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Global Buffer overflow in gettoken at Main.c (Ver 1.91) #75



HalcyOnic opened this issue on Oct 15 · 12 comments

HalcyOnic commented on Oct 15

Hi @sasagawa888,

I pulled down the most recent version of nprolog (Ver 1.91) and ran it through my fuzz tests. It looks like there is a global buffer overflow in gettoken at Main.c when you tell NPL to run a file in script mode.

-\$./npl--s output/default/crashes/id:000001,sig:11,src:000000+000002,time:157668,execs:302,op:splice,rep:16 zsh: segmentation fault ./npl -s

I have attached most of the crash files for reproduction. If you compile the project with AddressSanitizer it can also detect the global overflow:

Makefile

```
CC = gcc
LIBS = -lm -ldl -fsanitize=address

LIBSRASPI = -lm -ldl -lwiringPi -fsanitize=address
INCS =
CFLAGS = $(INCS) -Wall -O3 -fsanitize=address
DEST = /usr/local/bin
```

Running NPL in script mode

```
output/default/crashes/id:000001,sig:11,src:000000+000002,time:157668,execs:302,op:splice,rep:16
     #0 0×55c6d7c3b924 in gettoken (/home/kali/projects/fuzzing/fuzz_targets/nprolog/npl+0×24924)
     #1 0×55c6d7c40924 in parser (/home/kali/projects/fuzzing/fuzz_targets/nprolog/npl+0×29924)
#2 0×55c6d7c4c4ea in b_consult (/home/kali/projects/fuzzing/fuzz_targets/nprolog/npl+0×354ea)
#3 0×55c6d7c2cd8e in main (/home/kali/projects/fuzzing/fuzz_targets/nprolog/npl+0×15d8e)
     #4 0×7f68357e67fc in __libc_start_main ../csu/libc-start.c:332
#5 0×55c6d7c2d2c9 in _start (/home/kali/projects/fuzzing/fuzz_targets/nprolog/npl+0×162c9)
0×55c6d7cc04d0 is located 48 bytes to the left of global variable 'record_pt' defined in 'main.c:24:5' (0×55c6d7cc0500) of size 4
0×55c6d7cc04d0 is located 0 bytes to the right of global variable 'stok' defined in 'main.c:27:7' (0×55c6d7cc03c0) of size 272
SUMMARY: AddressSanitizer: global-buffer-overflow (/home/kali/projects/fuzzing/fuzz_targets/nprolog/npl+0×24924) in gettoken
Shadow bytes around the buggy address:
  0×0ab95af90040: 04
  0×0ab95af90050: 04
                                                        04
  0×0ab95af90060: 04
  0×0ab95af90070: 04
                                                       00 00 00 00 00 00 00 00
Addressable:
  Partially addressable: 01 02 03 04 05 06 07 Heap left redzone:
   Freed heap region:
  Stack left redzone:
Stack mid redzone:
  Stack right redzone:
  Stack after return:
Stack use after scope:
  Global redzone:
  Global init order:
  Poisoned by user:
  Container overflow:
  Intra object redzone:
  ASan internal:
  Right alloca redzone:
  Shadow gap:
4170466—ABORTING
```

crash.zip

```
sasagawa888 commented 10 days ago
```

Owner

Sorry for the late reply. I missed it. I will consider

```
sasagawa888 commented 10 days ago
```

Owner

I changed the game called lights-out included in hiroi.pl for script mode and tried it. It worked fine. My environment is Linux-MINT. Which Prolog file did you run? please tell me in detail.

```
npl -s tests/hiroi.pl
11000
```

11000

11011

00111

01110

01101

10110

01110

11100

11011

00011

01101 01110 00111 11011 11000 00011 11011 11100 01110 10110 sasagawa@sasagawa-Diginnos-PC:~/nprolog\$

Halcy0nic commented 10 days ago • edited ▼

Author

Hi there! In the original message I attached a file for reproduction (named crash.zip). If you unzip this file you will find a script to run using NPL. After running this file in script mode, NPL will segfault. Compiling the project with address sanitizer (above) and running the attached NPL script will indicate where the global buffer overflow takes place.

I tested this on Ubuntu 18, 20, 16.04, and Debian. All 64 bit operating systems

sasagawa888 commented 8 days ago

Owner

Thank you for your reply. I will try.

sasagawa888 commented 8 days ago

Owner

Hi HalcOnic.

I downloaded crash.zip and unzipped it. However, the contents could not be read. Could you please send the data again?

HalcyOnic commented 8 days ago • edited •

Author

Hi @sasagawa888!

