

## **LINUX PROGRAMMING WEEK 3**

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SLOT : B1 + TB1  
COURSE CODE : SWE4009

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### **1. Process and memory management**

a. AIM:

To demonstrate the process management and memory management commands in BASH shell.

b. ALGORITHM:

We will be executing following commands:

- i. bg - used to send a process to background (using rhythmbox for demo)
- ii. fg - used to bring a process to the foreground(using rhythmbox for demo)
- iii. top - lists out the running processes
- iv. ps - lists out the processes too, but in different manner
- v. kill - used to kill running process (using atom text editor for demo)
- vi. nice - like user defined priority; we can set it (using atom text editor for demo)
- vii. DF - lists the free space on hard drive
- viii. free - lists RAM and Swap availability

c. CODE:

```
kailash@18mis1074: ~/Linux/Week3
kailash@18mis1074: ~/Linux/Week3 x kailash@18mis1074: ~/Linux/Week3 x
kailash@18mis1074:~/Linux/Week3$ cat procmem.sh
#!/bin/bash
echo -e "\e[31;1m***** PROCESS MANAGEMENT *****\e[0m"
echo -e "\e[31;1m***** BG AND FG COMMAND DEMO *****\e[0m"
set -m
rhythmbox & kill -s STOP $(pidof rhythmbox)
bg
fg "%rhythmbox"
echo -e "\e[31;1m***** CLOSED RHYTHMBOX PROCESS *****\e[0m"
echo -e "\e[31;1m***** TOP COMMAND *****\e[0m"
top
echo -e "\e[31;1m***** PS COMMAND *****\e[0m"
ps
echo -e "\e[31;1m***** NICE VALUE *****\e[0m"
renice -n 18 $(pidof atom)
echo -e "\e[31;1m***** KILL COMMAND *****\e[0m"
kill $(pidof atom)
echo "ATOM KILLED"
echo -e "\e[31;1m***** MEMORY MANAGEMENT *****\e[0m"
echo -e "\e[31;1m***** DF COMMAND *****\e[0m"
df -h
echo -e "\e[31;1m***** FREE COMMAND *****\e[0m"
free -m
kailash@18mis1074:~/Linux/Week3$
```

d. OUTPUT: Atom was already opened previously, manually.  
Rhythmbox opened :

```
kailash@18mis1074: ~/Linux/Week3
kailash@18mis1074:~/Linux/Week3$ ./procmem.sh
***** PROCESS MANAGEMENT *****
***** BG AND FG COMMAND DEMO *****
[1]+  rhythmbox &
rhythmbox

(rhythmbox:14258): Gtk-WARNING **: 10:27:59.969: actionhelper: action app.
play-repeat can't be activated due to parameter type mismatch (parameter t
ype NULL, target type b)

(rhythmbox:14258): Gtk-WARNING **: 10:27:59.970: actionhelper: action app.
play-shuffle can't be activated due to parameter type mismatch (parameter
type NULL, target type b)

```

After closing rhythmbox manually:

```
/usr/lib/python3/dist-packages/gi/overrides/GObject.py:502: Warning: ../../  
../gobject/gsignal.c:2735: instance '0x561404f85700' has no handler with  
id '14310'  
    return func(*args, **kwargs)  
/usr/lib/python3/dist-packages/gi/overrides/GObject.py:502: Warning: ../../  
../gobject/gsignal.c:2735: instance '0x561404f85700' has no handler with  
id '14309'  
    return func(*args, **kwargs)  
  
(rhythmbox:14258): Gtk-WARNING **: 10:28:25.980: Can't set a parent on wid  
get which has a parent  
***** CLOSED RHYTHMBOX PROCESS *****  
***** TOP COMMAND *****
```

Top command :

get which has a parent

```
***** CLOSED RHYTHMBOX PROCESS *****  
***** TOP COMMAND *****
```

```
top - 10:29:08 up 1:29, 1 user, load average: 1.35, 1.55, 1.41  
Tasks: 247 total, 1 running, 246 sleeping, 0 stopped, 0 zombie  
%Cpu(s): 17.8 us, 10.3 sy, 0.0 ni, 70.2 id, 1.6 wa, 0.0 hi, 0.2 si, 0  
MiB Mem : 7424.5 total, 2516.2 free, 2287.4 used, 2620.9 buff/cach  
MiB Swap: 2048.0 total, 2048.0 free, 0.0 used. 4800.2 avail Mem
```

