系統程式作業三

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追蹤 ls 呼叫了哪些系統函式

```
strace -f -c ls
```

```
peter0749@peter0749-VirtualBox:~$ strace -c -f ls
Desktop         Downloads         Music       Public      Videos
Documents       examples.desktop  Pictures    Templates
% time     seconds   usecs/call     calls    errors syscall
------ ----------- ----------- --------- --------- ----------------
  0.00    0.000000           0         7           read
  0.00    0.000000           0         2           write
  0.00    0.000000           0         9           open
  0.00    0.000000           0        11           close
  0.00    0.000000           0        10           fstat
  0.00    0.000000           0        19           mmap
  0.00    0.000000           0        12           mprotect
  0.00    0.000000           0         1           munmap
  0.00    0.000000           0         3           brk
  0.00    0.000000           0         2           rt_sigaction
  0.00    0.000000           0         1           rt_sigprocmask
  0.00    0.000000           0         2           ioctl
  0.00    0.000000           0         7         7 access
  0.00    0.000000           0         1           execve
  0.00    0.000000           0         2           getdents
  0.00    0.000000           0         1           getrlimit
  0.00    0.000000           0         2         2 statfs
  0.00    0.000000           0         1           arch_prctl
  0.00    0.000000           0         1           set_tid_address
  0.00    0.000000           0         1           set_robust_list
------ ----------- ----------- --------- --------- ----------------
100.00    0.000000                    95         9 total
```

拿掉 table 執行檔的 symbol table

```
strip table
```

```
[ubuntu@28c2b8f45b0c:~/SP_PPT/ch02$ ls -ls table
12 -rwxrwxr-x 1 ubuntu ubuntu 9352  2月  16 07:50 table
[ubuntu@28c2b8f45b0c:~/SP_PPT/ch02$ strip table
[ubuntu@28c2b8f45b0c:~/SP_PPT/ch02$ ls -ls table
8 -rwxrwxr-x 1 ubuntu ubuntu 6288  3月  31 10:47 table
ubuntu@28c2b8f45b0c:~/SP_PPT/ch02$
```

ls 連結了哪些函式庫

```
objdump -R /bin/ls
```



```
peter0749@peter0749-VirtualBox:~$ objdump -R /bin/ls

/bin/ls:     file format elf64-x86-64

DYNAMIC RELOCATION RECORDS
OFFSET           TYPE              VALUE
000000000061dff8 R_X86_64_GLOB_DAT  __gmon_start__
000000000061e600 R_X86_64_COPY      __progname@@GLIBC_2.2.5
000000000061e608 R_X86_64_COPY      stdout@@GLIBC_2.2.5
000000000061e610 R_X86_64_COPY      optind@@GLIBC_2.2.5
000000000061e618 R_X86_64_COPY      optarg@@GLIBC_2.2.5
000000000061e620 R_X86_64_COPY      __progname_full@@GLIBC_2.2.5
