

Activity 2 : UNIX and C compiler

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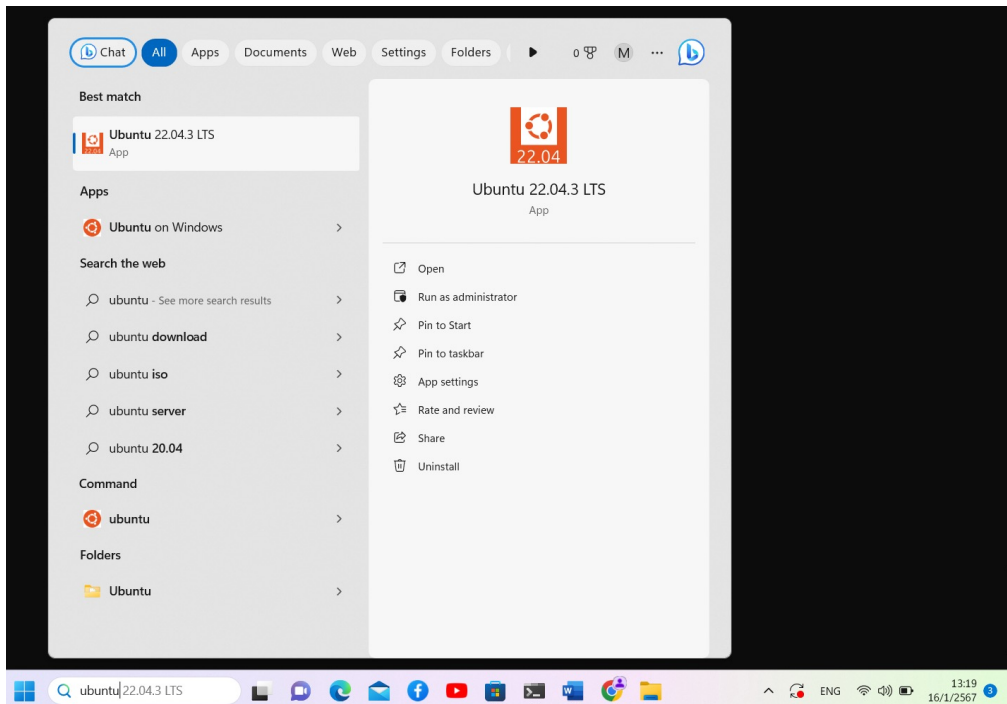
ข้อกำหนด : งานเดียว

การส่งงาน : แสดงทั้งคำสั่งและผลลัพธ์ แล้ว
capture หน้าจอบันทึกในไฟล์นี้

ต้องทำให้ครบทุกข้อจึงจะได้คะแนนเต็ม

* Linux command line ต่างๆ

มีออกสอบ midterm แน่นอน



(เหมือนมี os ubuntu parrallel ไป)

1. ติดตั้ง Linux

ขอให้ติดตั้ง Linux ในเครื่องคอมพิวเตอร์ของตนเอง เช่น Debian , Ubuntu

ถ้าใช้ Windows 10 , 11 สามารถติดตั้ง WSL (Windows Subsystem for Linux)

ถ้าใช้ Windows รุ่นอื่นหรือใช้เครื่องแมค อาจต้องติดตั้ง VirtualBox ก่อน แล้วจึงค่อยติดตั้ง Linux ใน VirtualBox อีกครั้ง

อ่านขั้นตอนการติดตั้ง VirtualBox ได้ที่

<http://cs.westminstercollege.edu/~greg/osc10e/vm/index.html>

2. ติดตั้ง gcc , gdb

ขอให้ติดตั้ง gcc (C compiler) และ gdb (GNU debugger) ด้วยคำสั่ง

sudo apt-get install gcc

sudo apt-get install gdb

You will get ubuntu os after you have already installed ubuntu on your machine using these steps.


Ubuntu is a type of linux os

What is linux : <https://www.linux.com/what-is-linux/>

What is Linux?

Just like Windows, iOS, and Mac OS, Linux is an operating system. In fact, one of the most popular platforms on the planet, Android, is powered by the Linux operating system. An operating system is software that manages all of the hardware resources associated with your desktop or laptop. To put it simply, the operating system manages the communication between your software and your hardware. Without the operating system (OS), the software wouldn't function.

