

OS Assignment 3

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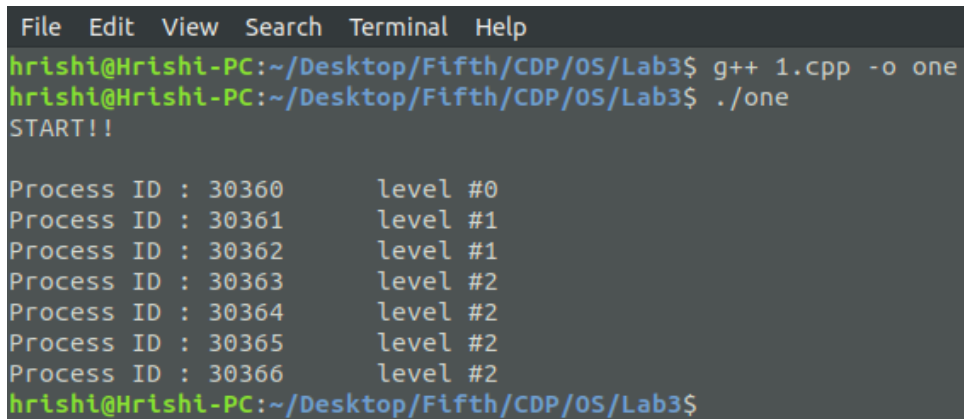
Q1.

Source Code : 1.cpp

Compile : g++ 1.cpp -o one

Usage : ./one

Output: Standard Output



```
File Edit View Search Terminal Help
hrishi@Hrishi-PC:~/Desktop/Fifth/CDP/OS/Lab3$ g++ 1.cpp -o one
hrishi@Hrishi-PC:~/Desktop/Fifth/CDP/OS/Lab3$ ./one
START!!

Process ID : 30360      level #0
Process ID : 30361      level #1
Process ID : 30362      level #1
Process ID : 30363      level #2
Process ID : 30364      level #2
Process ID : 30365      level #2
Process ID : 30366      level #2
hrishi@Hrishi-PC:~/Desktop/Fifth/CDP/OS/Lab3$
```

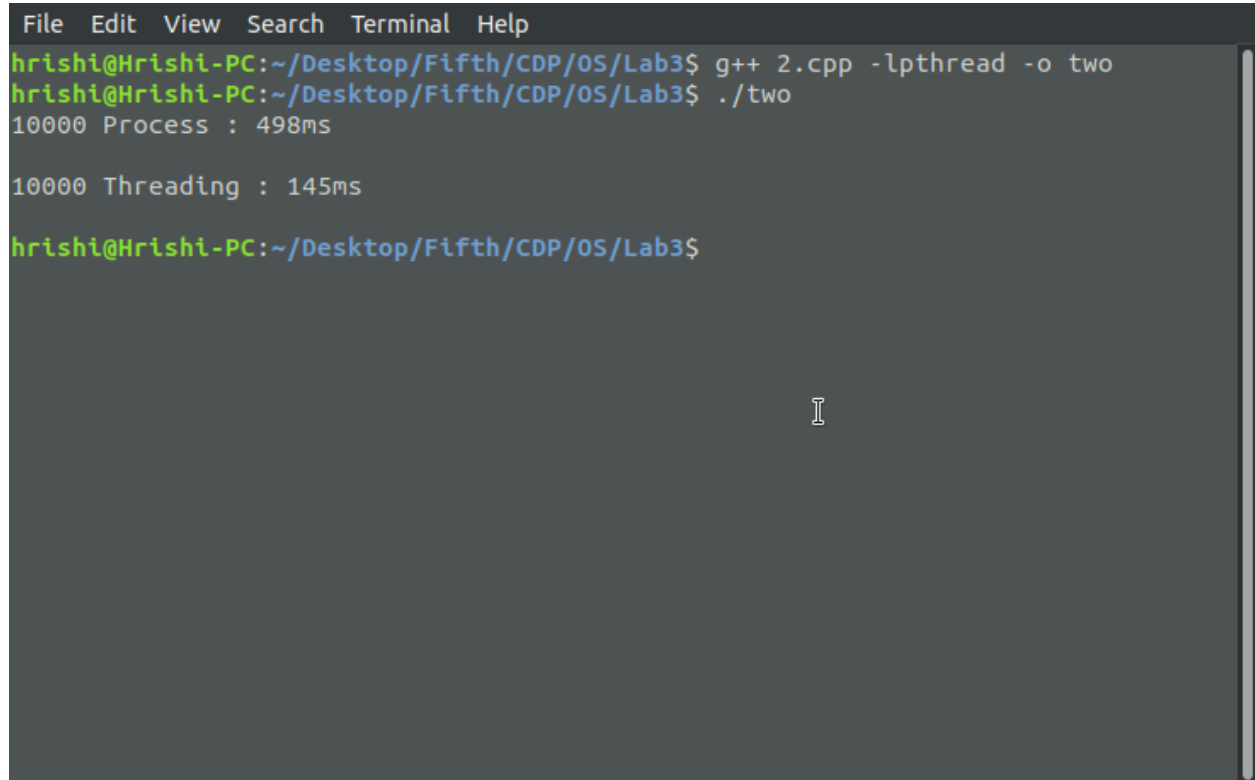
Q2.

