

# SUSTech CS302 OS Lab1 Report

Title: Fundamental Shell Programming

Student: Name: \_LuNing, ID: \_11610310

Time: 2019 03 05

Experimental Environment: Ubuntu 18.04 bash

Deadline: **23:59, 2019-03-06**

Submit by: Blackboard

Task :

Task 1.Run commands: ls, cd, man, mkdir, rm, mv, cp, cat, grep, ps, kill

Task 2. Compile the program in Tutorial 0 (as shown in screenshot). Check the assembly language under **O1** and **O2** standards

Task 3.Finish the shell script task in Lab1 (Tutorial\_1\_shell task )

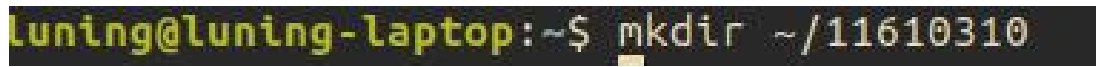
Experiments:

1. Run commands ( replacing studentID with your own ID )

**mkdir ~/studentID**

function and parameter meaning: create a folder named '11610310' in my user directory

Screenshot:

A terminal window with a black background and green text. The prompt is 'luning@luning-laptop:~\$' and the command entered is 'mkdir ~/11610310'.

```
luning@luning-laptop:~$ mkdir ~/11610310
```

**ls -la ~**

function and parameter meaning: show all information of the files and folders in the path '~', the -l shows the rights of different users and -a means showing more details

Screenshot:

```

luning@luning-laptop:~$ ls -la ~
总用量 332
drwxr-xr-x 51 luning luning 4096 2月 27 17:16 .
drwxr-xr-x 4 root root 4096 1月 5 03:30 ..
drwxrwxr-x 2 luning luning 4096 2月 27 17:16 11610310
drwx----- 3 luning luning 4096 1月 14 18:34 .adobe
drwxr-xr-x 5 luning luning 4096 2月 21 11:22 apps
drwxrwxr-x 3 luning luning 4096 2月 21 09:30 .astropy
-rw----- 1 luning luning 18496 2月 27 16:15 .bash_history
-rw-r--r-- 1 luning luning 220 1月 5 03:30 .bash_logout
-rw-r--r-- 1 luning luning 4261 2月 26 19:47 .bashrc
-rw-r--r-- 1 luning luning 4108 1月 6 12:03 .bashrc-anaconda3.bak
drwxr--r-- 2 luning luning 4096 1月 14 17:03 .byteexec
drwx----- 25 luning luning 4096 2月 27 10:06 .cache
-rw-r--r-- 1 luning luning 268 2月 21 16:43 comonds
drwxr-xr-x 3 luning luning 4096 1月 6 13:20 .conda
drwx----- 36 luning luning 4096 2月 27 17:11 .config
drwx----- 3 root root 4096 1月 6 02:10 .dbus
drwxrwxr-x 3 luning luning 4096 1月 5 11:42 .deepinwine
drwxr-xr-x 3 luning luning 4096 1月 5 21:06 download
drwxr-xr-x 2 luning luning 4096 2月 26 19:16 .empty
drwxrwxrwx 2 luning luning 4096 2月 18 15:47 trees
drwxr-xr-x 4 luning luning 4096 2月 26 10:01 .gazebo
drwx----- 2 luning luning 4096 2月 27 16:01 .gconf
-rw-r--r-- 1 luning luning 54 1月 6 23:31 .gitconfig
drwx----- 3 luning luning 4096 1月 5 07:44 .gnupg
-rw----- 1 luning luning 12456 2月 27 16:01 .ICEauthority
drwxr--r-- 3 luning luning 4096 2月 26 10:01 .ignition
drwxr-xr-x 5 luning luning 4096 1月 6 12:16 .ipython
drwxr-xr-x 5 luning luning 4096 2月 21 16:51 .java
drwxr-xr-x 4 luning luning 4096 2月 27 17:11 .kingsoft
drwxrwxr-x 4 luning luning 4096 2月 18 14:58 .lantern
drwx----- 5 luning luning 4096 1月 6 03:51 .local
drwx----- 3 luning luning 4096 1月 14 18:34 .macromedia
drwxr-xr-x 3 luning root 4096 1月 6 00:26 .matlab
-rw-r--r-- 1 luning luning 2597 2月 26 11:00 MATLABDesktopSaveError.log
drwx----- 5 luning luning 4096 1月 5 07:38 .mozilla
drwx----- 4 luning luning 4096 1月 6 13:43 .nv
-rw-rw-r-- 1 luning luning 866 1月 6 13:29 .nvidia-settings-rc
drwxr-xr-x 2 luning luning 4096 2月 26 10:51 .oracle_jre_usage
drwx----- 3 luning luning 4096 2月 13 18:47 .pki
drwx----- 2 luning luning 4096 2月 20 09:38 .presage
drwxrwxr-x 3 luning luning 4096 1月 7 15:06 Presentation
-rw-r--r-- 1 luning luning 807 1月 5 03:30 .profile
drwxr-xr-x 4 luning luning 4096 1月 6 22:02 .PyCharmCE2018.3
-rw----- 1 luning luning 217 2月 26 19:39 .python_history
-rw----- 1 luning luning 344 1月 7 16:13 .recently-used
drwxr-xr-x 4 luning luning 4096 2月 26 20:18 .ros
drwxr-xr-x 2 luning luning 4096 2月 26 10:01 .sdformat
drwxr-xr-x 6 luning luning 4096 1月 6 22:02 snap
drwxrwxr-x 2 luning luning 4096 2月 26 19:36 .sogouinput
drwx----- 2 luning luning 4096 1月 5 07:44 .ssh
drwxr-xr-x 3 luning luning 4096 2月 26 10:52 .subversion
-rw-r--r-- 1 luning luning 0 1月 5 07:38 .sudo_as_admin_successful