ตัวอย่าง : จงแสดงผลลัพธ์ของคำสั่ง whoami

 thong@Thongchai: ~

```
thong@Thongchai:~$ whoami
```

```
thong
```

```
thong@Thongchai:~$
```

1. แสดงปฏิทินปีที่น่าสนใจตลอดทั้งปี

```
sirasit@LAPTOP-FKHJFFP3:~$ cal
Command 'cal' not found, but can be installed with:
sudo apt install ncal
sirasit@LAPTOP-FKHJFFP3:~$ sudo apt install ncal
[sudo] password for sirasit:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following NEW packages will be installed:
ncal
0 upgraded, 1 newly installed, 0 to remove and 762 not upgraded.
Need to get 20.2 kB of archives.
After this operation, 69.6 kB of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu jammy/universe amd64 ncal amd64 12.1.7+nmu3ubuntu2 [20.2 kB]
Fetched 20.2 kB in 1s (22.4 kB/s)
Selecting previously unselected package ncal.
(Reading database ... 160011 files and directories currently installed.)
Preparing to unpack .../ncal_12.1.7+nmu3ubuntu2_amd64.deb ...
Unpacking ncal (12.1.7+nmu3ubuntu2) ...
Setting up ncal (12.1.7+nmu3ubuntu2) ...
Processing triggers for man-db (2.10.2-1) ...
sirasit@LAPTOP-FKHJFFP3:~$ cal
  January 2024
Su Mo Tu We Th Fr Sa
 1  2  3  4  5  6
 7  8  9 10 11 12 13
14 15 16 17 18 19 20
21 22 23 24 25 26 27
28 29 30 31

sirasit@LAPTOP-FKHJFFP3:~$ cal 2002
      2002
   January      February      March
Su Mo Tu We Th Fr Sa Su Mo Tu We Th Fr Sa Su Mo Tu We Th Fr Sa
 1  2  3  4  5          1  2          1  2
 6  7  8  9 10 11 12  3  4  5  6  7  8  9  3  4  5  6  7  8  9
13 14 15 16 17 18 19 10 11 12 13 14 15 16 10 11 12 13 14 15 16
20 21 22 23 24 25 26 17 18 19 20 21 22 23 17 18 19 20 21 22 23
27 28 29 30 31      24 25 26 27 28      24 25 26 27 28 29 30
                               31

   April      May      June
Su Mo Tu We Th Fr Sa Su Mo Tu We Th Fr Sa Su Mo Tu We Th Fr Sa
 1  2  3  4  5  6          1  2  3  4          1
 7  8  9 10 11 12 13  5  6  7  8  9 10 11  2  3  4  5  6  7  8
14 15 16 17 18 19 20 12 13 14 15 16 17 18  9 10 11 12 13 14 15
21 22 23 24 25 26 27 19 20 21 22 23 24 25 16 17 18 19 20 21 22
28 29 30          26 27 28 29 30 31      23 24 25 26 27 28 29
                               30

   July      August      September
Su Mo Tu We Th Fr Sa Su Mo Tu We Th Fr Sa Su Mo Tu We Th Fr Sa
 1  2  3  4  5  6          1  2  3          1  2  3  4  5  6  7
 7  8  9 10 11 12 13  4  5  6  7  8  9 10  8  9 10 11 12 13 14
14 15 16 17 18 19 20 11 12 13 14 15 16 17 15 16 17 18 19 20 21
21 22 23 24 25 26 27 18 19 20 21 22 23 24 22 23 24 25 26 27 28
28 29 30 31      25 26 27 28 29 30 31  29 30

   October      November      December
Su Mo Tu We Th Fr Sa Su Mo Tu We Th Fr Sa Su Mo Tu We Th Fr Sa
 1  2  3  4  5          1  2          1  2  3  4  5  6  7
 6  7  8  9 10 11 12  3  4  5  6  7  8  9  8  9 10 11 12 13 14
13 14 15 16 17 18 19 10 11 12 13 14 15 16 15 16 17 18 19 20 21
20 21 22 23 24 25 26 17 18 19 20 21 22 23 22 23 24 25 26 27 28
27 28 29 30 31      24 25 26 27 28 29 30  29 30 31
```

