

# 운영체제 보고서

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(1)proc의 maps를 이용해서 각각의 변수가 어디에 있는지 찾아본다.

```
55adf463a000-55adf463b000 r--p 00000000 08:05 1180470 /home/hunterspin/Desktop/practice/procChall/chall1
55adf463b000-55adf463c000 r-xp 00001000 08:05 1180470 /home/hunterspin/Desktop/practice/procChall/chall1
55adf463c000-55adf463d000 r--p 00002000 08:05 1180470 /home/hunterspin/Desktop/practice/procChall/chall1
55adf463d000-55adf463e000 r--p 00002000 08:05 1180470 /home/hunterspin/Desktop/practice/procChall/chall1
55adf463e000-55adf463f000 rw-p 00003000 08:05 1180470 /home/hunterspin/Desktop/practice/procChall/chall1
55adf513d000-55adf515e000 rw-p 00000000 00:00 0 [heap]
7f22843a2000-7f22843c4000 r--p 00000000 08:05 526484 /usr/lib/x86_64-linux-gnu/libc-2.31.so
7f22843c4000-7f228453c000 r-xp 00022000 08:05 526484 /usr/lib/x86_64-linux-gnu/libc-2.31.so
7f228453c000-7f228458a000 r--p 0019a000 08:05 526484 /usr/lib/x86_64-linux-gnu/libc-2.31.so
7f228458a000-7f228458e000 r--p 001e7000 08:05 526484 /usr/lib/x86_64-linux-gnu/libc-2.31.so
7f228458e000-7f2284590000 rw-p 001eb000 08:05 526484 /usr/lib/x86_64-linux-gnu/libc-2.31.so
7f2284590000-7f2284596000 rw-p 00000000 00:00 0
7f22845a5000-7f22845a6000 r--p 00000000 08:05 526477 /usr/lib/x86_64-linux-gnu/ld-2.31.so
7f22845a6000-7f22845c9000 r-xp 00001000 08:05 526477 /usr/lib/x86_64-linux-gnu/ld-2.31.so
7f22845c9000-7f22845d1000 r--p 00024000 08:05 526477 /usr/lib/x86_64-linux-gnu/ld-2.31.so
7f22845d1000-7f22845d3000 r--p 0002c000 08:05 526477 /usr/lib/x86_64-linux-gnu/ld-2.31.so
7f22845d3000-7f22845d4000 rw-p 0002d000 08:05 526477 /usr/lib/x86_64-linux-gnu/ld-2.31.so
7f22845d4000-7f22845d5000 rw-p 00000000 00:00 0
7ffc597ae000-7ffc597cf000 rw-p 00000000 00:00 0 [stack]
7ffc597fa000-7ffc597fe000 r--p 00000000 00:00 0 [vvar]
7ffc597fe000-7ffc59800000 r-xp 00000000 00:00 0 [vdso]
fffffffff60000-fffffffff60100 --xp 00000000 00:00 0 [vsyscall]
```

전역변수인 num1,num2는

```
55adf463e000-55adf463f000 rw-p 00003000 08:05 1180470 /home/hunterspin/Desktop/practice/procChall/chall1
```

이 부분에 존재하고,

지역변수인 num3,num4는

```
7ffc597ae000-7ffc597cf000 rw-p 00000000 00:00 0 [stack]
```

이 부분에 존재한다.

전역변수인 mp는

```
55adf513d000-55adf515e000 rw-p 00000000 00:00 0 [heap]
```

Heap에 저장된다.

(2) 코드를 약간 수정해서 foo 함수의 주소값을 출력해보고, 메모리맵 어디에 위치하는지 찾아보시오.

```
foo address is 0x55b4e3043361
```

코드를 수정해서 출력한 foo의 주소값이다.

```
55b4e3042000-55b4e3043000 r--p 00000000 08:05 1180464 /home/hunterspin/Desktop/practice/procChall/chall1
55b4e3043000-55b4e3044000 r-xp 00001000 08:05 1180464 /home/hunterspin/Desktop/practice/procChall/chall1
55b4e3044000-55b4e3045000 r--p 00002000 08:05 1180464 /home/hunterspin/Desktop/practice/procChall/chall1
55b4e3045000-55b4e3046000 r--p 00002000 08:05 1180464 /home/hunterspin/Desktop/practice/procChall/chall1
55b4e3046000-55b4e3047000 rw-p 00003000 08:05 1180464 /home/hunterspin/Desktop/practice/procChall/chall1
55b4e46e8000-55b4e4709000 rw-p 00000000 00:00 0 [heap]
7fd11bb4c000-7fd11bb6e000 r--p 00000000 08:05 526484 /usr/lib/x86_64-linux-gnu/libc-2.31.so
7fd11bb6e000-7fd11bce6000 r-xp 00022000 08:05 526484 /usr/lib/x86_64-linux-gnu/libc-2.31.so
7fd11bce6000-7fd11bd34000 r--p 0019a000 08:05 526484 /usr/lib/x86_64-linux-gnu/libc-2.31.so
7fd11bd34000-7fd11bd38000 r--p 001e7000 08:05 526484 /usr/lib/x86_64-linux-gnu/libc-2.31.so
7fd11bd38000-7fd11bd3a000 rw-p 001eb000 08:05 526484 /usr/lib/x86_64-linux-gnu/libc-2.31.so
7fd11bd3a000-7fd11bd40000 rw-p 00000000 00:00 0
7fd11bd4f000-7fd11bd50000 r--p 00000000 08:05 526477 /usr/lib/x86_64-linux-gnu/ld-2.31.so
7fd11bd50000-7fd11bd73000 r-xp 00001000 08:05 526477 /usr/lib/x86_64-linux-gnu/ld-2.31.so
7fd11bd73000-7fd11bd7b000 r--p 00024000 08:05 526477 /usr/lib/x86_64-linux-gnu/ld-2.31.so
7fd11bd7c000-7fd11bd7d000 r--p 0002c000 08:05 526477 /usr/lib/x86_64-linux-gnu/ld-2.31.so
7fd11bd7d000-7fd11bd7e000 rw-p 0002d000 08:05 526477 /usr/lib/x86_64-linux-gnu/ld-2.31.so
7fd11bd7e000-7fd11bd7f000 rw-p 00000000 00:00 0
7ffceadf000-7ffceab00000 rw-p 00000000 00:00 0 [stack]
7ffceabdb000-7ffceabdf000 r--p 00000000 00:00 0 [vvar]
7ffceabdf000-7ffceabe1000 r-xp 00000000 00:00 0 [vdso]
fffffffff600000-fffffffff601000 --xp 00000000 00:00 0 [vsyscall]
```