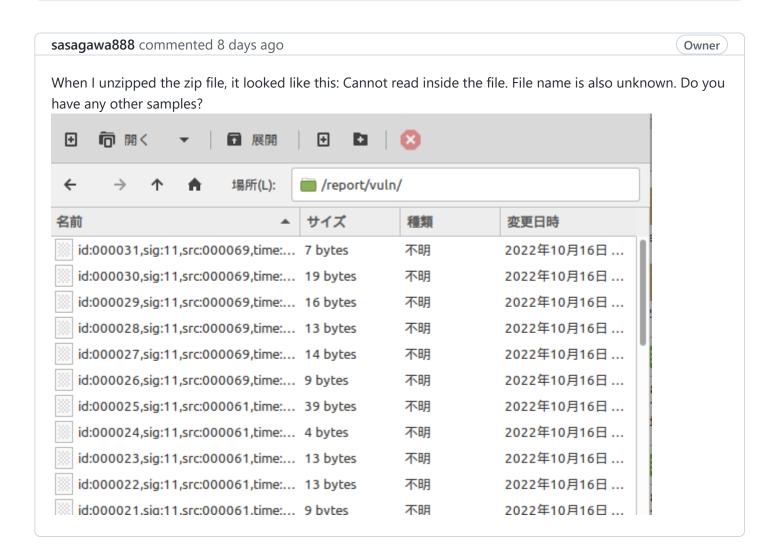
I just pulled down the file again and it seems like it is working correctly. If you unzip the file it should have a folder named report and another folder named vuln underneath it. The contents of the script may not be human readable (meaning the bytes of the file have been modified) but can still be executed by running the following:

npl -s [any file in the vuln directory]

Some of the output isn't human readable, because it was generated by the fuzzer I am using (AFL), and the file bytes have been modified.

Are you able to see all of the files that start with the pattern id:000... in the report/vuln directory?

If not I will upload another sample.



HalcyOnic commented 8 days ago

Author

@sasagawa888

Here are a few new examples. If you unzip the 'testcases.zip' file:

testcases.zip

You will see a folder named 'testcases' with the following contents inside:

test1.pl

- test2.pl
- test3.pl

Viewing and executing test1.pl without AddressSanitizer

Executing test1.pl with AddressSanitizer

cat testcases/test1.pl

```
#0 0×557313a17924 in gettoken (/home/kali/projects/fuzzing/fuzz_targets/nprolog/npl+0×24924)
#1 0×557313a1c924 in parser (/home/kali/projects/fuzzing/fuzz_targets/nprolog/npl+0×29924)
#2 0×557313a284ea in b_consult (/home/kali/projects/fuzzing/fuzz_targets/nprolog/npl+0×354ea)
             #3 0×557313a0848e in main (/home/kali/projects/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing/fuzzing
0×557313a9c4d0 is located 48 bytes to the left of global variable 'record_pt' defined in 'main.c:24:5' (0×557313a9c500) of size 4
0×557313a9c4d0 is located 0 bytes to the right of global variable 'stok' defined in 'main.c:27:7' (0×557313a9c3c0) of size 272
SUMMARY: AddressSanitizer: global-buffer-overflow (/home/kali/projects/fuzzing/fuzz_targets/nprolog/npl+0×24924) in gettoken
Shadow bytes around the buggy address: 0×0aaee274b840: 04 f9 f9 f9 f9 f9 f9 f9
       0×0aaee274b850: 04
      0×0aaee274b860: 04
                                                                                                                                                    04
      0×0aaee274b870: 04
                                                                                                                                                    00 00 00 00 00 00 00 00
     Shadow byte legend (one shadow byte represents 8 application bytes):
      Partially addressable: 01 02 03 04 05 06 07 Heap left redzone: 68 Freed heap region: fd
        Stack left redzone:
       Stack mid redzone:
Stack right redzone:
        Stack after return:
        Stack use after scope:
      Global redzone:
Global init order:
       Container overflow:
       Array cookie:
Intra object redzone:
       Right alloca redzone:
  Shadow gap:
=8598=ABORTING
```

Viewing and executing test2.pl without AddressSanitizer

```
$ cat testcases/test2.pl
:-
$1 is N+u is N+u

$ ./npl -s ./testcases/test2.pl
zsh: segmentation fault ./npl -s ./testcases/test2.pl
```

