

# Parallel Programming

## LAB 4

27th August 2018

**Note: Write all programs in your observation book and record the results. Get the signature of faculty /teaching assistance.**

1. Execute following code and observe the tasks created and executed by the threads.  
Also draw the recursion tree and note down the nodes executed by each thread.

```
#include<stdio.h>
#include<omp.h>
int fibo(int n);
void main()
{
    int n,fib;
    double t1,t2;
    printf("Enter the value of n:\n");
    scanf("%d",&n);
    t1=omp_get_wtime();
    #pragma omp parallel shared(n)
    {
        #pragma omp single
        {
            fib=fibo(n);
        }
    }
    t2=omp_get_wtime();
    printf("Fib is %d\n",fib);
    printf("Time taken is %f s \n",t2-t1);
}

int fibo(int n)
{
    int a,b;
    if(n<2)
        return n;
    else
    {
        #pragma omp task shared(a)
        {
            printf("Task Created by Thread %d\n",omp_get_thread_num());
            a=fibo(n-1);
            printf("Task Executed by Thread %d \ta=%d\n",omp_get_thread_num(),a);
        }
        #pragma omp task shared(b)
```

```

    {
        printf("Task Created by Thread %d\n",omp_get_thread_num());
        b=fibo(n-2);
        printf("Task Executed by Thread %d \tb=%d\n",omp_get_thread_num(),b);
    }
#pragma omp taskwait
return a+b;
}
}

```

2. **Execute following code and observe the working of threadprivate directive and copyin clause:**

```

#include<stdio.h>
#include<omp.h>
int tid,x;
#pragma omp threadprivate(x,tid)
void main()
{
x=10;
#pragma omp parallel num_threads(4) copyin(x)
{
    tid=omp_get_thread_num();
    #pragma omp master
    {
        printf("Parallel Region 1 \n");
        x=x+1;
    }
    #pragma omp barrier
    if(tid==1)
        x=x+2;
    printf("Thread % d Value of x is %d\n",tid,x);
    }//#pragma omp barrier
#pragma omp parallel num_threads(4)
{
    #pragma omp master
    {
        printf("Parallel Region 2 \n");
    }
    #pragma omp barrier
    printf("Thread %d Value of x is %d\n",tid,x);
}
printf("Value of x in Main Region is %d\n",x);
}

```

**DO the following:**

1. **Remove copyin clause and check the output.**

**2. Remove copyin clause and initialize x globally.**

**Note the observation about threadprivate directive and copyin clause.**

- 3. Write a C/C++ OpenMP program to find ROWSUM and COLUMNSUM of a matrix  $a[n][n]$ .**
- 4. Write a C/C++ OpenMP program to perform matrix multiplication.**
- 5. The details of an employ with employ id and employ salary is stored in a two dimensional array. The company would like to raise the salary of all its employees by 6%. If the increase in salary is more than 5,000 Rs, the company would like to put tax of 2% on the increased amount more than 5,000 Rs. Calculate the total extra amount the company need spend by increasing the salary 6%.**

**Note: Write the program, results and analysis in your observation book and get signature from TAs.**