```

cd ~/studentID

function and parameter meaning: change current working path to '~/11610310'

Screenshot:

```

luning@luning-laptop:~$ cd ~/11610310
luning@luning-laptop:~/11610310$

```

man grep

function and parameter meaning: see the helping doc of 'grep'

Screenshot:

**mv ~/studentID /home**

ls /home

function and parameter meaning: move the folder “11610310” from ~/ to /home

Screenshot:

**rm -r /home/studentID**

function and parameter meaning: remove the folder “11610310” recursively

Screenshot:

**cp /etc/apt/sources.list /etc/apt/sources.list.bak**

function and parameter meaning: copy the file and rename it with “sources.list.bak” in the same folder

Screenshot:

**cat /etc/shells**

function and parameter meaning: show the content in the file “/etc/shells”

Screenshot:



`cat /etc/shells | grep bash`

function and parameter meaning: \_\_\_\_\_ first use cat to get the content in the file 'shells', then use the content as input of grep command. Then grep search the content to find things having keyword "bash"

Screenshot:

```
luning@luning-laptop ~ /workspace/OS/lab1 cat /etc/shells | grep bash
/bin/bash
/bin/rbash
```

Open two terminals, find their PIDs by `ps` and kill one of them

function and parameter meaning: \_\_\_\_\_ one terminal: `ps`

another terminal: `ps -ef`      `kill <process id>`

Screenshot:

I use the default terminal(gnome) and terminator (another app of terminal), because if I use same terminator, kill command doesn't work. If I kill their parent process, then both terminals are killed.

```
luning@luning-laptop: ~
luning@luning-laptop:~$ ps
  PID TTY          TIME CMD
 6233 pts/2    00:00:00 bash
 6260 pts/2    00:00:00 ps
luning@luning-laptop:~$

luning@luning-laptop: ~
luning@luning-laptop:~$ ps -ef
root      16074      2   0 19:34 ?        00:00:00 [kworker/0:2]
luning    16079      1   2 19:34 tty2    00:00:01 /usr/bin/python /usr/bin/x-termi
luning    16090 16079   0 19:34 pts/0    00:00:00 /usr/bin/zsh
luning    16130 16079   0 19:35 pts/1    00:00:00 /usr/bin/zsh
luning    16226 6222    3 19:35 ?        00:00:00 /usr/lib/gnome-terminal/gnome-te
luning    16233 16226   0 19:35 pts/2    00:00:00 bash
luning    16263 16130   0 19:35 pts/1    00:00:00 ps -ef
luning    20442 9237    2 16:24 tty2    00:05:01 /usr/lib/firefox/firefox -conten
root      24020      2   0 16:41 ?        00:00:00 [kworker/u8:1]
luning    25010 6461    0 16:54 ?        00:00:00 /usr/lib/gvfs/gvfsd-network --sp
luning    25024 6461    0 16:54 ?        00:00:00 /usr/lib/gvfs/gvfsd-dnssd --spaw
luning    25075 6222    0 16:55 ?        00:00:01 /usr/bin/kactivitymanagerd start
luning    25937      1   0 17:03 tty2    00:00:33 /snap/chromium/621/usr/lib/chrom
luning    26051 25937   0 17:03 tty2    00:00:00 /snap/chromium/621/usr/lib/chrom
luning    26053 26051   0 17:03 tty2    00:00:00 /snap/chromium/621/usr/lib/chrom
luning    26079 25937   0 17:03 tty2    00:00:52 /snap/chromium/621/usr/lib/chrom
luning    26114 26079   0 17:03 tty2    00:00:00 /snap/chromium/621/usr/lib/chrom
luning    26153 26053   0 17:03 tty2    00:00:00 /snap/chromium/621/usr/lib/chrom
luning    26154 26053   0 17:03 tty2    00:00:56 /snap/chromium/621/usr/lib/chrom
luning    28354 9237    0 17:13 tty2    00:00:19 /usr/lib/firefox/firefox -conten
root      32141      2   0 17:49 ?        00:00:00 [kworker/u8:2]
luning    32388 6222    0 17:51 ?        00:00:56 /usr/bin/nautilus --gapplication
luning@luning-laptop ~$ kill 16233
```

```
luning@luning-laptop: ~
luning@luning-laptop:~$ ps -ef
luning    16233 16226   0 19:35 pts/2    00:00:00 bash
luning    16263 16130   0 19:35 pts/1    00:00:00 ps -ef
luning    20442 9237    2 16:24 tty2    00:05:01 /usr/lib/firefox/firefox -conten
root      24020      2   0 16:41 ?        00:00:00 [kworker/u8:1]
luning    25010 6461    0 16:54 ?        00:00:00 /usr/lib/gvfs/gvfsd-network --sp
luning    25024 6461    0 16:54 ?        00:00:00 /usr/lib/gvfs/gvfsd-dnssd --spaw
luning    25075 6222    0 16:55 ?        00:00:01 /usr/bin/kactivitymanagerd start
luning    25937      1   0 17:03 tty2    00:00:33 /snap/chromium/621/usr/lib/chrom
luning    26051 25937   0 17:03 tty2    00:00:00 /snap/chromium/621/usr/lib/chrom
luning    26053 26051   0 17:03 tty2    00:00:00 /snap/chromium/621/usr/lib/chrom
luning    26079 25937   0 17:03 tty2    00:00:52 /snap/chromium/621/usr/lib/chrom
luning    26114 26079   0 17:03 tty2    00:00:00 /snap/chromium/621/usr/lib/chrom
luning    26153 26053   0 17:03 tty2    00:00:00 /snap/chromium/621/usr/lib/chrom
luning    26154 26053   0 17:03 tty2    00:00:56 /snap/chromium/621/usr/lib/chrom
luning    28354 9237    0 17:13 tty2    00:00:19 /usr/lib/firefox/firefox -conten
root      32141      2   0 17:49 ?        00:00:00 [kworker/u8:2]
luning    32388 6222    0 17:51 ?        00:00:56 /usr/bin/nautilus --gapplication
luning@luning-laptop ~$ kill 16233
luning@luning-laptop ~$
```

## 2. Compile and Execute

- Compile: write following `opt.c` and check the assembly language under `-o0 -o1`

- Consider this example opt.c

```
hb@hb-virtual-machine:~/OS/lab1_C_programming$ cat opt.c
#include<stdio.h>

int main(){
    int x = 0;
    x += 1;
    x += 1;
    x += 1;
    printf("%d\n", x);
    return 0;
}
```

□ Source code

➤ : gcc hello.c -S -O0 -o opt0.s

---

```
.file "opt.c"
.text
.section .rodata
.LC0:
.string "%d\n"
.text
.globl main
.type main, @function
main:
.LFB0:
.cfi_startproc
pushq %rbp
.cfi_def_cfa_offset 16
.cfi_offset 6, -16
movq %rsp, %rbp
.cfi_def_cfa_register 6
subq $16, %rsp
movl $0, -4(%rbp)
addl $1, -4(%rbp)
addl $1, -4(%rbp)
addl $1, -4(%rbp)
movl -4(%rbp), %eax
movl %eax, %esi
leaq .LC0(%rip), %rdi
movl $0, %eax
call printf@PLT
movl $0, %eax
leave
.cfi_def_cfa 7, 8
ret
.cfi_endproc
.LFE0:
```

```

.size    main, .-main
.ident   "GCC: (Ubuntu 7.3.0-27ubuntu1~18.04) 7.3.0"
.section .note.GNU-stack,"",@progbits