Source Code : 2.cpp

Compile : g++ 2.cpp -lpthread -o two

Usage : ./two

Output: Standard Output

A terminal window with a dark background and a menu bar (File, Edit, View, Search, Terminal, Help). The prompt is 'hrishi@Hrishi-PC:~/Desktop/Fifth/CDP/OS/Lab3\$'. The first command is 'g++ 2.cpp -lpthread -o two', followed by './two'. The output shows '10000 Process : 498ms' and '10000 Threading : 145ms'. The prompt returns to 'hrishi@Hrishi-PC:~/Desktop/Fifth/CDP/OS/Lab3\$'.

```
File Edit View Search Terminal Help
hrishi@Hrishi-PC:~/Desktop/Fifth/CDP/OS/Lab3$ g++ 2.cpp -lpthread -o two
hrishi@Hrishi-PC:~/Desktop/Fifth/CDP/OS/Lab3$ ./two
10000 Process : 498ms

10000 Threading : 145ms

hrishi@Hrishi-PC:~/Desktop/Fifth/CDP/OS/Lab3$
```

Spawning new threads is much faster than spawning new processes as there is much less overhead associated with threads. This is because new process requires allocation of separate heap from the main program.

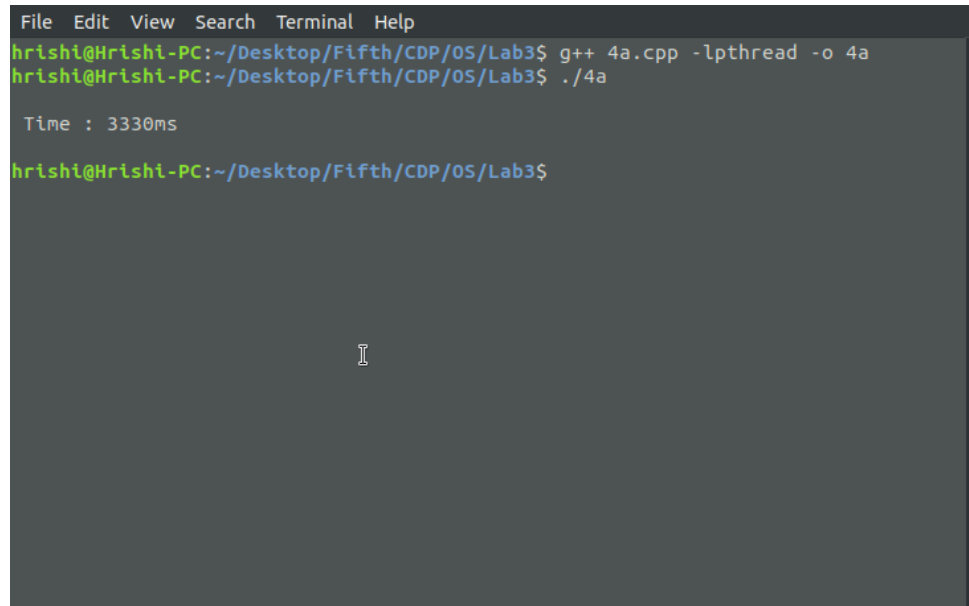
Q4. a)