1. sudo apt install ncal
2. cal -> show calendar of the current month
3. cal 2002 -> calendar of year 2002
4. cal 2 2024 -> february 2024

2. แสดงเฉพาะจำนวนบรรทัดของไฟล์ /etc/passwd

```
sirasit@LAPTOP-FKHJFFP3:~$ more /etc/passwd
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/bin/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin
irc:x:39:39:ircd:/run/ircd:/usr/sbin/nologin
gnats:x:41:41:Gnats Bug-Reporting System (admin)/var/lib/gnats:/usr/sbin/nologin
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin
systemd-network:x:100:102:systemd Network Management,,,:/run/systemd:/usr/sbin/nologin
systemd-resolve:x:101:103:systemd Resolver,,,:/run/systemd:/usr/sbin/nologin
messagebus:x:102:105:systemd Message Bus,,,:/run/systemd:/usr/sbin/nologin
systemd-timesync:x:103:106:systemd Time Synchronization,,,:/run/systemd:/usr/sbin/nologin
syslog:x:104:111:syslog:/home/syslog:/usr/sbin/nologin
_apt:x:105:65534:apt:/nonexistent:/usr/sbin/nologin
uidd:x:106:112:uidd:/run/uidd:/usr/sbin/nologin
tcpdump:x:107:113:tcpdump:/run/tcpdump:/usr/sbin/nologin
sirasit:x:1000:1000:,,,:/home/sirasit:/bin/bash
avahi:x:108:118:Avahi mDNS daemon,,,:/run/avahi-daemon:/usr/sbin/nologin
geoclue:x:109:119:geoclue:/var/lib/geoclue:/usr/sbin/nologin
sirasit@LAPTOP-FKHJFFP3:~$ wc /etc/passwd
 29  41 1549 /etc/passwd
sirasit@LAPTOP-FKHJFFP3:~$ wc -L /etc/passwd
 29 /etc/passwd
sirasit@LAPTOP-FKHJFFP3:~$ wc -w /etc/passwd
 41 /etc/passwd
sirasit@LAPTOP-FKHJFFP3:~$ wc -c /etc/passwd
1549 /etc/passwd
sirasit@LAPTOP-FKHJFFP3:~$ wc -lw /etc/passwd
 29  41 /etc/passwd
sirasit@LAPTOP-FKHJFFP3:~$ |
```

1. Cat -> The *cat* command is the simplest way to view the contents of a file
2. More -> The *cat* command is all well and good for small files. But, if the file is large, the contents will zoom past and we'll only see the last screen worth of content.
3. wc -> wc stands for word count. As the name implies, it is mainly used for counting purpose.

3.1 wc -l -> number of lines (29)

3.2 wc -w -> number of words (41)

3.3 wc -c -> number of characters (1549)

3. แสดงเฉพาะจำนวนคำของไฟล์ /etc/hosts

```
sirasit@LAPTOP-FKHJFFP3:~$ cat /etc/hosts
# This file was automatically generated by WSL. To stop automatic generation of this file, add the following entry to /etc/wsl.conf:
# [network]
# generateHosts = false
127.0.0.1    localhost
127.0.1.1    LAPTOP-FKHJFFP3.localdomain    LAPTOP-FKHJFFP3

# The following lines are desirable for IPv6 capable hosts
::1        ip6-localhost ip6-loopback
fe00::0    ip6-localnet
ff00::0    ip6-mcastprefix
ff02::1    ip6-allnodes
ff02::2    ip6-allrouters
sirasit@LAPTOP-FKHJFFP3:~$ wc -w /etc/hosts
53 /etc/hosts
sirasit@LAPTOP-FKHJFFP3:~$
```

wc -w -> word count

4. แสดง 3 บรรทัดแรกของไฟล์ /etc/passwd

```
4.  
sirasil@LAPTOP-FKHJFFP3:~/university/os_sys$ head -3 /etc/passwd  
root:x:0:0:root:/root:/bin/bash  
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin  
bin:x:2:2:bin:/bin:/usr/sbin/nologin  
sirasil@LAPTOP-FKHJFFP3:~/university/os_sys$ tail -4 /etc/passwd
```