000000000061e640 R_X86_64_COPY      stderr@@GLIBC_2.2.5
000000000061e018 R_X86_64_JUMP_SLOT __ctype_toupper_loc@GLIBC_2.3
000000000061e020 R_X86_64_JUMP_SLOT __uflow@GLIBC_2.2.5
000000000061e028 R_X86_64_JUMP_SLOT getenv@GLIBC_2.2.5
000000000061e030 R_X86_64_JUMP_SLOT sigprocmask@GLIBC_2.2.5
000000000061e038 R_X86_64_JUMP_SLOT raise@GLIBC_2.2.5
000000000061e040 R_X86_64_JUMP_SLOT free@GLIBC_2.2.5
000000000061e048 R_X86_64_JUMP_SLOT localtime@GLIBC_2.2.5
000000000061e050 R_X86_64_JUMP_SLOT __mempcpy_chk@GLIBC_2.3.4
000000000061e058 R_X86_64_JUMP_SLOT abort@GLIBC_2.2.5
000000000061e060 R_X86_64_JUMP_SLOT __errno_location@GLIBC_2.2.5
000000000061e068 R_X86_64_JUMP_SLOT strncmp@GLIBC_2.2.5
000000000061e070 R_X86_64_JUMP_SLOT localtime_r@GLIBC_2.2.5
000000000061e078 R_X86_64_JUMP_SLOT _exit@GLIBC_2.2.5
000000000061e080 R_X86_64_JUMP_SLOT strcpy@GLIBC_2.2.5
000000000061e088 R_X86_64_JUMP_SLOT __fpending@GLIBC_2.2.5
000000000061e090 R_X86_64_JUMP_SLOT isatty@GLIBC_2.2.5
```

```
000000000061e070 R_X86_64_JUMP_SLOT    localtime_r@GLIBC_2.2.5
000000000061e078 R_X86_64_JUMP_SLOT    _exit@GLIBC_2.2.5
000000000061e080 R_X86_64_JUMP_SLOT    strcpy@GLIBC_2.2.5
000000000061e088 R_X86_64_JUMP_SLOT    __fpending@GLIBC_2.2.5
000000000061e090 R_X86_64_JUMP_SLOT    isatty@GLIBC_2.2.5
000000000061e098 R_X86_64_JUMP_SLOT    sigaction@GLIBC_2.2.5
000000000061e0a0 R_X86_64_JUMP_SLOT    iswcntrl@GLIBC_2.2.5
000000000061e0a8 R_X86_64_JUMP_SLOT    wcswidth@GLIBC_2.2.5
000000000061e0b0 R_X86_64_JUMP_SLOT    localeconv@GLIBC_2.2.5
000000000061e0b8 R_X86_64_JUMP_SLOT    mbstowcs@GLIBC_2.2.5
000000000061e0c0 R_X86_64_JUMP_SLOT    readlink@GLIBC_2.2.5
000000000061e0c8 R_X86_64_JUMP_SLOT    clock_gettime@GLIBC_2.17
000000000061e0d0 R_X86_64_JUMP_SLOT    setenv@GLIBC_2.2.5
000000000061e0d8 R_X86_64_JUMP_SLOT    textdomain@GLIBC_2.2.5
000000000061e0e0 R_X86_64_JUMP_SLOT    fclose@GLIBC_2.2.5
000000000061e0e8 R_X86_64_JUMP_SLOT    opendir@GLIBC_2.2.5
000000000061e0f0 R_X86_64_JUMP_SLOT    getpwuid@GLIBC_2.2.5
000000000061e0f8 R_X86_64_JUMP_SLOT    bindtextdomain@GLIBC_2.2.5
000000000061e100 R_X86_64_JUMP_SLOT    stpcpy@GLIBC_2.2.5
000000000061e108 R_X86_64_JUMP_SLOT    dcgettext@GLIBC_2.2.5
000000000061e110 R_X86_64_JUMP_SLOT    __ctype_get_mb_cur_max@GLIBC_2.2.5
000000000061e118 R_X86_64_JUMP_SLOT    strlen@GLIBC_2.2.5
000000000061e120 R_X86_64_JUMP_SLOT    __lxstat@GLIBC_2.2.5
000000000061e128 R_X86_64_JUMP_SLOT    __stack_chk_fail@GLIBC_2.4
000000000061e130 R_X86_64_JUMP_SLOT    getopt_long@GLIBC_2.2.5
000000000061e138 R_X86_64_JUMP_SLOT    mbrtowc@GLIBC_2.2.5
000000000061e140 R_X86_64_JUMP_SLOT    strchr@GLIBC_2.2.5
