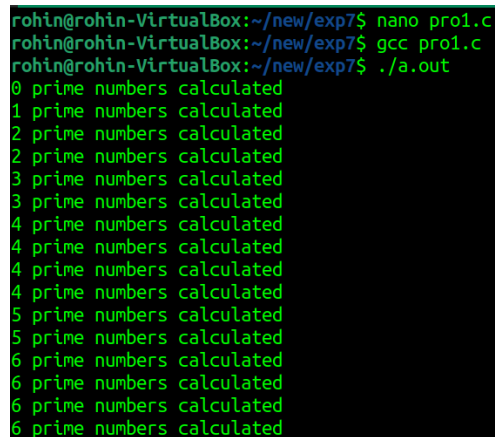# Exp: 7

Title: Write a CPU bound C program and a I/O bound C program and observe the effect of their CPU share using the top command and its variants

- ## CPU Bound C Program

1) ```c
#include<stdio.h>
#include<time.h>
int main() {
clock_t start,end;
double runtime;
start = clock();
int i,num=1,primes=0;
while(num<=10000000){
i=2;
while(i<=num){
 if (num%i==0)
  break;
 i++;
 }
 if (i==num)
primes++;
//clear("clear");
printf("%d prime numbers calculated\n",primes);
num++;
}
end=clock();
return 0;
}
```

Output:

```
rohin@rohin-VirtualBox:~/new/exp7$ nano pro1.c
rohin@rohin-VirtualBox:~/new/exp7$ gcc pro1.c
rohin@rohin-VirtualBox:~/new/exp7$ ./a.out
0 prime numbers calculated
1 prime numbers calculated
2 prime numbers calculated
2 prime numbers calculated
3 prime numbers calculated
3 prime numbers calculated
4 prime numbers calculated
4 prime numbers calculated
4 prime numbers calculated
4 prime numbers calculated
5 prime numbers calculated
5 prime numbers calculated
6 prime numbers calculated
6 prime numbers calculated
6 prime numbers calculated
6 prime numbers calculated
```

```
top - 19:49:58 up 55 min,  1 user,  load average: 0.32, 0.29, 0.27
Tasks: 189 total,   3 running, 186 sleeping,   0 stopped,   0 zombie
%Cpu(s): 74.0 us, 26.0 sy,  0.0 ni,  0.0 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
MiB Mem :   3414.0 total,   1688.0 free,    817.1 used,    909.0 buff/cache
MiB Swap:   4508.0 total,   4508.0 free,      0.0 used.   2396.6 avail Mem

   PID USER      PR  NI    VIRT    RES    SHR S  %CPU  %MEM     TIME+ COMMAND
  2941 rohin     20   0    2772   1016    924 R  52.3   0.0   0:02.48 a.out
  2418 rohin     20   0  577096  59172  45516 R  30.6   1.7   0:42.87 gnome-terminal-
  1688 rohin     20   0 4113148 417972 141992 S   7.2  12.0   3:58.49 gnome-shell
  2907 root      20   0       0      0      0 I   4.6   0.0   0:00.47 kworker/u2:0-events_unbound
  2853 root      20   0       0      0      0 I   3.3   0.0   0:00.79 kworker/u2:3-events_unbound
  1843 rohin     20   0  249800  11712   7116 S   0.3   0.3   0:02.70 ibus-daemon
```

2)
```c
#include<stdio.h>
int main() {
int ResultantMatrix[4][4],i,j,k; //matrix calculation
int matrix1[4][4]={ {2,23,23,45},
{66,45,3,23},
{3,5,89,67},
{4,4,9,7} };
int matrix2[4][4]={ {3,5,6,4},

{64,89,56,2},

{56,26,56,99},

{90,7,43,2} };

while(1) {

for(j=0;j<4;j++)//matrix multiplication

{

for(i=0;i<4;i++) {

ResultantMatrix[i][j]=0;

for(k=0;k<4;k++)

ResultantMatrix[i][j]+=matrix1[i][k]+matrix2[k][j];

printf("result=%d",ResultantMatrix[i][j]);

} } } }
```

Output:

```
lt=325result=185result=200result=244result=271result=131result=306result=350result=377res
ult=325result=185result=200result=244result=271result=131result=306result=350result=377r
result=325result=185result=200result=244result=271result=131result=306result=350result=37
98result=325result=185result=200result=244result=271result=131result=306result=350result=
=298result=325result=185result=200result=244result=271result=131result=306result=350resul
lt=298result=325result=185result=200result=244result=271result=131result=306result=350res
ult=298result=325result=185result=200result=244result=271result=131result=306result=350r
result=298result=325result=185result=200result=244result=271result=131result=306result=35
54result=298result=325result=185result=200result=244result=271result=131result=306result=
=254result=298result=325result=185result=200result=244result=271result=131result=306resul
lt=254result=298result=325result=185result=200result=244result=271result=131result=306res
ult=254result=298result=325result=185result=200result=244result=271result=131result=306r
result=254result=298result=325result=185result=200result=244result=271result=131result=30
61result=254result=298result=325result=185result=200result=244result=271result=131result=
=151result=254result=298result=325result=185result=200result=244result=271result=131resul
lt=151result=254result=298result=325result=185result=200result=244result=271result=131res
ult=151result=254result=298result=325result=185result=200result=244result=271result=131r
result=151result=254result=298result=325result=185result=200result=244result=271result=13
91result=151result=254result=298result=325result=185result=200result=244result=271result=
=291result=151result=254result=298result=325result=185result=200result=244result=271resul
lt=291result=151result=254result=298result=325result=185result=200result=244result=271res
ult=291result=151result=254result=298result=325result=185result=200result=244result=271r
result=291result=151result=254result=298result=325result=185result=200result=244result=27
64result=291result=151result=254result=298result=325result=185result=200result=244result=
=264result=291result=151result=254result=298result=325result=185result=200result=244resul
lt=264result=291result=151result=254result=298result=325result=185result=200result=244res
ult=264result=291result=151result=254result=298result=325result=185result=200result=244r
```