Source Code : 4a.cpp

Compile : g++ 4a.cpp -lpthread -o 4a

Usage : ./4a

Output: Standard Output

A terminal window with a dark background and light green text. The menu bar at the top includes 'File', 'Edit', 'View', 'Search', 'Terminal', and 'Help'. The prompt is 'hrishi@Hrishi-PC:~/Desktop/Fifth/CDP/OS/Lab3\$'. The first command is 'g++ 4a.cpp -lpthread -o 4a' and the second is './4a'. The output shows 'Time : 3330ms' followed by a blank line and the prompt again.

```
File Edit View Search Terminal Help
hrishi@Hrishi-PC:~/Desktop/Fifth/CDP/OS/Lab3$ g++ 4a.cpp -lpthread -o 4a
hrishi@Hrishi-PC:~/Desktop/Fifth/CDP/OS/Lab3$ ./4a

Time : 3330ms

hrishi@Hrishi-PC:~/Desktop/Fifth/CDP/OS/Lab3$
```

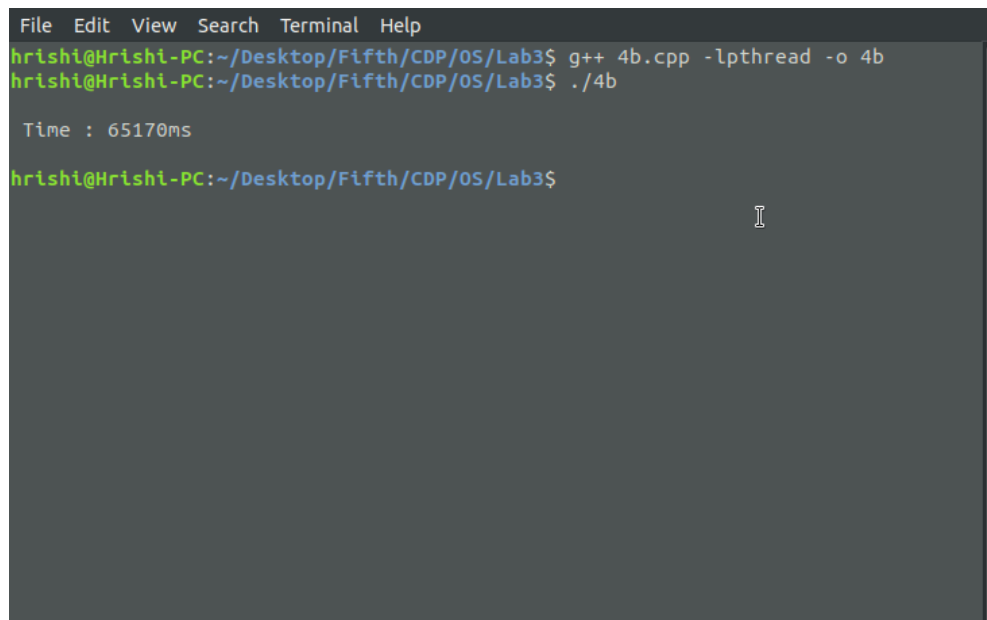
b)

Source Code : 4b.cpp

Compile : g++ 4b.cpp -lpthread -o 4b

Usage : ./4b

Output: Standard Output

A terminal window with a dark background and light green text. The menu bar at the top includes 'File', 'Edit', 'View', 'Search', 'Terminal', and 'Help'. The prompt is 'hrishi@Hrishi-PC:~/Desktop/Fifth/CDP/OS/Lab3\$'. The first command is 'g++ 4b.cpp -lpthread -o 4b' and the second is './4b'. The output shows 'Time : 65170ms' followed by a blank line and the prompt again.

```
File Edit View Search Terminal Help
hrishi@Hrishi-PC:~/Desktop/Fifth/CDP/OS/Lab3$ g++ 4b.cpp -lpthread -o 4b
hrishi@Hrishi-PC:~/Desktop/Fifth/CDP/OS/Lab3$ ./4b

Time : 65170ms

hrishi@Hrishi-PC:~/Desktop/Fifth/CDP/OS/Lab3$
```

In the first part, calculation of each column of the resultant matrix was taken care by a single thread whereas in the second part, calculation of each value of the resultant matrix was done by separate threads. This means a much higher number of threads were spawned in the second case. The huge time difference is there between execution of first and second part as spawning new threads requires large overhead. Furthermore, as the number of processor cores are limited on the machine, spawning large number of threads do not necessarily increase the performance but may increase the execution time. The above mentioned reasons contribute to the fact that the second program is much slower than the first program.