Parallel and Distributed Computing
CSE4001
Fall Semester 2020-21

Lab Assignment 1

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Aim:

Write a simple OpenMP program to demonstrate the parallel loop construct.

1. Use OMP_SET_THREAD_NUM( ) and OMP_GET_THREAD_NUM( ) to find the number of processing unit
2. Use function invoke to print 'Hello World'
3. To examine the above scenario, the functions such as omp_get_num_procs(),

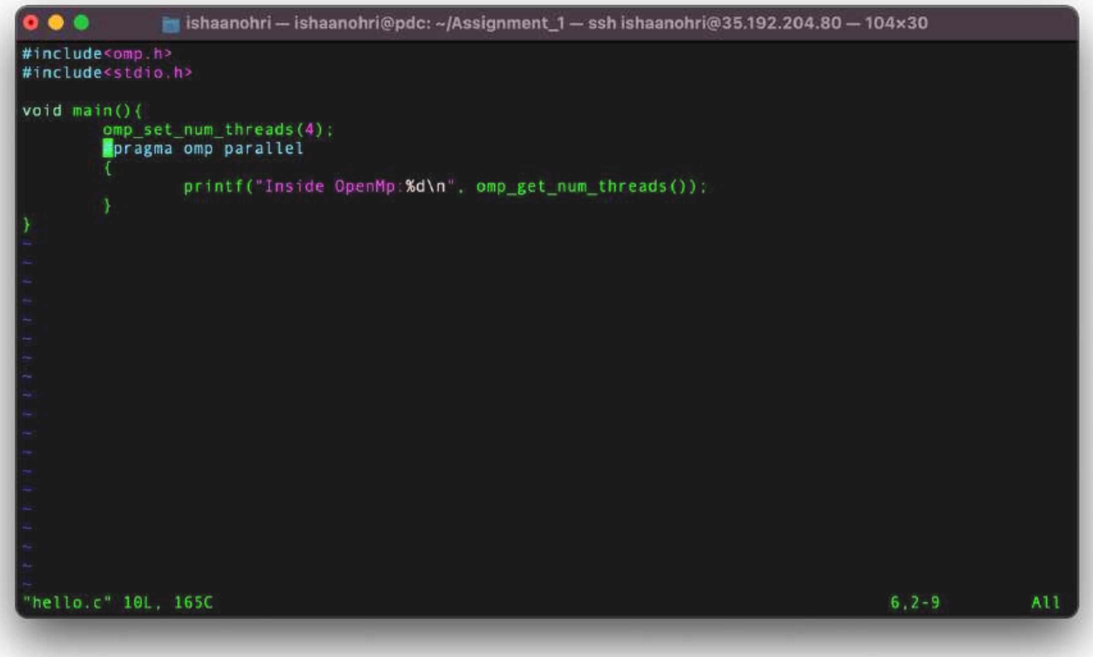
   omp_set_num_threads(), omp_get_num_threads(), omp_in_parallel(), omp_get_dynamic() and omp_get_nested() are listed and the explanation is given below to explore the concept practically.
   omp_set_num_threads() - takes an integer argument and requests that the Operating System provide that number of threads in subsequent parallel regions.
   omp_get_num_threads() (integer function) - returns the actual number of threads in the current team of threads.

   omp_get_thread_num() (integer function) - returns the ID of a thread, where the ID ranges from 0 to the number of threads minus 1. The thread with the ID of 0 is the master thread.
   omp_get_num_procs() - returns the number of processors that are available when the function is called.

   omp_get_dynamic() - returns a value that indicates if the number of threads available in subsequent parallel region can be adjusted by the run time. o omp_get_nested( ) returns a value that indicates if nested parallelism is enabled.

omp_set_num_threads() and omp_get_num_threads()

Source Code:



