initiator	Type	Transferred	Size	0 ms
401	GET	docs.google.com	edit	document	html	5.21 KB	15.88 KB	623 ms
	GET	fonts.googleapis.com	css?family=Product+Sans	stylesheet				
	GET	ssl.gstatic.com	spreadsheets_lockup2.png	img				
	GET	ssl.gstatic.com	spreadsheets_lockup2.png	img				
	GET	fonts.googleapis.com	css?family=Product+Sans	stylesheet				
⃠	GET	docs.google.com	favicon.ico	img		NS_BINDING_ABORTED		
302	GET	docs.google.com	edit?skip_itp2_check=true	edit:6 (document)	html	466.06 KB	1.59 MB	241 ms
200	GET	accounts.google.com	ServiceLogin?service=wise&passive=1209600&continue=https://docs.g	document	html	466 KB	1.59 MB	836 ms
200	GET	fonts.gstatic.com	4UaGrENHsxJlGDuGo1OIlL3Owp4.woff2	font	woff2	21.72 KB	20.96 KB	319 ms
200	GET	fonts.gstatic.com	KFOmCnqEu92Fr1Mu4mxK.woff2	font	woff2	15.75 KB	14.98 KB	404 ms

27 requests | 3.42 MB / 1.07 MB transferred | Finish: 3.28 s | load: 2.03 s

HTTP requests and responses in Firefox for a request to a document in Google Drive without being logged into Google.

500-599: Server errors

- Status codes in this category are sent by a server when the request seemed valid, but the server fails to successfully process it.
- We should typically log such error responses in our server programs so that we can investigate them and fix the issues that caused the error.
- Here are some examples where a server error could be reported:

Code	Reason-Phrase	Notes
500	Internal Server Error	This error code is typically a result of a coding error. For example, if our code throws an exception, and we do not catch and handle it correctly, it can get reported as `500` status code by the Express server.
502	Bad Gateway	This error code is typically sent by the web server when it receives an invalid response from some other server, or a request it sent to another server times out. Misconfiguration can sometimes cause these errors.
503	Service Unavailable	This error code is sent by the server when it is not capable of handling a request. This might happen because the server is overloaded or it is down for maintenance.

Example: 503

On 8th June 2021, many high-profile websites, including Amazon, Reddit, Twitch, etc., were inaccessible in many parts of the world for a few hours. The reason was a software bug that impacted the servers of Fastly, a company that provides caching services for the content of the affected companies. During this period, websites of many of the impacted companies were sending back `503` status codes.

Summary

In this exploration, we looked at the different categories of HTTP status codes and their use cases.

Additional Resources

Here are some references to learn more about the topics we discussed in this exploration.

- **Section 6.1 of RFC 7321** **(https://datatracker.ietf.org/doc/html/rfc7231#section-6.1)** lists status codes. But there are additional extension status code. **The complete list** **(https://www.iana.org/assignments/http-status-codes/http-status-codes.xhtml)** is maintained by IANA.
- A list of **HTTP status codes** **(https://developer.mozilla.org/en-US/docs/Web/HTTP/Status)** with descriptions is available at MDN.
- **One** **(https://www.theguardian.com/technology/2021/jun/08/edge-cloud-error-tuesday-internet-outage-fastly-speed)** of the many news reports on web outage caused by Fastly on 8th June, 2021.