PARALLEL AND DISTRIBUTED COMPUTING – CSE4001

LAB ASSIGNMENT- 1

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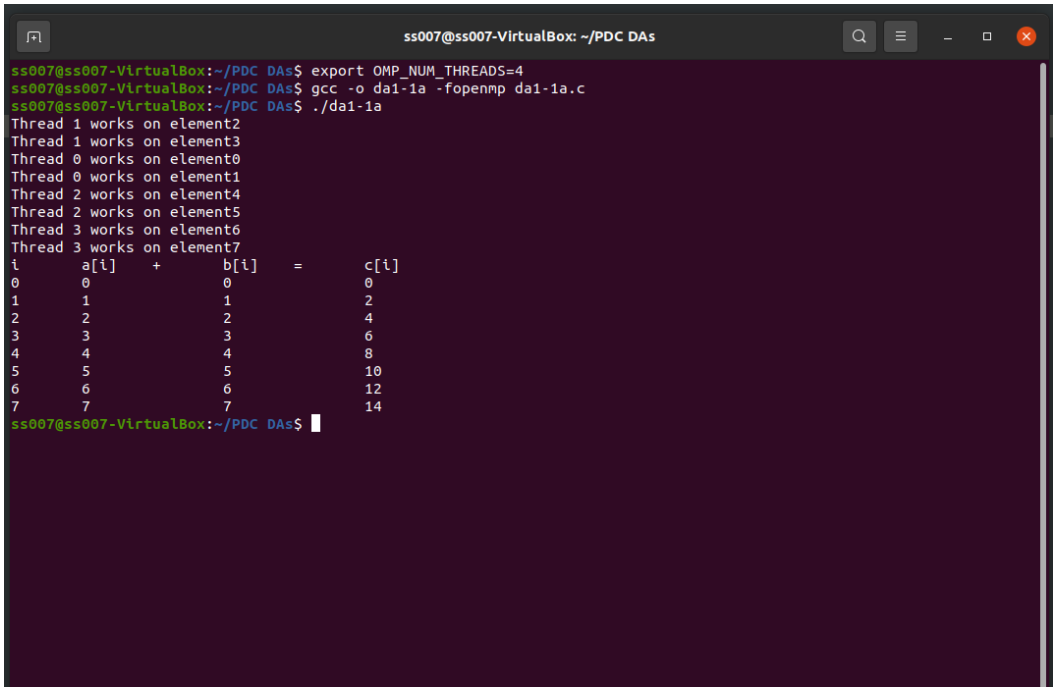
Q1) Using OpenMP, Design, develop and run a multi-threaded program to perform and print vector addition.

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

#define ARRAY_SIZE 8
#define NUM_THREADS 4

int main(int argc, char *argv[])
{

    int *a;
    int *b;
    int *c;

    int n = ARRAY_SIZE;
    int n_per_thread;
    int total_threads = NUM_THREADS;
    int i;
    a = (int *)malloc(sizeof(int) * n);
    b = (int *)malloc(sizeof(int) * n);
    c = (int *)malloc(sizeof(int) * n);
```

```
    for (i = 0; i < n; i++)
    {
        a[i] = i;
    }
    for (i = 0; i < n; i++)
    {
        b[i] = i;
    }

    omp_set_num_threads(total_threads);

    n_per_thread = n / total_threads;

#pragma omp parallel for shared(a, b, c) private(i) schedule(static, n_per_thread)
    for (i = 0; i < n; i++)
    {
        c[i] = a[i] + b[i];
        printf("Thread %d works on element%d\n", omp_get_thread_num(), i);
    }

    printf("i\ta[i]\t+\tb[i]\t=\tc[i]\n");
    for (i = 0; i < n; i++)
    {
        printf("%d\t%d\t\t%d\t\t%d\n", i, a[i], b[i], c[i]);
    }

    free(a);
    free(b);
    free(c);

    return 0;
}
```



Q2) Using OpenMP, Design, develop and run a multi-threaded program to perform sum of N elements (N=2021) using Loop work Sharing with schedule clause.

```
#include <omp.h>
#include <stdio.h>
#include <stdlib.h>
#define N 2021
int main (int argc, char *argv[])
{

int i, nthreads, tid;
int a[N], sum = 0 ;

for (i=0; i<=N; i++)
{
a[i] = i ;
}
#pragma omp parallel shared(a,nthreads) private(i,tid)
```

```
{
tid = omp_get_thread_num();
if (tid == 0)
{
nthreads = omp_get_num_threads();
printf("Number of threads = %d\n", nthreads);
}
printf("Thread %d starting...\n",tid);
#pragma omp for
for (i=0; i<=N; i++)
{
sum = sum + a[i];
if((i%100)==0)
printf("Thread %d, Current Sum Value = %d\n",tid,sum);
if(i==2021)
printf("Thread %d updated Last Value which is %d\n",tid,sum);
}
}
printf("\nSum of elements of Vector 0 with 2021 elements is %d\n ", sum);
}
```