School name: Computer Science

Assignment Cover Sheet
For submission individual or group work

Tutor / Marker's name	Assignment number	Assignment due date	Lab Time
Michael Swiatkiwsky	1	27/08/2017	Monday 4:30pm – 5:30pm
Course Code / Course Title			Semester
COSC1114 / Operating Systems Principles			2017 semester 2
Lecturer/Teacher's name			Assignment total marks
Deng Ke			

This statement should be completed and signed by the student(s) participating in preparation of the assignment.

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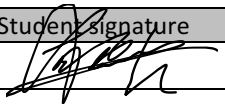
Family name	Given name	Student number	Student signature	Date
Zang	Siyu	S3534987		28/07/2017

1. Introduce Running Environment

1.1 Hardware:

Process: 2.6 GHz Intel Core i5
Memory: 8 GB 1600 MHz DDR3

1.2 Software:

VMware Fusion 8.5.8

2. Progress Diary

Stage	Step	Task Description	Comments	Time
1	1	Download ubuntu-14.04.2desktop-i386.iso from Ubuntu (32-bit) from Ubuntu.com		Start date: 25/07/2017 End date: 25/07/2017 Demo Date:
1	2	Download VMware Fusion 8.5.8		Start date: 25/07/2017 End date: 25/07/2017 Demo Date:
1	3	Install VMware on my Mac Computer		Start date: 25/07/2017 End date: 25/07/2017 Demo Date:
1	4	Install Ubuntu on VMware		Start date: 25/07/2017 End date: 25/07/2017 Demo Date:
2	1	Download kernel 4.12.3from kernel.org	The current version is: 4.8.0-36-generic	Start date: 25/07/2017 End date: 25/07/2017 Demo Date:
2	2	Extract and install it		Start date: 25/07/2017 End date: 25/07/2017 Demo Date:

2	3	Reboot and check install correct	uname –r shows that the version is 4.12.3	Start date: 25/07/2017 End date: 25/07/2017 Demo Date:
3	1	Create a system call in the kernel source file		Start date: 25/07/2017 End date: 25/07/2017 Demo Date:
3	2	Re-complie kerel source file		Start date: 25/07/2017 End date: 25/07/2017 Demo Date:
3	3	Wirte a C program to call this system call		Start date: 25/07/2017 End date: 25/07/2017 Demo Date:
3	4	Check kernel log and system log to make sure that message is correct be logged.	uname –r shows that the version is 4.12.3.systemcall	Start date: 25/07/2017 End date: 25/07/2017 Demo Date:

3. Stage 3 steps

3.1 Go to System call folder

cd /home/osp/Downloads/linux-4.12.3/arch/x86/entry/syscalls/

3.2 Edit syscall_32.tbl file

Add a new line at the end of the file:

```
385     i386    helloworld      sys_helloworld
```

Then, save the change.

3.3 Go to include folder

cd /home/ osp/Downloads/linux-4.12.3/include/linux

3.4 Edit syscalls.h file

Add a new line at the end of the file:

```
asmlinkage int sys_ helloworld(void);
```

3.5 Create the system call file

cd /home/ osp/Downloads/linux-4.12.3/

create a new file, name is: helloworld.c. The file content:

```
#include <linux/kernel.h>
#include <linux/init.h>
#include <linux/syscalls.h>
#include <linux/linkage.h>

asmlinkage int sys_helloworld(void) {
         printk(KERN_EMERG "This is Zang's message");
         return 0;
}
```

3.6 Create Kconfig file

Create a Kconfig file, name is: Kconfig.helloworld. The file content:

```
config HELLOWORLD
        bool " This is Zang's message "
        default y
        help
                This will print my service is running
```

3.7 Edit Makefile of kernel directory

Edit makefile file, and add helloworld.o to the obj-y list.

3.8 Edit Makefile of kernel

Edit makefile file, and edit line 4:

EXTRAVERSION = .syscall

3.9 Re-complier Kernel

Then, Re-complier Kernel

3.10 Check the kernel version

uname -r

And it should out put:

4.12.3.syscall

3.11 Create a C program to invoke the system call

Helloworld.c

```
#include <stdlib.h>

int helloworld() {
        int ret;
        __asm__("movl $385,%eax");
        __asm__("int $0x80");
        __asm__("movl %eax, -4(%ebp)");
        return ret;
}

int main()  {
        int ret;
        printf("invoking system call myservice...\n");
        ret = helloworld();
        if(ret<0) {
                printf("not working");
```

```
                exit(1);
        }
        printf("system call executed.\n");
        return 0;
}
```

3.12 Compile the program, and run it.
gcc helloworld.c

3.13 Check the kernel log
Cat /var/log/kernel.log

3.14 Check the system log
Cat /vat/log/syslog

Both 3.13 and 3.14 can see the message: This is Zang's message