ishaanohri — ishaanohri@pdc: ~/Assignment_1 — ssh ishaanohri@35.192.204.80 — 104×30

```
#include<omp.h>
#include<stdio.h>

void main(){
        omp_set_num_threads(4);
        #pragma omp parallel
        {
                printf("Inside OpenMp:%d\n", omp_get_num_threads());
        }
}
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"hello.c" 10L, 165C                                                     6,2-9          All
```
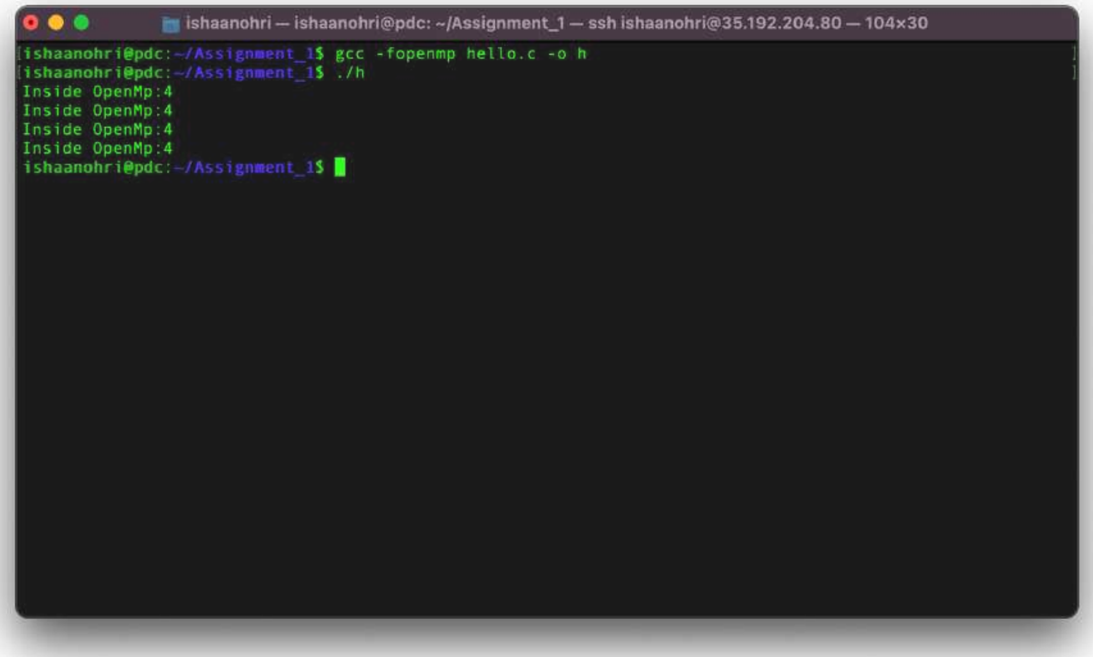

Execution:

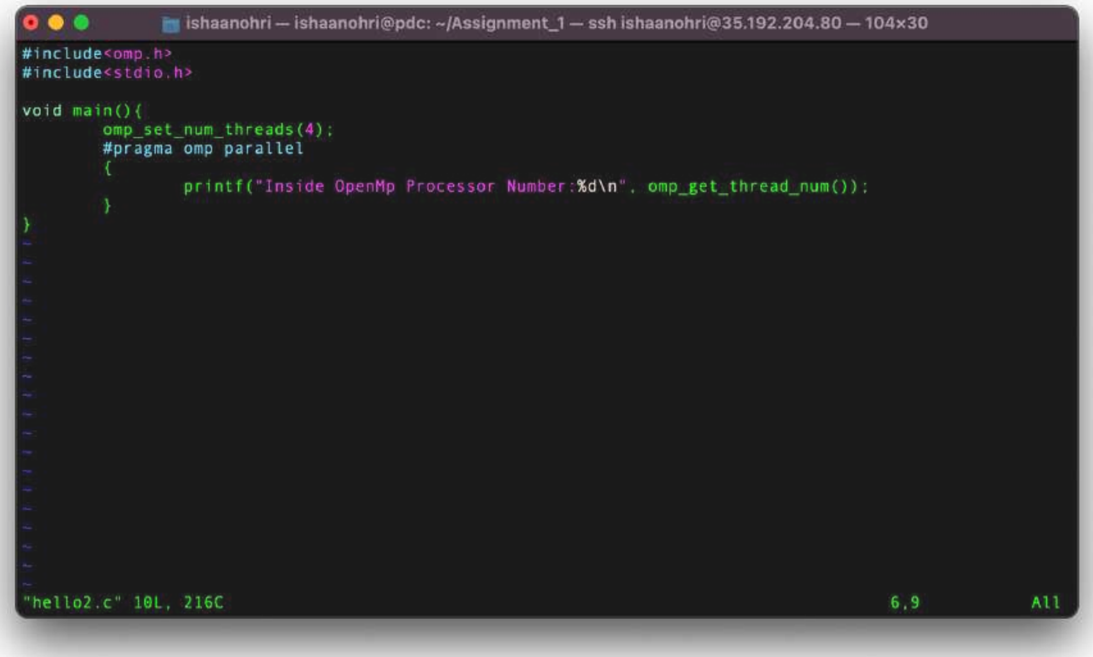


ishaanohri — ishaanohri@pdc: ~/Assignment_1 — ssh ishaanohri@35.192.204.80 — 104×30

```
[ishaanohri@pdc:~/Assignment_1$ gcc -fopenmp hello.c -o h
[ishaanohri@pdc:~/Assignment_1$ ./h
Inside OpenMp:4
Inside OpenMp:4
Inside OpenMp:4
Inside OpenMp:4
ishaanohri@pdc:~/Assignment_1$
```