Executing test2.pl with AddressSanitizer

```
$ ./npl -s ./testcases/test2.pl
       #0 0×55ecedbdb53c in gettoken (/home/kali/projects/fuzzing/fuzz_targets/nprolog/npl+0×2553c)
#1 0×55ecedbdf924 in parser (/home/kali/projects/fuzzing/fuzz_targets/nprolog/npl+0×29924)
#2 0×55ecedbe0d46 in parser (/home/kali/projects/fuzzing/fuzz_targets/nprolog/npl+0×2ad46)
       #3 0*55ecedbebdea in b_consult (/home/kali/projects/fuzzing/fuzz_targets/nprolog/npl+0*354ea)
#4 0*55ecedbebdea in b_consult (/home/kali/projects/fuzzing/fuzz_targets/nprolog/npl+0*354ea)
#4 0*55ecedbebdse in main (/home/kali/projects/fuzzing/fuzz_targets/nprolog/npl+0*15d8e)
#5 0*7fa75efbb209 in __libc_start_call_main ../sysdeps/nptl/libc_start_call_main.h:58
#6 0*7fa75efbb20b in __libc_start_main_impl ../csu/libc-start.c:389
#7 0*55ecedbcc2c9 in _start (/home/kali/projects/fuzzing/fuzz_targets/nprolog/npl+0*162c9)
0×55ecedc5f4d0 is located 48 bytes to the left of global variable 'record_pt' defined in 'main.c:24:5' (0×55ecedc5f500) of size 4
0×55ecedc5f4d0 is located 0 bytes to the right of global variable 'stok' defined in 'main.c:27:7' (0×55ecedc5f3c0) of size 272
SUMMARY: AddressSanitizer: global-buffer-overflow (/home/kali/projects/fuzzing/fuzz_targets/nprolog/npl+0×2553c) in gettoken
Shadow bytes around the buggy address: 0×0abe1db83e40: 04 f9 f9 f9 f9 f9 f9
   0×0abe1db83e50: 04
                                                                                     04
   0×0abe1db83e60: 04
                                                                                     04
Shadow byte legend (one shadow byte represents 8 application bytes):
   Addressable:
   Partially addressable: 01 02 03 04 05 06 07 Heap left redzone:
   Freed heap region:
Stack left redzone:
    Stack mid redzone:
   Stack right redzone:
Stack after return:
   Global redzone:
Global init order:
   Container overflow:
Array cookie:
   Intra object redzone:
ASan internal:
   Right alloca redzone:
   Shadow gap:
=8165=ABORTING
```

Viewing and executing test3.pl without AddressSanitizer

```
cat testcases/test3.pl
:-
%1-
$1 :-:-
%.
```

```
-$ ./npl -s ./testcases/test3.pl
zsh: segmentation fault ./npl -s ./testcases/test3.pl
```

Executing test3.pl with AddressSanitizer

```
./testcases/test3.pl
       #0 0×5561e155d3c in gettoken (/home/kali/projects/fuzzing/fuzz_targets/nprolog/npl+0×2553c)
#1 0×5561e1571924 in parser (/home/kali/projects/fuzzing/fuzz_targets/nprolog/npl+0×29924)
#2 0×5561e1572446 in parser (/home/kali/projects/fuzzing/fuzz_targets/nprolog/npl+0×2ad46)
#3 0×5561e155d4ea in b_consult (/home/kali/projects/fuzzing/fuzz_targets/nprolog/npl+0×354ea)
#4 0×5561e155dd8e in main (/home/kali/projects/fuzzing/fuzz_targets/nprolog/npl+0×1568e)
        #5 0×7fe121641209 in __libc_start_call_main ../sysdeps/nptl/libc_start_call_main.h:58 #6 0×7fe1216412bb in __libc_start_main_impl ../csu/libc-start.c:389 #7 0×5561e155e2c9 in _start (/home/kali/projects/fuzzing/fuzz_targets/nprolog/npl+0×162c9)
0×5561e15f14d0 is located 48 bytes to the left of global variable 'record_pt' defined in 'main.c:24:5' (0×5561e15f1500) of size 4
0×5561e15f14d0 is located 0 bytes to the right of global variable 'stok' defined in 'main.c:27:7' (0×5561e15f13c0) of size 272
SUMMARY: AddressSanitizer: global-buffer-overflow (/home/kali/projects/fuzzing/fuzz_targets/nprolog/npl+0×2553c) in gettoken
Shadow bytes around the buggy address:
   0×0aacbc2b6250: 04
   0×0aacbc2b6260: 04
Shadow byte legend (one shadow byte represents 8 application bytes):
   Addressable: 00
Partially addressable: 01 02 03 04 05 06 07
Heap left redzone: 6a
   Freed heap region:
Stack left redzone:
   Stack right redzone:
Stack after return:
    Stack use after scope:
   Global redzone:
Global init order:
   Container overflow:
Array cookie:
Intra object redzone:
    ASan internal:
    Right alloca redzone:
    Shadow gap:
:7530—ABORTING
```

sasagawa888 commented 7 days ago

Owner

I tested.

