

Forcing Firefox to Execute XSS Payloads during 302 Redirects

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Content

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Forcing Firefox to Execute XSS Payloads during 302 Redirects

Initial Discovery

During a recent engagement I identified an open redirect where a GET parameter would be reflected as-is in the HTTP response Location header without any kind of sanitization. Something similar to this:

Request					Response				
Raw	Params	Headers	Hex	Hackvector	Raw	Headers	Hex	Hackvector	
1					1				HTTP/1.0 302 Found
2					2				Server: BaseHTTP/0.6 Python/3.5.2
3					3				Date: Wed, 30 Sep 2020 12:52:40 GMT
4					4				Content-type: text/html
5					5				Location: https://www.gremwell.com
6					6				
					7				

Trying multiple kinds of injections, I discovered that newlines and carriage returns characters could be inserted, leading to header injection:

Request					Response			
Raw	Params	Headers	Hex	Hackvector	Raw	Headers	Hex	Hackvector
1				GET /!redir= https://www.gremwell.com%0AInjected-Header:%20value HTTP/1.1	1	HTTP/1.0 302 Found		
2		Host: acme.corp			2	Server: BaseHTTP/0.6 Python/3.5.2		
3		Accept: /*/*			3	Date: Wed, 30 Sep 2020 12:55:13 GMT		
4		Connection: close			4	Content-type: text/html		
5					5	Location: https://www.gremwell.com		
6					6	Injected-Header: value		
					7			
					8			

Even more interesting, we can inject arbitrary content in the HTTP response body by inserting two newline characters, leading to reflected cross-site scripting:

Request					Response				
Raw	Params	Headers	Hex	Hackvector	Raw	Headers	Hex	Render	Hackvector
1				GET /!redir= https://www.gremwell.com%0AInjected-Header:%20value%0A%0A<script>alert(1)</script> HTTP/1.1	1	HTTP/1.0 302 Found			
2		Host: acme.corp			2	Server: BaseHTTP/0.6 Python/3.5.2			
3		Accept: /*/*			3	Date: Wed, 30 Sep 2020 12:57:11 GMT			
4		Connection: close			4	Content-type: text/html			
5					5	Location: https://www.gremwell.com			
6					6	Injected-Header: value			
					7				
					8				
					9	<script>			
					10	alert(1)			
					11	</script>			

However, modern browsers (Google Chrome, Internet Explorer, Firefox) do not interpret the HTTP response body if the HTTP response status code is a 302, so our cross-site scripting payload is useless. Time to find a bypass !

Prior Work

By searching for prior bypasses, I stumbled upon this [blog post](#) where Fortinet describes how they bypassed the execution block by setting the Location header to a URI starting with 'mailto://'. [Bugcrowd forums](#) also provides some insight into bypasses that may have worked in the past. And this excellent [HackerOne report](#) on XSS affecting Twitter, where they used a Location header starting with '//x:1/' definitely sent me in the right direction.

Let's Fuzz

Given that none of the already documented bypasses worked, I decided to write a dumb fuzzer that would generate a list of URLs and open them with xdg-open. To do so, I downloaded the [IANA URI schemes list](#) and generated a list of URLs following this format: `http://acme.corp/?redir=[URI_SCHEME]://gremwell.com%0A%0A[XSS_PAYLOAD]`. Google Chrome and Firefox were tested in this way, Internet Explorer was also tested but with a PowerShell script rather than simply calling xdg-open.

I then spent quite some time closing browser tabs, hoping to be greeted with an alert box :)

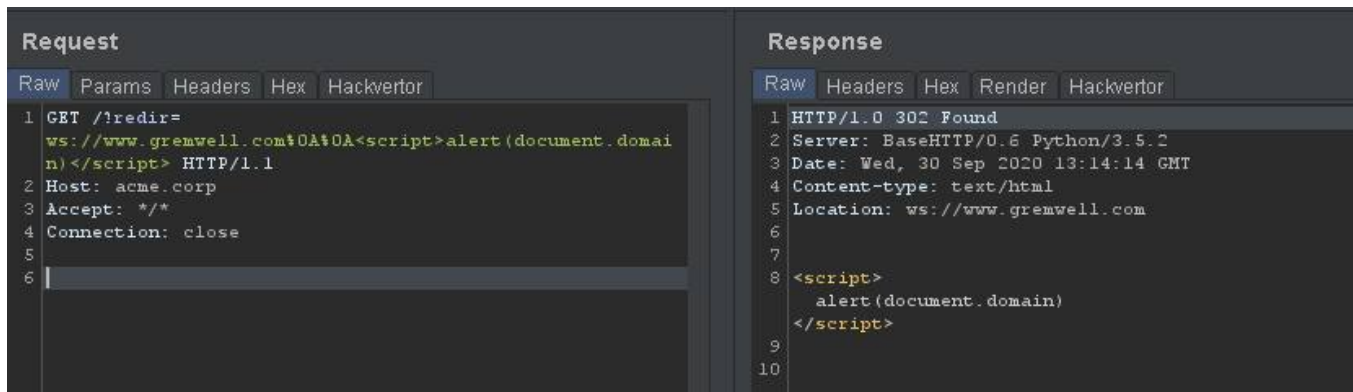
A Valid Candidate

Two candidates out of the full IANA URI scheme list worked, and only on Firefox:

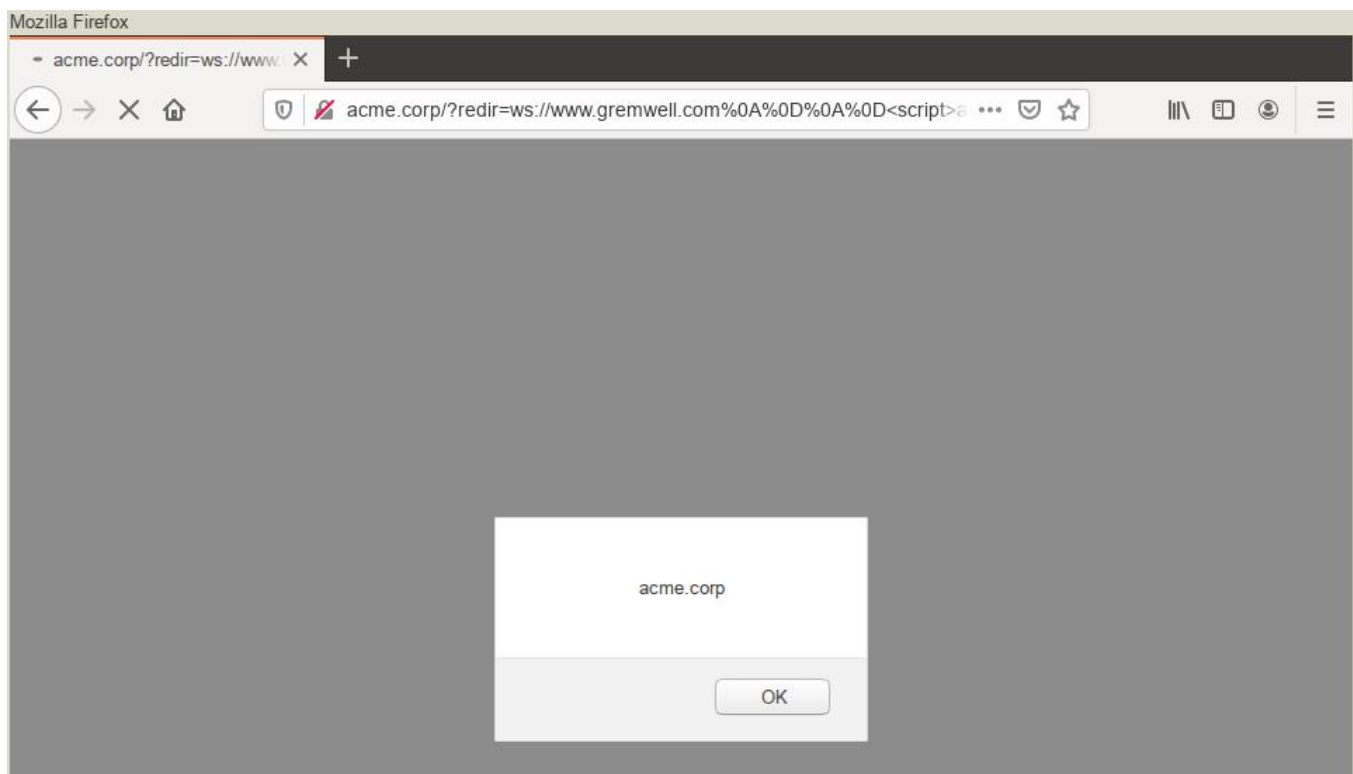
- ws:// (WebSocket)

- wss:// (Secure WebSocket).

It simply looks like this:



Opening the link in the latest version of Firefox (version 81 at the time of writing) and we see we are executing JavaScript under the right domain, without being redirected:



Proof-of-Concept

If you want to test this at home, you can download the [302_server](#) script. It will launch a Python3 HTTP server on port 8000, mimicking the behavior I just described.

Update - October 1st 2020

[Sergey Bobrov](#) just [pointed out](#) that using an empty Location header will work to force Google Chrome to execute the payload. Nice find !

Update - October 2nd 2020

[Maxim Rupp](#) just [pointed out](#) that using an resource:// URI in the Location header will work to force Firefox 81 to execute the payload. Nice find !

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