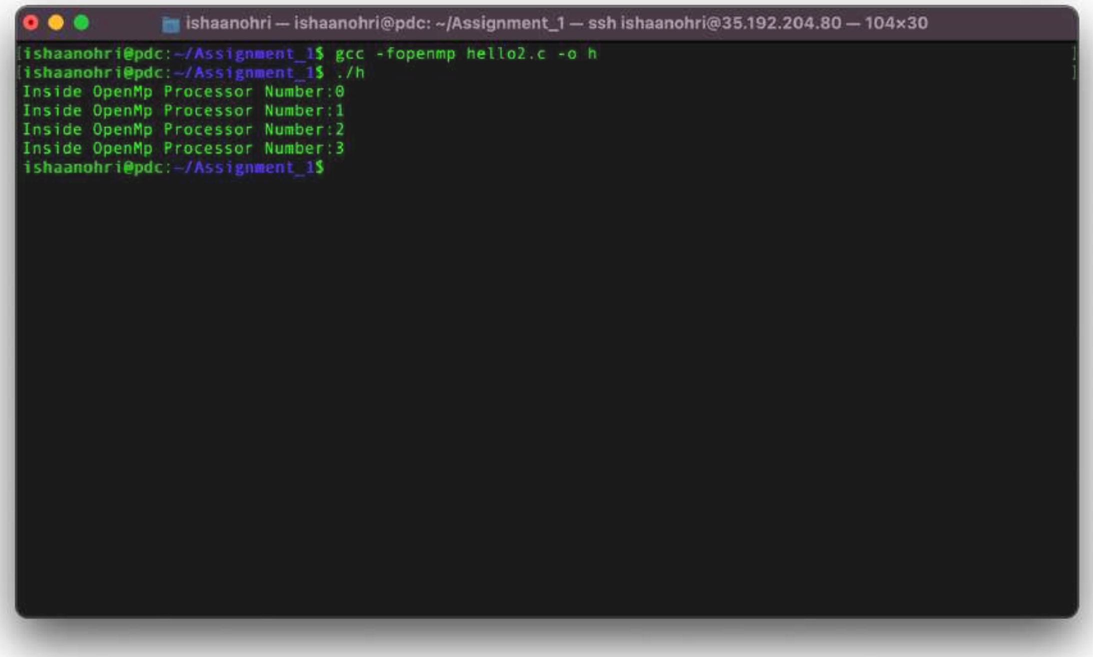
omp_set_num_threads() and omp_get_thread_num()

Source Code:


ishaanohri — ishaanohri@pdc: ~/Assignment_1 — ssh ishaanohri@35.192.204.80 — 104×30

```
#include<omp.h>
#include<stdio.h>

void main(){
        omp_set_num_threads(4);
        #pragma omp parallel
        {
                printf("Inside OpenMp Processor Number:%d\n", omp_get_thread_num());
        }
}
"hello2.c" 10L, 216C                                                                    6,9           All
```

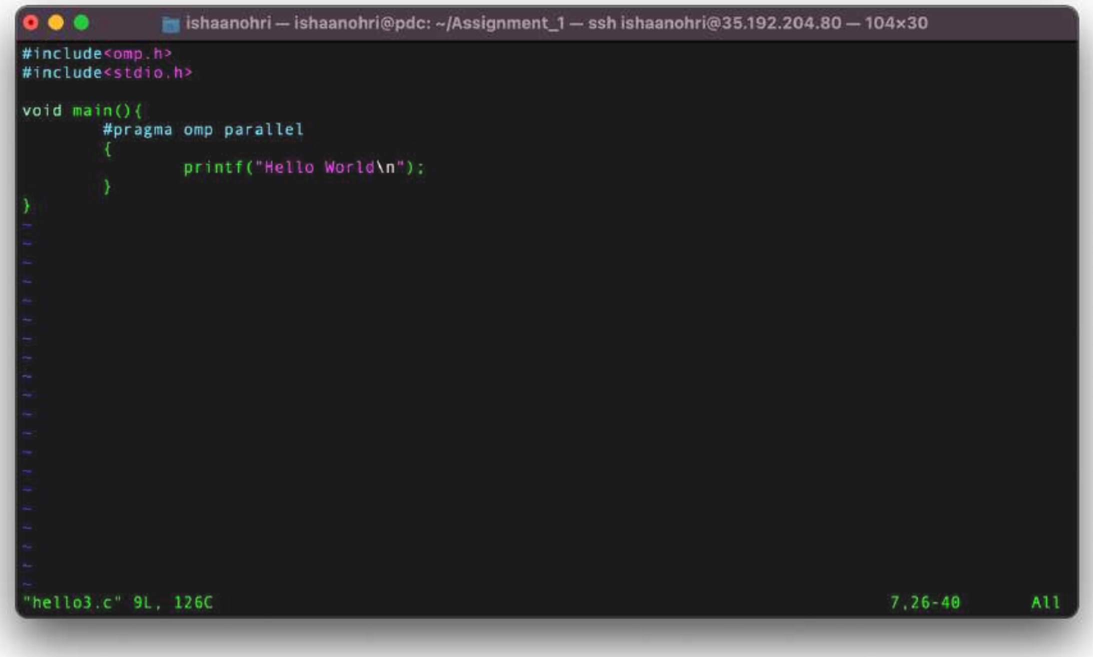
Execution:


ishaanohri — ishaanohri@pdc: ~/Assignment_1 — ssh ishaanohri@35.192.204.80 — 104×30

```
ishaanohri@pdc:~/Assignment_1$ gcc -fopenmp hello2.c -o h
ishaanohri@pdc:~/Assignment_1$ ./h
Inside OpenMp Processor Number:0
Inside OpenMp Processor Number:1
Inside OpenMp Processor Number:2
Inside OpenMp Processor Number:3
ishaanohri@pdc:~/Assignment_1$
```