An error occurred in test1.pl.

test2.pl Test3.pl becomes a segmentation fault. The reason is that \$ is a symbol representing a string and the terminating \$ is not given. I needed to detect file_end and make it an error.

N-Prolog is ARITY-Prolog compatible. Not ISO-Prolog.

```
N-Prolog Ver 1.91
?- X = $abcd$.
X = $abcd$ .
yes
?-
sasagawa@DESKTOP-0D0L605:~/nprolog$ cat tests/test1.pl
...
sasagawa@DESKTOP-0D0L605:~/nprolog$ npl -s tests/test1.pl
Syntax error expected operator
around here line=1 column=0
?- halt.
Not callable ?- .halt
?- halt.
- good bye -
```

```
sasagawa@DESKTOP-0D0L605:~/nprolog$ cat tests/test2.pl
:-
$1 is N+u is N+u.
sasagawa@DESKTOP-0D0L605:~/nprolog$ npl -s tests/test2.pl
Segmentation fault (core dumped)
sasagawa@DESKTOP-0D0L605:~/nprolog$ cat tests/test3.pl
:-
%1-
$1 :-:-
%.
sasagawa@DESKTOP-0D0L605:~/nprolog$ npl -s tests/test3.pl
Segmentation fault (core dumped)
sasagawa@DESKTOP-0D0L605:~/nprolog$
```

HalcyOnic commented 7 days ago

Author

Glad you were able to reproduce.

Just a heads up, it will segfault and cause a global buffer overflow even without the '\$' character. Here is an example (attached):

test4.zip

```
ffAon(Nf)'
```

Executing with AddressSanitizer

```
testcases/test4.pl
     #0 0×55a1ee497924 in gettoken (/home/kali/projects/fuzzing/fuzz_targets/nprolog/npl+0×24924)
     #1 0x55a1ee49c924 in parser (/home/kali/projects/fuzzing/fuzz_targets/nprolog/npl+0x29924)
#2 0x55a1ee4a84ea in b_consult (/home/kali/projects/fuzzing/fuzz_targets/nprolog/npl+0x354ea)
     #3 0×55alee488d8e in main (/home/kali/projects/fuzzing/fuzz_targets/nprolog/npl+0×15d8e)
#4 0×7f33a8c2b209 in __libc_start_call_main ../sysdeps/nptl/libc_start_call_main.h:58
#5 0×7f33a8c2b2bb in __libc_start_main_impl ../csu/libc-start.c:389
#6 0×55alee4892c9 in _start (/home/kali/projects/fuzzing/fuzz_targets/nprolog/npl+0×162c9)
0×55a1ee51c4d0 is located 48 bytes to the left of global variable 'record_pt' defined in 'main.c:24:5' (0×55a1ee51c500) of size 4
0×55a1ee51c4d0 is located 0 bytes to the right of global variable 'stok' defined in 'main.c:27:7' (0×55a1ee51c3c0) of size 272
SUMMARY: AddressSanitizer: global-buffer-overflow (/home/kali/projects/fuzzing/fuzz_targets/nprolog/npl+0×24924) in gettoken
Shadow bytes around the buggy address: 0×0ab4bdc9b840: 04 f9 f9 f9 f9 f9 f9
   0×0ab4bdc9b850: 04
  0×0ab4bdc9b860: 04
                                                            04
   0×0ab4bdc9b870: 04
                                                            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:
   Freed heap region:
Stack left redzone:
   Stack mid redzone:
  Stack right redzone:
Stack after return:
  Global redzone:
Global init order:
   Container overflow:
   Intra object redzone:
   Left alloca redzone:
   Right alloca redzone:
  Shadow gap:
=105440—ABORTING
```

sasagawa888 commented 7 days ago

Owner

Reproduced. The reason is that I didn't expect the case without the period. Finding file_end should be an error.

```
sasagawa@sasagawa-Diginnos-PC:~/nprolog$ cat tests/test4.pl
ffAon(Nf)'sasagawa@sasagawa-Diginnos-PC:~/nprolog$ npl -s tests/test4.pl
Segmentation fault (core dumped)
sasagawa@sasagawa-Diginnos-PC:~/nprolog$
```

sasagawa888 commented 6 days ago

Owner

I fixed it. Please continue testing.



🔛 sasagawa888 closed this as completed 5 days ago

Assignees		
No one assigned		
Labels		
None yet		
Projects		
None yet		
Milestone		
No milestone		
Development		
No branches or pull requests		
2 narticipants		

2 participants