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+
1500	kailash	20	0	2055032	120056	57432	S	11.6	1.6	5:55.54
7257	kailash	20	0	8896460	205672	102384	S	11.0	2.7	3:14.37
940	kailash	9	-11	4178304	21984	17268	S	9.3	0.3	4:34.00
1344	kailash	20	0	4197344	319908	121000	S	9.0	4.2	4:22.11
1864	kailash	20	0	369792	99892	66404	S	5.3	1.3	0:54.56
1014	kailash	20	0	860728	104880	57136	S	3.0	1.4	2:36.45
1823	kailash	20	0	771848	263444	148556	S	2.3	3.5	3:19.65
6073	kailash	20	0	828348	60448	49476	S	2.0	0.8	0:50.77
14117	kailash	20	0	1035356	219340	120688	S	1.0	2.9	0:03.06
1026	mysql	20	0	1740948	358736	35076	S	0.7	4.7	0:23.96
14337	kailash	20	0	4557568	88340	66932	S	0.7	1.2	0:00.19
163	root	-51	0	0	0	0	S	0.3	0.0	0:04.74
169	root	20	0	0	0	0	I	0.3	0.0	0:04.69
6135	kailash	20	0	20.6g	274532	98972	S	0.3	3.6	1:48.53
12192	root	20	0	0	0	0	I	0.3	0.0	0:03.33

After quitting top command,  
PS command:

```
***** PS COMMAND *****  
PID TTY TIME CMD  
14203 pts/0 00:00:00 bash  
14257 pts/0 00:00:00 procmem.sh  
14357 pts/0 00:00:00 ps  
***** NICE VALUE *****
```

Nice / Renice command:



```

***** NICE VALUE *****
14179 (process ID) old priority 0, new priority 18
14149 (process ID) old priority 0, new priority 18
14123 (process ID) old priority 0, new priority 18
14121 (process ID) old priority 0, new priority 18
14117 (process ID) old priority 0, new priority 18
***** KILL COMMAND *****

```

Kill command:

```

***** KILL COMMAND *****
ATOM KILLED
***** MEMORY MANAGEMENT *****
***** DF COMMAND *****

```

Df command:

```

***** MEMORY MANAGEMENT *****
***** DF COMMAND *****
Filesystem      Size  Used Avail Use% Mounted on
udev            3.6G   0    3.6G   0% /dev
tmpfs           743M  2.1M  741M   1% /run
/dev/sda2       916G   89G   781G  11% /
tmpfs           3.7G   66M   3.6G   2% /dev/shm
tmpfs           5.0M   4.0K   5.0M   1% /run/lock
tmpfs           3.7G   0    3.7G   0% /sys/fs/cgroup
/dev/loop3       32M   32M     0 100% /snap/snapd/11036
/dev/loop6       56M   56M     0 100% /snap/core18/1988
/dev/loop2      926M  926M     0 100% /snap/android-studio/100
/dev/loop1      818M  818M     0 100% /snap/android-studio/99
/dev/loop0       50M   50M     0 100% /snap/snap-store/467
/dev/loop7       63M   63M     0 100% /snap/gtk-common-themes/1506
/dev/loop8       99M   99M     0 100% /snap/core/10823
/dev/loop10      56M   56M     0 100% /snap/core18/1944
/dev/loop11      52M   52M     0 100% /snap/snap-store/518
/dev/loop12     219M  219M     0 100% /snap/gnome-3-34-1804/66
/dev/loop9      216M  216M     0 100% /snap/atom/271
/dev/loop4      125M  125M     0 100% /snap/vscode/93
/dev/loop5      282M  282M     0 100% /snap/atom/273
/dev/loop14     256M  256M     0 100% /snap/gnome-3-34-1804/36
/dev/loop13      65M   65M     0 100% /snap/gtk-common-themes/1514
/dev/loop15      32M   32M     0 100% /snap/snapd/10707
/dev/loop16      62M   62M     0 100% /snap/core20/904
/dev/sda1       511M   7.9M   504M   2% /boot/efi
tmpfs           743M   52K   743M   1% /run/user/1000
***** FREE COMMAND *****

```

Free command:

```

***** FREE COMMAND *****

```

	total	used	free	shared	buff/cache	avail
Mem:	7424	2188	2606	72	2629	
Swap:	2047	0	2047			

```

kailash@18mis1074: ~/Linux/Week3$

```

e. RESULT:

Therefore, we have successfully completed the process and memory management script.

