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New issue

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heap-buffer-overflow in libsixel/src/quant.c:876 #156

⊙ Open **a4865g** opened this issue on Sep 1, 2021 · 0 comments

a4865g commented on Sep 1, 2021

Hi,I found a heap-buffer-overflow in the current master 6a5be8b
I build `img2sixel` with `ASAN` ,this is ASAN report.

OS: Ubuntu 20.04.3 LTS x86_64
Kernel: 5.11.0-27-generic

POC: poc.zip

```
$ ./img2sixel -o ./a.sixel -7 -p 1 -C 5 -d stucki -E size ~/Downloads/poc
=================================================================
==2216856==ERROR: AddressSanitizer: heap-buffer-overflow on address 0x62e00000c3fd at pc
0x7ffff74e5a7e bp 0x7fffffffc340 sp 0x7fffffffc330
READ of size 1 at 0x62e00000c3fd thread T0
    #0 0x7ffff74e5a7d in error_diffuse /home/wulearn/Desktop/testtt/libsixel/src/quant.c:876
    #1 0x7ffff74e6027 in diffuse_stucki /home/wulearn/Desktop/testtt/libsixel/src/quant.c:1002
    #2 0x7ffff74e8154 in sixel_quant_apply_palette
/home/wulearn/Desktop/testtt/libsixel/src/quant.c:1417
    #3 0x7ffff74eab2b in sixel_dither_apply_palette
/home/wulearn/Desktop/testtt/libsixel/src/dither.c:801
    #4 0x7ffff74d9d9c in sixel_encode_dither
/home/wulearn/Desktop/testtt/libsixel/src/tosixel.c:830
    #5 0x7ffff74e1c75 in sixel_encode /home/wulearn/Desktop/testtt/libsixel/src/tosixel.c:1551
    #6 0x7ffff7535f3b in sixel_encoder_output_without_macro
/home/wulearn/Desktop/testtt/libsixel/src/encoder.c:825
    #7 0x7ffff75371e2 in sixel_encoder_encode_frame
/home/wulearn/Desktop/testtt/libsixel/src/encoder.c:1056
    #8 0x7ffff753b0af in load_image_callback
/home/wulearn/Desktop/testtt/libsixel/src/encoder.c:1679
    #9 0x7ffff752b085 in load_with_builtin /home/wulearn/Desktop/testtt/libsixel/src/loader.c:963
    #10 0x7ffff752b5cb in sixel_helper_load_image_file
/home/wulearn/Desktop/testtt/libsixel/src/loader.c:1418
    #11 0x7ffff753b513 in sixel_encoder_encode
/home/wulearn/Desktop/testtt/libsixel/src/encoder.c:1743
    #12 0x555555558a3b in main /home/wulearn/Desktop/testtt/libsixel/converters/img2sixel.c:457
    #13 0x7ffff72c60b2 in __libc_start_main (/usr/lib/x86_64-linux-gnu/libc.so.6+0x270b2)
    #14 0x55555555638d in _start
```

```
(/home/wulearn/Desktop/testtt/libsixel/converters/.libs/img2sixel+0x238d)

0x62e00000c3fd is located 3 bytes to the left of 47208-byte region [0x62e00000c400,0x62e000017c68)
allocated by thread T0 here:
    #0 0x7ffff76a2bc8 in malloc (/usr/lib/x86_64-linux-gnu/libasan.so.5+0x10dbc8)
    #1 0x555555558c4e in rpl_malloc
/home/wulearn/Desktop/testtt/libsixel/converters/malloc_stub.c:45
    #2 0x7ffff7549243 in sixel_allocator_malloc
/home/wulearn/Desktop/testtt/libsixel/src/allocator.c:162
    #3 0x7ffff7535cab in sixel_encoder_output_without_macro
/home/wulearn/Desktop/testtt/libsixel/src/encoder.c:789
    #4 0x7ffff75371e2 in sixel_encoder_encode_frame
/home/wulearn/Desktop/testtt/libsixel/src/encoder.c:1056
    #5 0x7ffff753b0af in load_image_callback
/home/wulearn/Desktop/testtt/libsixel/src/encoder.c:1679
    #6 0x7ffff752b085 in load_with_builtin /home/wulearn/Desktop/testtt/libsixel/src/loader.c:963
    #7 0x7ffff752b5cb in sixel_helper_load_image_file
/home/wulearn/Desktop/testtt/libsixel/src/loader.c:1418
    #8 0x7ffff753b513 in sixel_encoder_encode
/home/wulearn/Desktop/testtt/libsixel/src/encoder.c:1743
    #9 0x555555558a3b in main /home/wulearn/Desktop/testtt/libsixel/converters/img2sixel.c:457
    #10 0x7ffff72c60b2 in __libc_start_main (/usr/lib/x86_64-linux-gnu/libc.so.6+0x270b2)

SUMMARY: AddressSanitizer: heap-buffer-overflow
/home/wulearn/Desktop/testtt/libsixel/src/quant.c:876 in error_diffuse
Shadow bytes around the buggy address:
  0x0c5c7fff9820: fa fa fa fa fa fa fa fa fa fa fa fa fa fa fa fa
  0x0c5c7fff9830: fa fa fa fa fa fa fa fa fa fa fa fa fa fa fa fa
  0x0c5c7fff9840: fa fa fa fa fa fa fa fa fa fa fa fa fa fa fa fa
  0x0c5c7fff9850: fa fa fa fa fa fa fa fa fa fa fa fa fa fa fa fa
  0x0c5c7fff9860: fa fa fa fa fa fa fa fa fa fa fa fa fa fa fa fa
=>0x0c5c7fff9870: fa fa fa fa fa fa fa fa fa fa fa fa fa fa fa[fa]
  0x0c5c7fff9880: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  0x0c5c7fff9890: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  0x0c5c7fff98a0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  0x0c5c7fff98b0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  0x0c5c7fff98c0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
Shadow byte legend (one shadow byte represents 8 application bytes):
  Addressable:           00
  Partially addressable: 01 02 03 04 05 06 07
  Heap left redzone:       fa
  Freed heap region:       fd
  Stack left redzone:      f1
  Stack mid redzone:       f2
  Stack right redzone:     f3
  Stack after return:      f5
  Stack use after scope:   f8
  Global redzone:          f9
  Global init order:       f6
  Poisoned by user:        f7
  Container overflow:      fc
  Array cookie:            ac
  Intra object redzone:    bb
  ASan internal:           fe
  Left alloca redzone:     ca
  Right alloca redzone:    cb
  Shadow gap:              cc
==2216856==ABORTING
```