그것은 메모리 맵중에서

```
55b4e3043000-55b4e3044000 r-xp 00001000 08:05 1180464 /home/hunterspin/Desktop/practice/procChall/chall1
```

이부분에 해당한다.

(3) 코드를 약간 수정해서 아래와 같이 arr1, arr2를 추가하고 각 배열의 주소값을 출력해보자. 메모리맵 어떤 부분에 주소가 생성되었는지 분석해보자.

```
arr1 address is 0x55acfce71040
arr2 address is 0x55acfc2db00
```

주소 값은 이렇게 되고

```
55acfce6d000-55acfce6e000 r--p 00000000 08:05 1180464 /home/hunterspin/Desktop/practice/procChall/chall1
55acfce6e000-55acfce6f000 r-xp 00001000 08:05 1180464 /home/hunterspin/Desktop/practice/procChall/chall1
55acfce6f000-55acfce70000 r--p 00002000 08:05 1180464 /home/hunterspin/Desktop/practice/procChall/chall1
55acfce70000-55acfce71000 r--p 00002000 08:05 1180464 /home/hunterspin/Desktop/practice/procChall/chall1
55acfce71000-55acfc2db000 rw-p 00003000 08:05 1180464 /home/hunterspin/Desktop/practice/procChall/chall1
55acfc2db000-55acfc2db000 rw-p 00000000 00:00 0
55acfc2db000-55acfc2db000 rw-p 00000000 00:00 0
7fc14762b000-7fc14764d000 r--p 00000000 08:05 526484 /usr/lib/x86_64-linux-gnu/libc-2.31.so
7fc14764d000-7fc1477c5000 r-xp 00022000 08:05 526484 /usr/lib/x86_64-linux-gnu/libc-2.31.so
7fc1477c5000-7fc147813000 r--p 0019a000 08:05 526484 /usr/lib/x86_64-linux-gnu/libc-2.31.so
7fc147813000-7fc147817000 r--p 001e7000 08:05 526484 /usr/lib/x86_64-linux-gnu/libc-2.31.so
7fc147817000-7fc147819000 rw-p 001eb000 08:05 526484 /usr/lib/x86_64-linux-gnu/libc-2.31.so
7fc147819000-7fc14781f000 rw-p 00000000 00:00 0
7fc14782e000-7fc14782f000 r--p 00000000 08:05 526477 /usr/lib/x86_64-linux-gnu/ld-2.31.so
7fc14782f000-7fc147852000 r-xp 00001000 08:05 526477 /usr/lib/x86_64-linux-gnu/ld-2.31.so
7fc147852000-7fc14785a000 r--p 00024000 08:05 526477 /usr/lib/x86_64-linux-gnu/ld-2.31.so
7fc14785b000-7fc14785c000 r--p 0002c000 08:05 526477 /usr/lib/x86_64-linux-gnu/ld-2.31.so
7fc14785c000-7fc14785d000 rw-p 0002d000 08:05 526477 /usr/lib/x86_64-linux-gnu/ld-2.31.so
7fc14785d000-7fc14785e000 rw-p 00000000 00:00 0
7ffdd8e4c000-7ffdd8e6d000 rw-p 00000000 00:00 0
7ffdd8e6d000-7ffdd8eb5000 r--p 00000000 00:00 0
7ffdd8eb5000-7ffdd8eb7000 r-xp 00000000 00:00 0
ffffffffff600000-ffffffffff601000 --xp 00000000 00:00 0 [vsyscall]
```

이 부분에서

```
55acfce71000-55acfc2db000 rw-p 00003000 08:05 1180464 /home/hunterspin/Desktop/practice/procChall/chall1
```

전역 변수이기 때문에 이 구역에 존재한다.