## 2. Program to use curses

a. AIM:

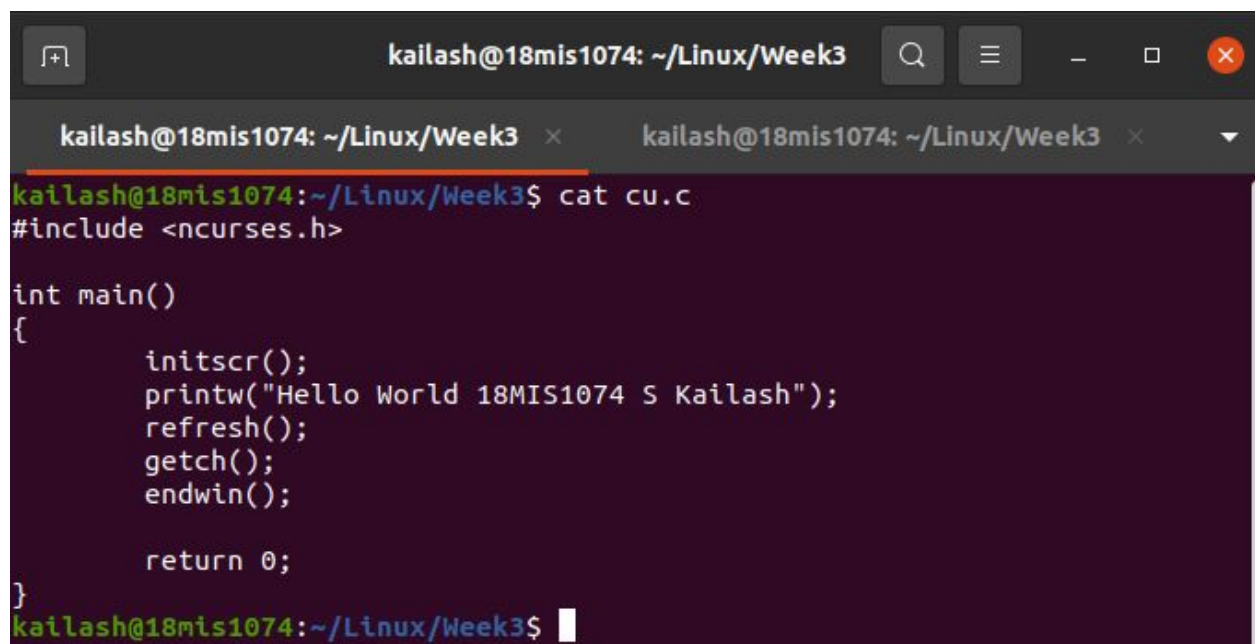
To demonstrate simple use of ncurses library using hello world program.

b. ALGORITHM:

The program is written in C language, with the Incurses flag enabled for gcc during compilation; we also import ncurses header file.

1. Initialise screen using `initscr()` method
2. Print "Hello World 18MIS1074 S Kailash"
3. `refresh()` method is called to print to real screen
4. `getch()` is used to wait for user i/p and `endwin()` is called to terminate the window's curses mode.

c. CODE:



```
kailash@18mis1074: ~/Linux/Week3
kailash@18mis1074: ~/Linux/Week3 x kailash@18mis1074: ~/Linux/Week3 x
kailash@18mis1074:~/Linux/Week3$ cat cu.c
#include <ncurses.h>

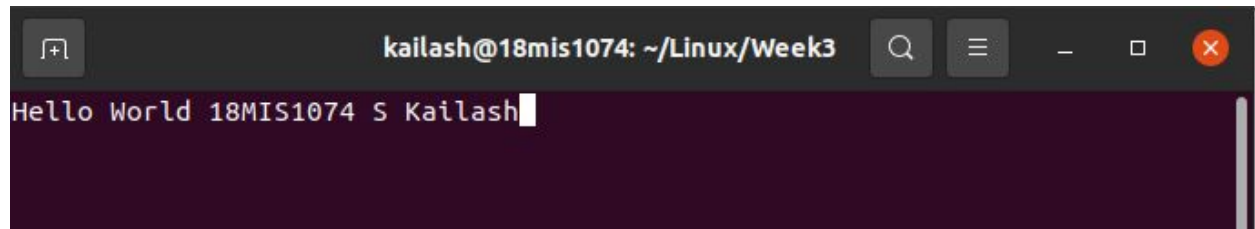
int main()
{
    initscr();
    printw("Hello World 18MIS1074 S Kailash");
    refresh();
    getch();
    endwin();

    return 0;
}
kailash@18mis1074:~/Linux/Week3$
```

d. OUTPUT:

Compilation : gcc cu.c -lncurses -o cu

On running ./cu

A terminal window with a dark background. The title bar shows the user 'kailash@18mis1074' and the directory '~/Linux/Week3'. The terminal content shows the output 'Hello World 18MIS1074 S Kailash' followed by a cursor. The window has standard Linux window controls (minimize, maximize, close) on the right side.

```
kailash@18mis1074: ~/Linux/Week3
Hello World 18MIS1074 S Kailash
```

e. RESULT:

Hence, we have demonstrated use of ncurses library using hello world function.

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