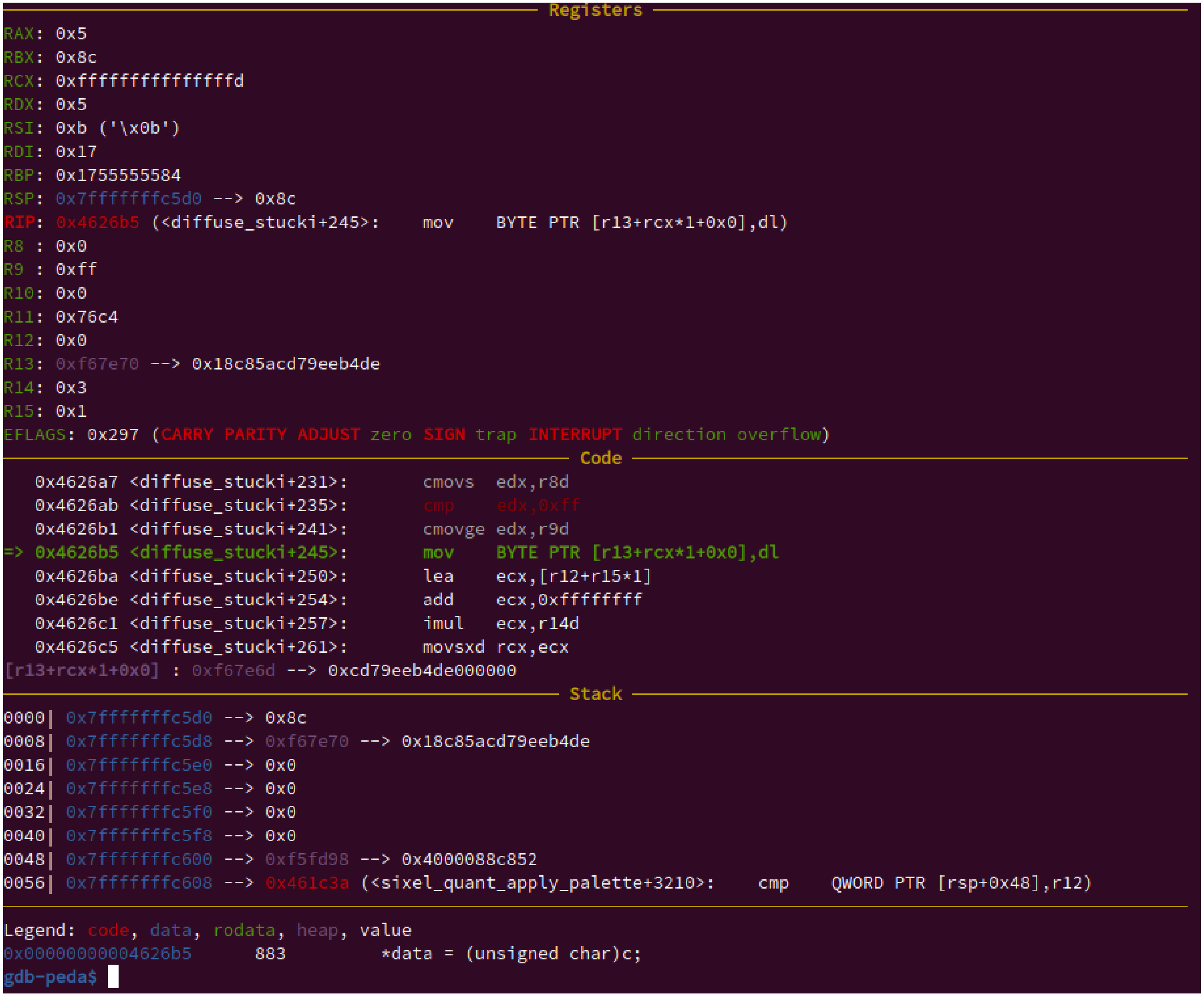
It happens in:

libsixel/src/quant.c
Line 1002 in 6a5be8b

```
1002      error_diffuse(data, pos + width * 1 - 2, depth, error, 1, 24);
```

when x=0, y=0, width=1,then

gdb info:



```
─────────────────────────────────────── Registers ───────────────────────────────────────
RAX: 0x5
RBX: 0x8c
RCX: 0xfffffffffffffffd
RDX: 0x5
RSI: 0xb ('\x0b')
RDI: 0x17
RBP: 0x1755555584
RSP: 0x7fffffffc5d0 --> 0x8c
RIP: 0x4626b5 (<diffuse_stucki+245>:    mov    BYTE PTR [r13+rcx*1+0x0],dl)
R8 : 0x0
R9 : 0xff
R10: 0x0
R11: 0x76c4
R12: 0x0
R13: 0xf67e70 --> 0x18c85acd79eeb4de
R14: 0x3
R15: 0x1
EFLAGS: 0x297 (CARRY PARITY ADJUST zero SIGN trap INTERRUPT direction overflow)
───────────────────────────────────────── Code ──────────────────────────────────────────
   0x4626a7 <diffuse_stucki+231>:       cmovs  edx,r8d
   0x4626ab <diffuse_stucki+235>:       cmp    edx,0xff
   0x4626b1 <diffuse_stucki+241>:       cmovge edx,r9d
=> 0x4626b5 <diffuse_stucki+245>:       mov    BYTE PTR [r13+rcx*1+0x0],dl
   0x4626ba <diffuse_stucki+250>:       lea    ecx,[r12+r15*1]
   0x4626be <diffuse_stucki+254>:       add    ecx,0xffffffff
   0x4626c1 <diffuse_stucki+257>:       imul   ecx,r14d
   0x4626c5 <diffuse_stucki+261>:       movsxd rcx,ecx
[r13+rcx*1+0x0] : 0xf67e6d --> 0xcd79eeb4de000000
───────────────────────────────────────── Stack ─────────────────────────────────────────
0000| 0x7fffffffc5d0 --> 0x8c
0008| 0x7fffffffc5d8 --> 0xf67e70 --> 0x18c85acd79eeb4de
0016| 0x7fffffffc5e0 --> 0x0
0024| 0x7fffffffc5e8 --> 0x0
0032| 0x7fffffffc5f0 --> 0x0
0040| 0x7fffffffc5f8 --> 0x0
0048| 0x7fffffffc600 --> 0xf5fd98 --> 0x4000088c852
0056| 0x7fffffffc608 --> 0x461c3a (<sixel_quant_apply_palette+3210>:    cmp    QWORD PTR [rsp+0x48],r12)
─────────────────────────────────────────────────────────────────────────────────────────
Legend: code, data, rodata, heap, value
0x00000000004626b5      883         *data = (unsigned char)c;
gdb-peda$ 
```

In this position,[r13+rcx*1+0x0] will be `0x100000000000f7e6d` => `0xf7e6d`
So,writing to data will cause `overflow`
and then it writes to a location (chunk) in the heap that should not be written to.

heap info:
Before:

```
0xf5fda0            0x0                 0x60                Freed                   0x0
None
0xf5fe00            0x0                 0x8060              Used                   None
None
0xf67e60            0x0                 0x70                Used                   None
None
0xf67ed0            0x0                 0x30                Used                   None
None
0xf67f00            0x0                 0x10010             Used                   None
None
0xf77f10            0x0                 0x7eb0              Freed      0x7ffff7c9cbe0
0x7ffff7c9cbe0
0xf7fdc0            0x7eb0              0xd0                Freed                   0x0
None
```

After:

```
0xf5fda0            0x0                 0x60                Freed                   0x0
None
0xf5fe00            0x0                 0x8060              Used                   None
None
Corrupt ?!
```

👀 2

a4865g mentioned this issue on Sep 2, 2021

heap-buffer-overflow in libsixel/src/quant.c:867 libsixel/libsixel#25

Closed

Assignees

No one assigned

Labels

None yet

Projects

None yet

Milestone

No milestone

Development

No branches or pull requests

1 participant