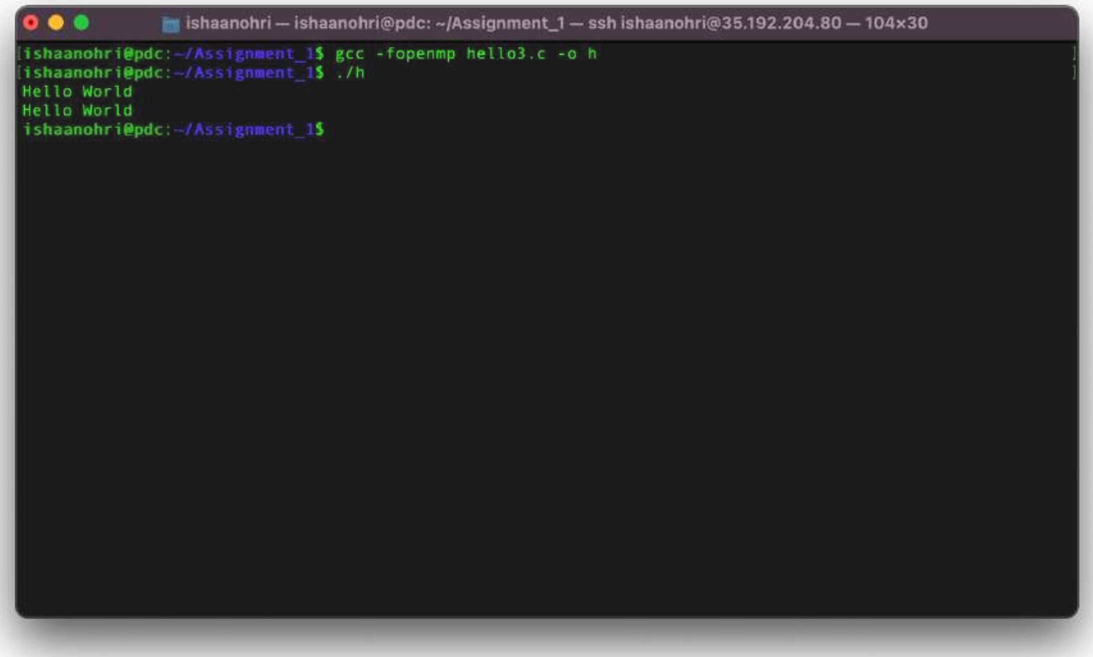
Invoking ‘Hello World’

Source Code:


ishaanohri — ishaanohri@pdc: ~/Assignment_1 — ssh ishaanohri@35.192.204.80 — 104×30

```
#include<omp.h>
#include<stdio.h>

void main(){
        #pragma omp parallel
        {
                printf("Hello World\n");
        }
}
"hello3.c" 9L, 126C                                                    7,26-40       All
```

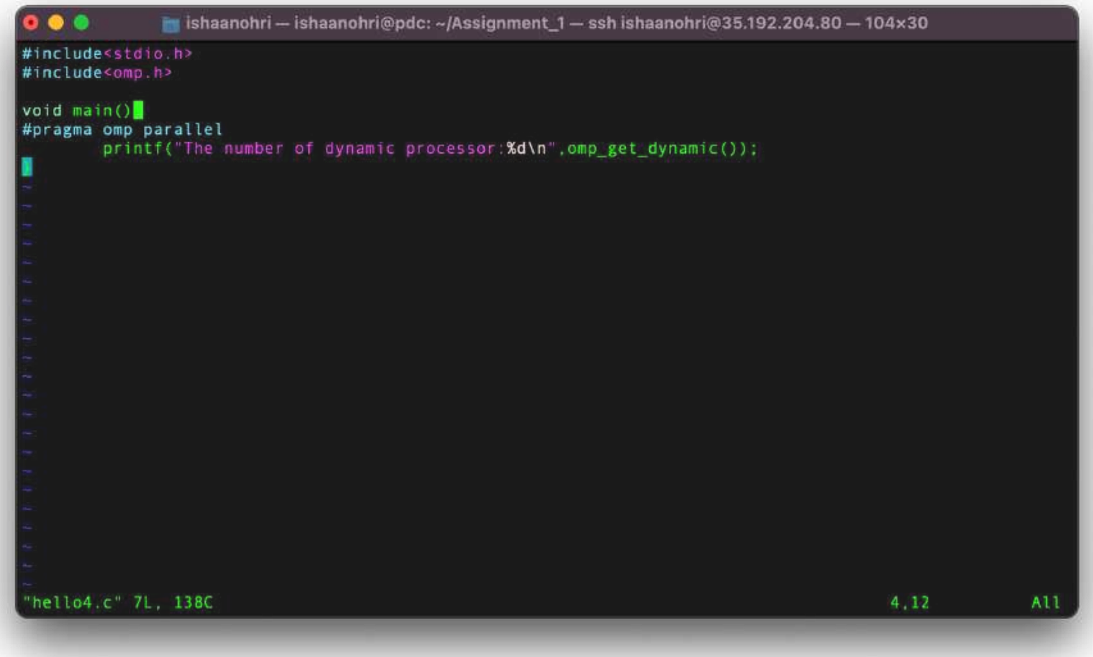
Execution:


ishaanohri — ishaanohri@pdc: ~/Assignment_1 — ssh ishaanohri@35.192.204.80 — 104×30

```
[ishaanohri@pdc:~/Assignment_1$ gcc -fopenmp hello3.c -o h
[ishaanohri@pdc:~/Assignment_1$ ./h
Hello World
Hello World
ishaanohri@pdc:~/Assignment_1$
```

omp_get_dynamic()