head -3 -> display first 3 lines of /etc/passwd

5. แสดง 4 บรรทัดสุดท้ายของไฟล์ /etc/hosts

```
tail-4: command not found
sirasi@LAPTOP-FKHJFFP3:~/university/os_sys$ tail -4 /etc/hosts
fe00::0 ip6-localnet
ff00::0 ip6-mcastprefix
ff02::1 ip6-allnodes
ff02::2 ip6-allrouters
```

tail -4 -> display last 4 lines of /etc/hosts

6. แสดงทุกบรรทัดที่มี username ของนิตินในไฟล์ /etc/passwd still incorrect

```
1702.12 ipb-attouters  
sirasi@LAPTOP-FKHJFFP3:~/university/os_sys$ grep sirasi /etc/passwd  
sirasi:x:1000:1000:,,,:/home/sirasi:/bin/bash  
sirasi@LAPTOP-FKHJFFP3:~/university/os_sys$ |
```

grep sirasi /etc/passwd -> searches for files containing sirasi (username).

7. เขียนโปรแกรมภาษา C ที่แสดงชื่อ นามสกุลของนิสิต และ แสดงการใช้ gcc เพื่อ compile โปรแกรม และ run โปรแกรมจน ได้ผลลัพธ์

```
sirasit@LAPTOP-FKHJFFP3:~/university/os_sys$ vim name.c
sirasit@LAPTOP-FKHJFFP3:~/university/os_sys$ ls
name.c
sirasit@LAPTOP-FKHJFFP3:~/university/os_sys$ gcc name.c
sirasit@LAPTOP-FKHJFFP3:~/university/os_sys$ ls
a.out  name.c
sirasit@LAPTOP-FKHJFFP3:~/university/os_sys$ a.out
a.out: command not found
sirasit@LAPTOP-FKHJFFP3:~/university/os_sys$ ./a.out
Sirasit Tanrattanawong
sirasit@LAPTOP-FKHJFFP3:~/university/os_sys$ |
```

1. vim or nano or pico to create .c file
2. gcc name.c(name of file) -> you will get a.out
3. a.out or ./a.out to display the result

8. เขียนโปรแกรมภาษา C ที่แสดงเลขประจำตัวของนิสิต จากนั้น แสดงการใช้ gcc เพื่อ compile โปรแกรมเป็นภาษา assembly และแสดงเนื้อหาของโปรแกรม assembly

```
id.s: command not found
sirasi@LAPTOP-FKHJFFP3:~/university/os_sys$ vim id.s
sirasi@LAPTOP-FKHJFFP3:~/university/os_sys$ |
```

1. vim or nano or pico to create .c file
2. gcc name.c(name of file) -> you will get a.out
3. a.out or ./a.out to display the result
4. gcc -c -S -id.c (name of file) -> you will get id.s file
5. cat id.s to display content

```
.file "id.c"
.text
.section .rodata
.LC0:
.string "6432166421"
.text
.globl main
.type main, @function
main:
.LFB0:
.cfi_startproc
endbr64
pushq %rbp
.cfi_def_cfa_offset 16
.cfi_offset 6, -16
movq %rsp, %rbp
.cfi_def_cfa_register 6
leaq .LC0(%rip), %rax
movq %rax, %rdi
call puts@PLT
movl $0, %eax
popq %rbp
.cfi_def_cfa 7, 8
ret
.cfi_endproc
.LFE0:
.size main, .-main
.ident "GCC: (Ubuntu 11.3.0-1ubuntu1~22.04) 11.3.0"
.section .note.GNU-stack,"",@progbits
.section .note.gnu.property,"a"
.align 8
.long 1f - 0f
.long 4f - 1f
.long 5
0:
.string "GNU"
1:
.align 8
.long 0xc0000002
.long 3f - 2f
2:
.long 0x3
3:
.align 8
4:
~
~
~
sirasi@LAPTOP-FKHJFFP3:~/university/os_sys$ |
```