```
top - 11:52:55 up 5 min,  1 user,  load average: 1.14, 1.55, 0.81
Tasks: 193 total,   3 running, 190 sleeping,   0 stopped,   0 zombie
%Cpu(s): 73.2 us, 18.8 sy,  0.0 ni,  0.0 id,  8.0 wa,  0.0 hi,  0.0 si,  0.0 st
MiB Mem :   3414.0 total,   1686.1 free,    824.7 used,    903.2 buff/cache
MiB Swap:   4508.0 total,   4508.0 free,      0.0 used.   2394.2 avail Mem

  PID USER      PR  NI    VIRT    RES    SHR S  %CPU  %MEM     TIME+ COMMAND
 2260 rohin     20   0  577696  59552  45360 R  71.9   1.7   0:25.49 gnome-terminal-
 2579 rohin     20   0    2772    924    832 R  18.2   0.0   0:00.94 a.out
 1648 rohin     20   0 4101836 412760 141580 S   2.3  11.8   1:03.73 gnome-shell
  318 root      20   0       0      0      0 I   1.7   0.0   0:00.47 kworker/u2:8-ext4
   98 root      20   0       0      0      0 I   1.3   0.0   0:00.63 kworker/u2:4-even
 1705 rohin     20   0  323848   6840   5964 S   0.3   0.2   0:00.04 gvfs-afc-volume
```

- ## I/O Bound C Program

```c
#include<stdio.h>
#include<time.h>
int main()
{
int j,k,n;
while (1) { //infinite loop
printf("\nEnter any number : "); //taking input
scanf("%d" , &k);
printf("enter any number :");
scanf("%d" , &j);
n =k%j ; //calculation
printf("%d", n);//printing  the result
time_t rawtime; //displaying the current time
struct tm * timeinfo;
```

```
        time(&rawtime);
        timeinfo = localtime ( &rawtime );
        printf("\nCurrent local time and date : %s",asctime
        (timeinfo) ); //printing the current time
        }
    }
```

Output:

```
rohin@rohin-VirtualBox:~/new/exp7$ nano pro2.c
rohin@rohin-VirtualBox:~/new/exp7$ gcc pro2.c
rohin@rohin-VirtualBox:~/new/exp7$ ./a.out

Enter any number : 4
enter any number :8
4
Current local time and date : Sun Nov 20 11:54:17 2022

Enter any number : 9
enter any number :0
Floating point exception (core dumped)
rohin@rohin-VirtualBox:~/new/exp7$ ./a.out

Enter any number : 45
enter any number :8
5
Current local time and date : Sun Nov 20 11:54:31 2022

Enter any number : |
```

```
top - 11:54:36 up 7 min,  1 user,  load average: 1.39, 1.54, 0.89
Tasks: 190 total,   1 running, 189 sleeping,   0 stopped,   0 zombie
%Cpu(s): 33.1 us, 10.4 sy,  0.0 ni, 47.6 id,  1.1 wa,  0.0 hi,  7.8 si,  0.0 st
MiB Mem :   3414.0 total,   1536.2 free,    830.3 used,   1047.6 buff/cache
MiB Swap:   4508.0 total,   4508.0 free,      0.0 used.   2381.9 avail Mem

  PID USER      PR  NI    VIRT    RES    SHR S  %CPU  %MEM     TIME+ COMMAND
 1648 rohin     20   0 4113152 424632 141708 S  25.9  12.1   1:22.37 gnome-shell
 2710 root      20   0  735576  42892  19980 S  21.3   1.2   0:03.14 snapd
 2260 rohin     20   0  577520  59524  45360 S   4.7   1.7   0:39.22 gnome-terminal-
   13 root      20   0       0      0      0 S   0.7   0.0   0:00.70 ksoftirqd/0
 1998 rohin     20   0  162220   2540   2148 S   0.7   0.1   0:01.14 VBoxClient
    9 root       0 -20       0      0      0 I   0.3   0.0   0:00.61 kworker/0:1H-ever
   17 root      20   0       0      0      0 I   0.3   0.0   0:00.38 kworker/0:1-ata_s
```