Source Code:


ishaanohri — ishaanohri@pdc: ~/Assignment_1 — ssh ishaanohri@35.192.204.80 — 104×30

```
#include<stdio.h>
#include<omp.h>

void main()
#pragma omp parallel
        printf("The number of dynamic processor:%d\n",omp_get_dynamic());

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"hello4.c" 7L, 138C                                                          4,12          All
```
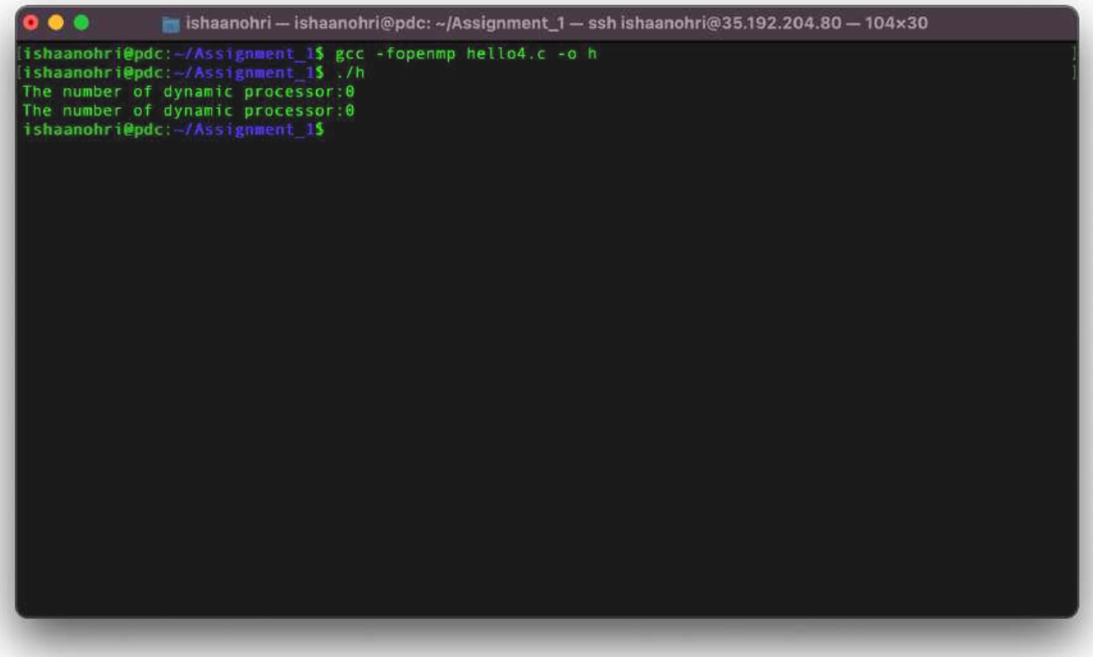
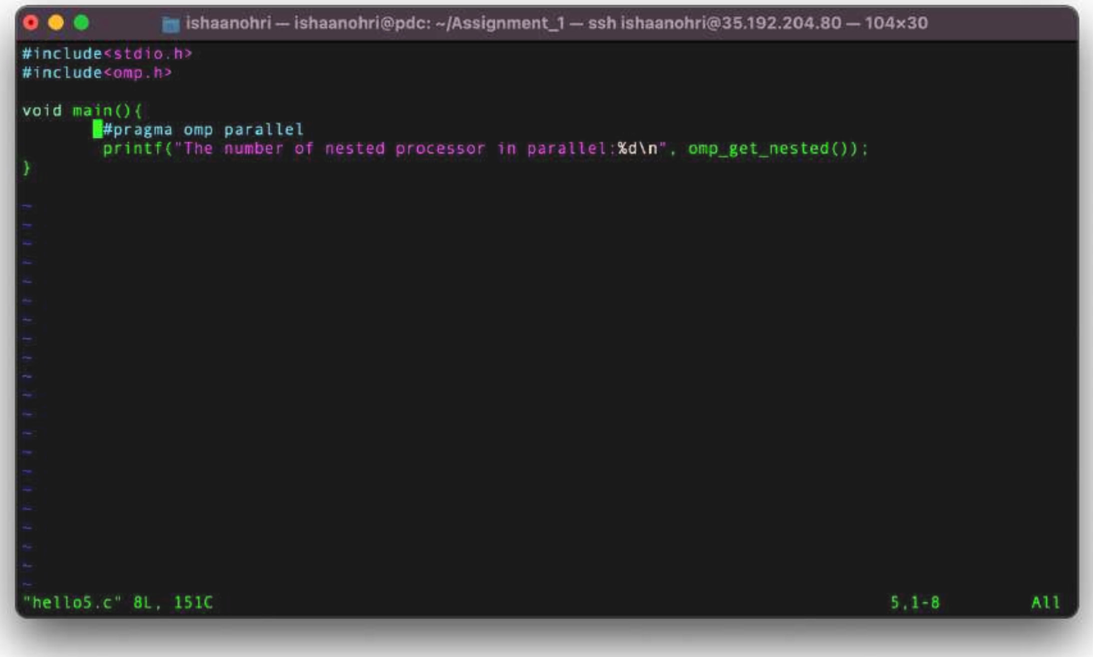