000000000061e148 R_X86_64_JUMP_SLOT    getgrgid@GLIBC_2.2.5
000000000061e150 R_X86_64_JUMP_SLOT    __overflow@GLIBC_2.2.5
```

```
000000000061e148  R_X86_64_JUMP_SLOT    getgrgid@GLIBC_2.2.5
000000000061e150  R_X86_64_JUMP_SLOT    __overflow@GLIBC_2.2.5
000000000061e158  R_X86_64_JUMP_SLOT    strrchr@GLIBC_2.2.5
000000000061e160  R_X86_64_JUMP_SLOT    fgetfilecon
000000000061e168  R_X86_64_JUMP_SLOT    gmtime_r@GLIBC_2.2.5
000000000061e170  R_X86_64_JUMP_SLOT    lseek@GLIBC_2.2.5
000000000061e178  R_X86_64_JUMP_SLOT    gettimeofday@GLIBC_2.2.5
000000000061e180  R_X86_64_JUMP_SLOT    __assert_fail@GLIBC_2.2.5
000000000061e188  R_X86_64_JUMP_SLOT    __strtoul_internal@GLIBC_2.2.5
000000000061e190  R_X86_64_JUMP_SLOT    fnmatch@GLIBC_2.2.5
000000000061e198  R_X86_64_JUMP_SLOT    memset@GLIBC_2.2.5
000000000061e1a0  R_X86_64_JUMP_SLOT    fscanf@GLIBC_2.2.5
000000000061e1a8  R_X86_64_JUMP_SLOT    ioctl@GLIBC_2.2.5
000000000061e1b0  R_X86_64_JUMP_SLOT    close@GLIBC_2.2.5
000000000061e1b8  R_X86_64_JUMP_SLOT    closedir@GLIBC_2.2.5
000000000061e1c0  R_X86_64_JUMP_SLOT    __libc_start_main@GLIBC_2.2.5
000000000061e1c8  R_X86_64_JUMP_SLOT    memcmp@GLIBC_2.2.5
000000000061e1d0  R_X86_64_JUMP_SLOT    _setjmp@GLIBC_2.2.5
000000000061e1d8  R_X86_64_JUMP_SLOT    fputs_unlocked@GLIBC_2.2.5
000000000061e1e0  R_X86_64_JUMP_SLOT    calloc@GLIBC_2.2.5
000000000061e1e8  R_X86_64_JUMP_SLOT    lgetfilecon
000000000061e1f0  R_X86_64_JUMP_SLOT    strcmp@GLIBC_2.2.5
000000000061e1f8  R_X86_64_JUMP_SLOT    signal@GLIBC_2.2.5
000000000061e200  R_X86_64_JUMP_SLOT    dirfd@GLIBC_2.2.5
000000000061e208  R_X86_64_JUMP_SLOT    getpwnam@GLIBC_2.2.5
000000000061e210  R_X86_64_JUMP_SLOT    __memcpy_chk@GLIBC_2.3.4
000000000061e218  R_X86_64_JUMP_SLOT    sigemptyset@GLIBC_2.2.5
000000000061e220  R_X86_64_JUMP_SLOT    memcpy@GLIBC_2.14
000000000061e228  R_X86_64_JUMP_SLOT    getgrnam@GLIBC_2.2.5
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```
000000000061e220 R_X86_64_JUMP_SLOT    memcpy@GLIBC_2.14
000000000061e228 R_X86_64_JUMP_SLOT    getgrnam@GLIBC_2.2.5
000000000061e230 R_X86_64_JUMP_SLOT    getfilecon
000000000061e238 R_X86_64_JUMP_SLOT    tzset@GLIBC_2.2.5
000000000061e240 R_X86_64_JUMP_SLOT    fileno@GLIBC_2.2.5
000000000061e248 R_X86_64_JUMP_SLOT    tcgetpgrp@GLIBC_2.2.5
000000000061e250 R_X86_64_JUMP_SLOT    __xstat@GLIBC_2.2.5
000000000061e258 R_X86_64_JUMP_SLOT    readdir@GLIBC_2.2.5
000000000061e260 R_X86_64_JUMP_SLOT    wcwidth@GLIBC_2.2.5
000000000061e268 R_X86_64_JUMP_SLOT    malloc@GLIBC_2.2.5
000000000061e270 R_X86_64_JUMP_SLOT    fflush@GLIBC_2.2.5