```

---

```

gcc hello.c -S -O1 -o opt1.s

```

---

```

.file "opt.c"
.text
.section .rodata.str1.1,"aMS",@progbits,1
.LC0:
.string  "%d\n"
.text
.globl   main
.type    main, @function
main:
.LFB23:
.cfi_startproc
    subq    $8, %rsp
    .cfi_def_cfa_offset 16
    movl    $3, %edx
    leaq    .LC0(%rip), %rsi
    movl    $1, %edi
    movl    $0, %eax
    call    __printf_chk@PLT
    movl    $0, %eax
    addq    $8, %rsp
    .cfi_def_cfa_offset 8
    ret
    .cfi_endproc
.LFE23:
.size    main, .-main
.ident   "GCC: (Ubuntu 7.3.0-27ubuntu1~18.04) 7.3.0"
.section .note.GNU-stack,"",@progbits

```

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## Analyse

The first command asks the compiler to just compile the .c file without optimization. We can see there are three “+1” operation in the first file.

In the second compile the .c file with level-1 optimization, and the code is apparently shorter than first one. We can see the three “+1” operations are replaced by one “+3” operation.

➤ : `gcc hello.c -S -O0 -o opt0.s`

`gcc hello.c -S -O1 -o opt1.s`

#### □ Result and Screenshot

```
luning@luning-laptop ~/workspace/OS/lab1_C_programming$ gcc opt.c -S -O0 -o opt0.s
luning@luning-laptop ~/workspace/OS/lab1_C_programming$ cat opt0.s
.file "opt.c"
.text
.section .rodata
.LC0:
.string "%d\n"
.text
.globl main
.type main, @function
main:
.LFB0:
.cfi_startproc
pushq %rbp
.cfi_def_cfa_offset 16
.cfi_offset 6, -16
movq %rsp, %rbp
.cfi_def_cfa_register 6
subq $16, %rsp
movl $0, -4(%rbp)
addl $1, -4(%rbp)
addl $1, -4(%rbp)
addl $1, -4(%rbp)
movl -4(%rbp), %eax
movl %eax, %esi
leaq .LC0(%rip), %rdi
movl $0, %eax
call printf@PLT
movl $0, %eax
leave
.cfi_def_cfa 7, 8
ret
.cfi_endproc
.LFE0:
.size main, .-main
.ident "GCC: (Ubuntu 7.3.0-27ubuntu1~18.04) 7.3.0"
.section .note.GNU-stack,"",@progbits
```

□ Result and Screenshot

### 3. Compile and Execute

□ Finish the shell script task in lab1 (details in Tuto

□ Submit the shell scripts

Conclusion :

```

luning@luning-laptop ~/workspace/OS/lab1_C_programming$ gcc opt.c -S -O1 -o opt1.s
luning@luning-laptop ~/workspace/OS/lab1_C_programming$ cat opt1.s
.file "opt.c"
.text
.section .rodata.str1.1,"aMS",@progbits,1
.LC0:
.string "%d\n"
.text
.globl main
.type main, @function
main:
.LFB23:
.cfi_startproc
subq $8, %rsp
.cfi_def_cfa_offset 16
movl $3, %edx
leaq .LC0(%rip), %rsi
movl $1, %edi
movl $0, %eax
call __printf_chk@PLT
movl $0, %eax
addq $8, %rsp
.cfi_def_cfa_offset 8
ret
.cfi_endproc
.LFE23:
.size main, .-main
.ident "GCC: (Ubuntu 7.3.0-27ubuntu1~18.04) 7.3.0"
.section .note.GNU-stack,"",@progbits

```

### 3. Compile and Execute

- ❑ [Finish the shell script task in lab1 \(details in Tutorial\\_1\\_shell task\)](#)
- ❑ [Submit the shell scripts](#)

### Conclusion :

### 3. Compile and Execute

- ❑ [Finish the shell script task in lab1 \(details in Tutorial\\_1\\_shell task\)](#)
- ❑ [Submit the shell scripts](#)

### Conclusion :

I learned a lot in this lab. For examples, I learn how to use array in shell and how to get the file name in a path.

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Submission:

-lab1_studentID	(directory)
---lab1_report_studentID.pdf	(pdf version report)
---lab1_studentID.sh	(shell script file)

**Zip the directory with the same name and submit it**

Suggestion and Feedback for Lab :

I think lab is good, and the shell homework help me learn a lot . However, this is time-consuming.

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