Execution:


ishaanohri — ishaanohri@pdc: ~/Assignment_1 — ssh ishaanohri@35.192.204.80 — 104×30

```
ishaanohri@pdc:~/Assignment_1$ gcc -fopenmp hello4.c -o h
ishaanohri@pdc:~/Assignment_1$ ./h
The number of dynamic processor:0
The number of dynamic processor:0
ishaanohri@pdc:~/Assignment_1$
```

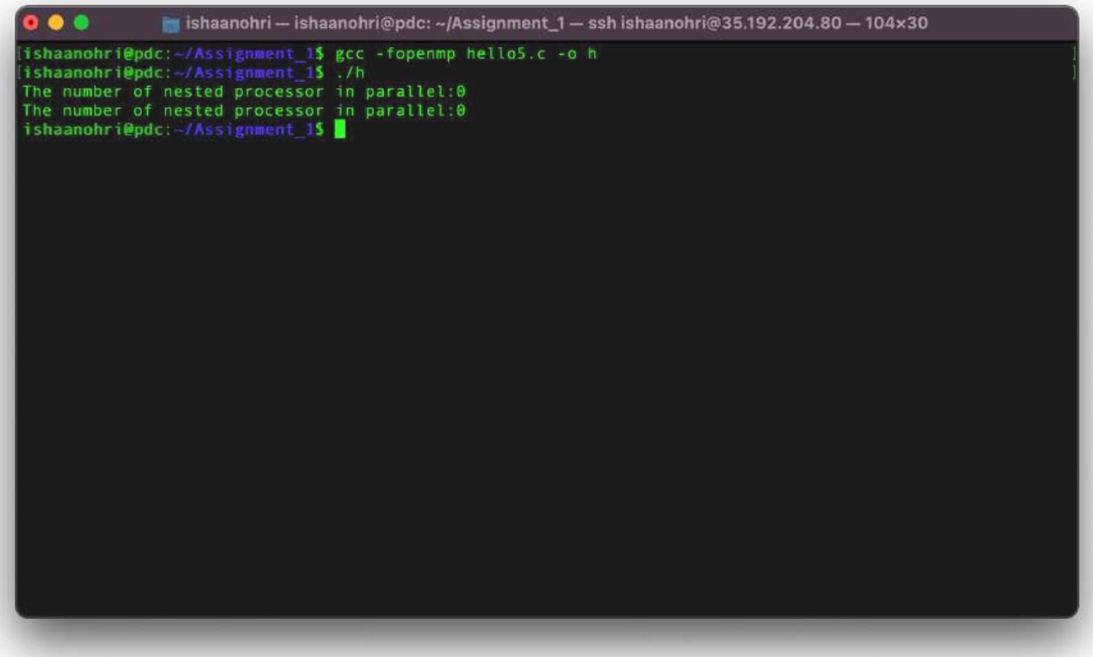
omp_get_nested()

Source Code:


ishaanohri — ishaanohri@pdc: ~/Assignment_1 — ssh ishaanohri@35.192.204.80 — 104×30

```
#include<stdio.h>
#include<omp.h>

void main(){
        #pragma omp parallel
        printf("The number of nested processor in parallel:%d\n", omp_get_nested());
}
"hello5.c" 8L, 151C                                                          5,1-8          All
```

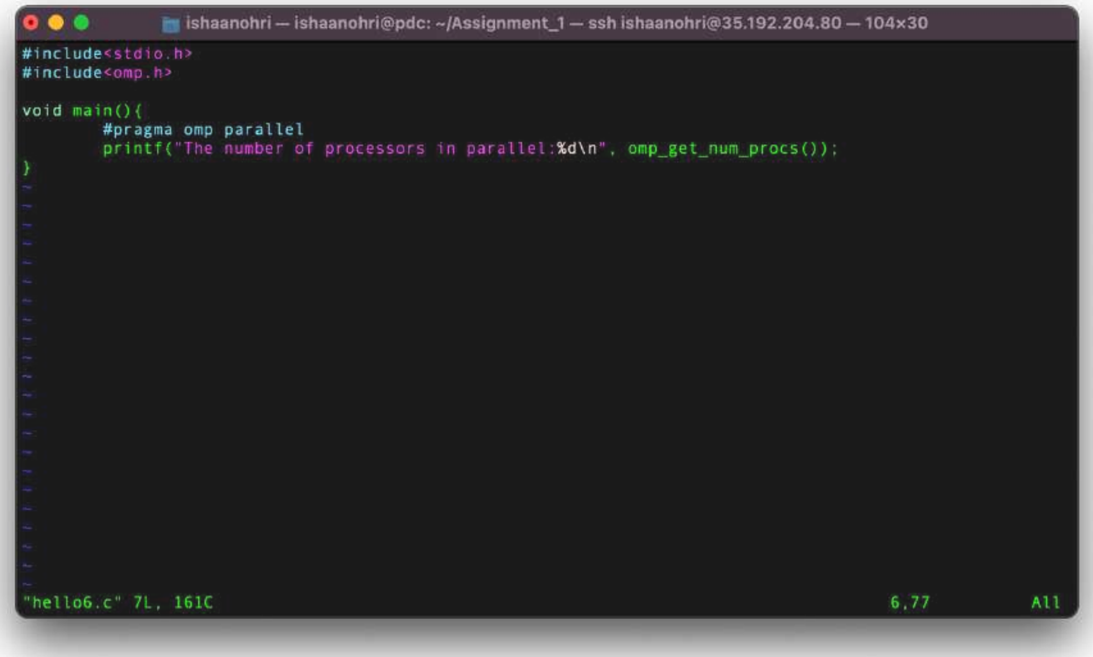
Execution:


ishaanohri — ishaanohri@pdc: ~/Assignment_1 — ssh ishaanohri@35.192.204.80 — 104×30

```
ishaanohri@pdc:~/Assignment_1$ gcc -fopenmp hello5.c -o h
ishaanohri@pdc:~/Assignment_1$ ./h
The number of nested processor in parallel:0
The number of nested processor in parallel:0
ishaanohri@pdc:~/Assignment_1$
```

omp_get_num_procs()

Source Code:


ishaanohri — ishaanohri@pdc: ~/Assignment_1 — ssh ishaanohri@35.192.204.80 — 104×30

```
#include<stdio.h>
#include<omp.h>

void main(){
        #pragma omp parallel
        printf("The number of processors in parallel:%d\n", omp_get_num_procs());
}
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"hello6.c" 7L, 161C                                                                     6,77          All
```
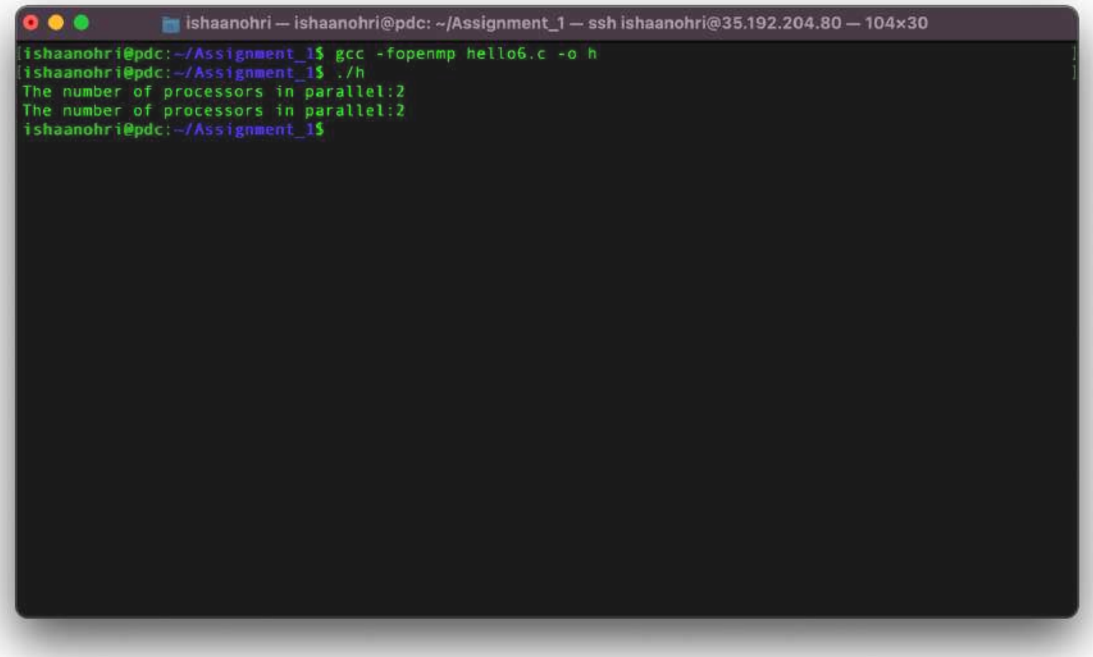
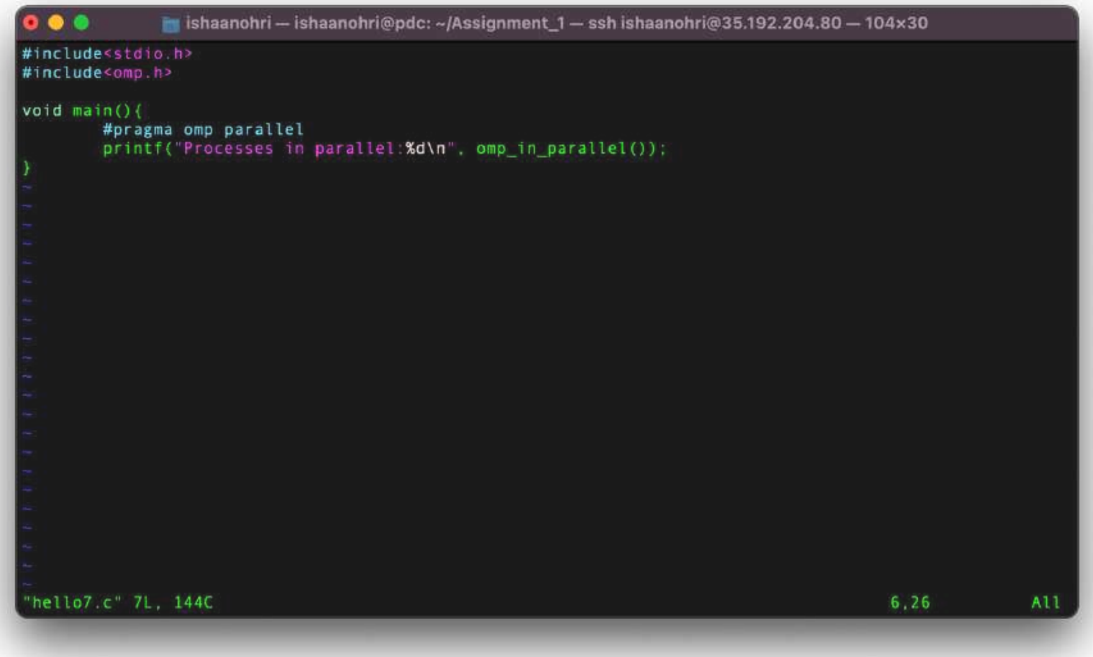