000000000061e278 R_X86_64_JUMP_SLOT    nl_langinfo@GLIBC_2.2.5
000000000061e280 R_X86_64_JUMP_SLOT    ungetc@GLIBC_2.2.5
000000000061e288 R_X86_64_JUMP_SLOT    __fxstat@GLIBC_2.2.5
000000000061e290 R_X86_64_JUMP_SLOT    strcoll@GLIBC_2.2.5
000000000061e298 R_X86_64_JUMP_SLOT    __freading@GLIBC_2.2.5
000000000061e2a0 R_X86_64_JUMP_SLOT    fwrite_unlocked@GLIBC_2.2.5
000000000061e2a8 R_X86_64_JUMP_SLOT    realloc@GLIBC_2.2.5
000000000061e2b0 R_X86_64_JUMP_SLOT    stpncpy@GLIBC_2.2.5
000000000061e2b8 R_X86_64_JUMP_SLOT    fdopen@GLIBC_2.2.5
000000000061e2c0 R_X86_64_JUMP_SLOT    setlocale@GLIBC_2.2.5
000000000061e2c8 R_X86_64_JUMP_SLOT    __printf_chk@GLIBC_2.3.4
000000000061e2d0 R_X86_64_JUMP_SLOT    timegm@GLIBC_2.2.5
000000000061e2d8 R_X86_64_JUMP_SLOT    strftime@GLIBC_2.2.5
000000000061e2e0 R_X86_64_JUMP_SLOT    mempcpy@GLIBC_2.2.5
000000000061e2e8 R_X86_64_JUMP_SLOT    memmove@GLIBC_2.2.5
000000000061e2f0 R_X86_64_JUMP_SLOT    error@GLIBC_2.2.5
000000000061e2f8 R_X86_64_JUMP_SLOT    open@GLIBC_2.2.5
000000000061e300 R_X86_64_JUMP_SLOT    fseeko@GLIBC_2.2.5
```

```
000000000061e2c8  R_X86_64_JUMP_SLOT  __printf_chk@GLIBC_2.3.4
000000000061e2d0  R_X86_64_JUMP_SLOT  timegm@GLIBC_2.2.5
000000000061e2d8  R_X86_64_JUMP_SLOT  strftime@GLIBC_2.2.5
000000000061e2e0  R_X86_64_JUMP_SLOT  mempcpy@GLIBC_2.2.5
000000000061e2e8  R_X86_64_JUMP_SLOT  memmove@GLIBC_2.2.5
000000000061e2f0  R_X86_64_JUMP_SLOT  error@GLIBC_2.2.5
000000000061e2f8  R_X86_64_JUMP_SLOT  open@GLIBC_2.2.5
000000000061e300  R_X86_64_JUMP_SLOT  fseeko@GLIBC_2.2.5
000000000061e308  R_X86_64_JUMP_SLOT  unsetenv@GLIBC_2.2.5
000000000061e310  R_X86_64_JUMP_SLOT  strtoul@GLIBC_2.2.5
000000000061e318  R_X86_64_JUMP_SLOT  __cxa_atexit@GLIBC_2.2.5
000000000061e320  R_X86_64_JUMP_SLOT  wcstombs@GLIBC_2.2.5
000000000061e328  R_X86_64_JUMP_SLOT  getxattr@GLIBC_2.3
000000000061e330  R_X86_64_JUMP_SLOT  freecon
000000000061e338  R_X86_64_JUMP_SLOT  sigismember@GLIBC_2.2.5
000000000061e340  R_X86_64_JUMP_SLOT  exit@GLIBC_2.2.5
000000000061e348  R_X86_64_JUMP_SLOT  fwrite@GLIBC_2.2.5
000000000061e350  R_X86_64_JUMP_SLOT  __fprintf_chk@GLIBC_2.3.4
000000000061e358  R_X86_64_JUMP_SLOT  fflush_unlocked@GLIBC_2.2.5
000000000061e360  R_X86_64_JUMP_SLOT  mbsinit@GLIBC_2.2.5
000000000061e368  R_X86_64_JUMP_SLOT  iswprint@GLIBC_2.2.5
000000000061e370  R_X86_64_JUMP_SLOT  sigaddset@GLIBC_2.2.5
000000000061e378  R_X86_64_JUMP_SLOT  strstr@GLIBC_2.2.5
000000000061e380  R_X86_64_JUMP_SLOT  __ctype_tolower_loc@GLIBC_2.3
000000000061e388  R_X86_64_JUMP_SLOT  __ctype_b_loc@GLIBC_2.3
000000000061e390  R_X86_64_JUMP_SLOT  __sprintf_chk@GLIBC_2.3.4
```