

## Lab Assignment 6

### Running openMP program in gcc

```
$ gcc -o omp_hello -fopenmp omp_hello.c
```

**Note:** Upload the assignment in classroom.

**Exercise 1: OpenMP Hello-world Program** (Implement the first OpenMP program)

You are expected to complete the basic understanding of OpenMP environment, i.e., how to compile an OpenMP program, how to set the number of OpenMP threads and retrieve the thread ID number at runtime.

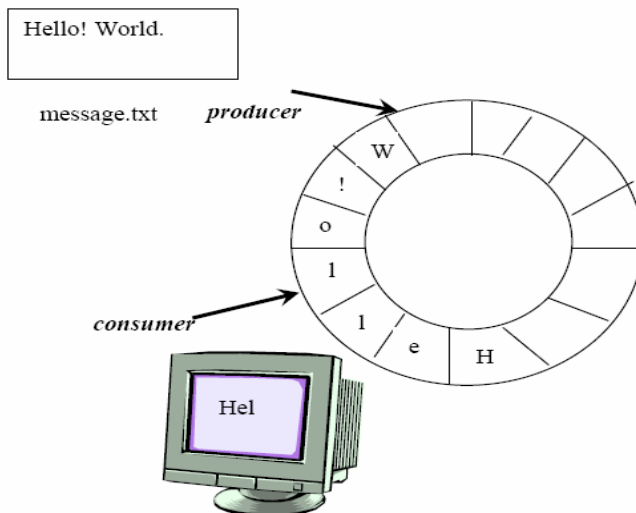
- Find out the default number of threads of your system.
- Observer the behaviour of the threads. Is there any possibility that two threads can interleave the printing of "hello world".
- Write a program to print Thread id and number of threads using different clauses i.e omp barrier, thread private, two parallel regions, omp single. Avoid race condition.

**Exercise 2:** Write a program to add the element of array with very large size. Note down the computation time by creating different number of threads on the same data **[i.e with 2, 4, 6 and 8 threads]**. Avoid race condition if any.

**Exercise 3:** Implement producer consumer problem in OpenMP.

**Exercise 4:** Implement the following scenario in openMP.

Using condition variables to implement a producer-consumer algorithm. Define two threads: one producer and one consumer. The producer reads characters one by one from a string stored in a file named "string.txt", then writes sequentially these characters into a circular queue. Meanwhile, the consumer reads sequentially from the queue and prints them in the same order. The diagram illustrates the process. Upon completion of running the program, "Hello! World." is printed on the screen. In the program, use #define to specify the size of the queue. For example, #define QUEUE\_SIZE 5. Make sure to test your program with different queue sizes, including 1.



**Exercise 5.** Write a program to implement matrix vector multiplication in openMP. Define the size of matrix using #define QUEUE\_SIZE N; Test your program with different values of N (large values of N should be tested).