Execution:


ishaanohri — ishaanohri@pdc: ~/Assignment_1 — ssh ishaanohri@35.192.204.80 — 104×30

```
ishaanohri@pdc:~/Assignment_1$ gcc -fopenmp hello6.c -o h
ishaanohri@pdc:~/Assignment_1$ ./h
The number of processors in parallel:2
The number of processors in parallel:2
ishaanohri@pdc:~/Assignment_1$
```

omp_in_parallel()

Source Code:


ishaanohri — ishaanohri@pdc: ~/Assignment_1 — ssh ishaanohri@35.192.204.80 — 104×30

```
#include<stdio.h>
#include<omp.h>

void main(){
        #pragma omp parallel
        printf("Processes in parallel:%d\n", omp_in_parallel());
}
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"hello7.c" 7L, 144C                                                                  6,26          All
```
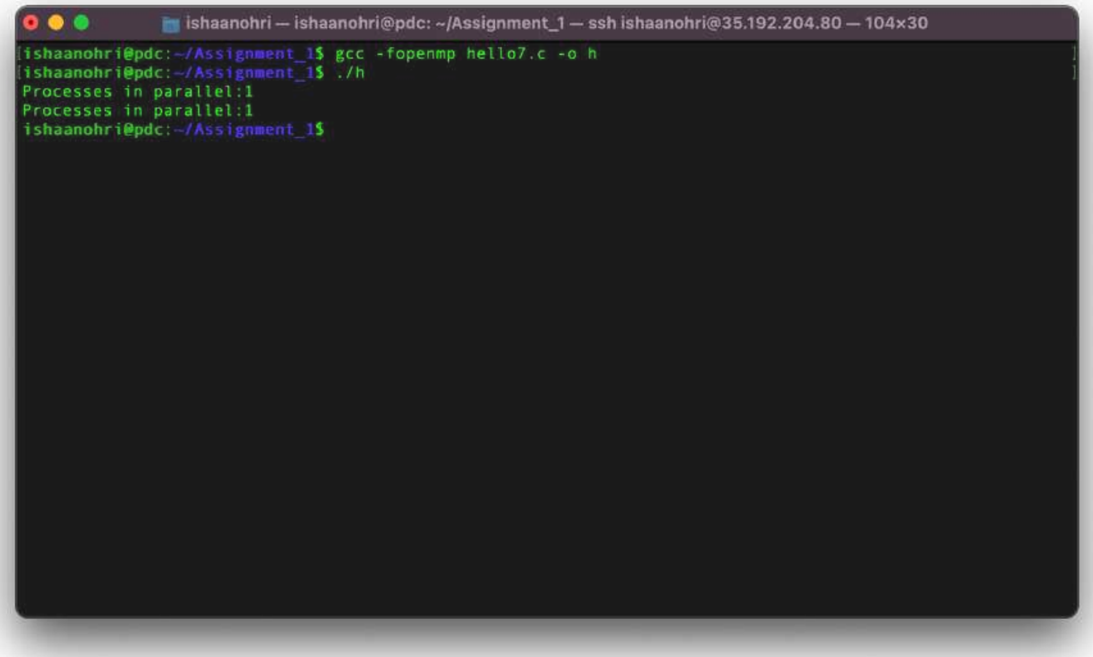

Execution:


ishaanohri — ishaanohri@pdc: ~/Assignment_1 — ssh ishaanohri@35.192.204.80 — 104×30

```
[ishaanohri@pdc:~/Assignment_1$ gcc -fopenmp hello7.c -o h
[ishaanohri@pdc:~/Assignment_1$ ./h
Processes in parallel:1
Processes in parallel:1
ishaanohri@pdc:~/Assignment_1$
```