NATIONAL INSTITUTE OF TECHNOLOGY KARNATAKA SURATHKAL

DEPARTMENT OF INFORMATION TECHNOLOGY

**IT 301 Parallel Computing LAB 5**

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Execute following programs and put screen shots of the output. Write analysis of the result before uploading in IRIS as a single pdf file. For programming exercises, write the code and also put screenshot of the results.

**Total Marks =2+8=10 marks**

**1. How to compare sequential and parallel program execution times. ?**

**Include following header files in the program.**

#include <sys/time.h>

#include <stdlib.h>

**//Declare following variables.**

struct timeval TimeValue\_Start;

struct timezone TimeZone\_Start;

struct timeval TimeValue\_Final;

struct timezone TimeZone\_Final;

long time\_start, time\_end;

double time\_overhead;

**Just before starting parallel region code , note down the time(start time)**

gettimeofday(&TimeValue\_Start, &TimeZone\_Start);

**After finishing parallel region, get end time.**

gettimeofday(&TimeValue\_Final, &TimeZone\_Final);

**Calculate the overhead time as follows:**

time\_start = TimeValue\_Start.tv\_sec \* 1000000 + TimeValue\_Start.tv\_usec;

time\_end = TimeValue\_Final.tv\_sec \* 1000000 + TimeValue\_Final.tv\_usec;

time\_overhead = (time\_end - time\_start)/1000000.0;

printf("\n\n\t\t Time in Seconds (T) : %lf",time\_overhead);

**Example: Execute the program and compare sequential and parallel executions. [sequential result : 1Mark +Parallel Execution 1 Mark=2 Marks]**

#include <stdio.h>

#include <sys/time.h>

#include <omp.h>

#include <stdlib.h>

int main(void){

struct timeval TimeValue\_Start;

struct timezone TimeZone\_Start;

struct timeval TimeValue\_Final;

struct timezone TimeZone\_Final;

long time\_start, time\_end;

double time\_overhead;double pi,x;

int i,N;

pi=0.0;

N=1000;

gettimeofday(&TimeValue\_Start, &TimeZone\_Start);

#pragma omp parallel for private(x) reduction(+:pi)

for(i=0;i<=N;i++){

x=(double)i/N;

pi+=4/(1+x\*x);

}

gettimeofday(&TimeValue\_Final, &TimeZone\_Final);

time\_start = TimeValue\_Start.tv\_sec \* 1000000 + TimeValue\_Start.tv\_usec;

time\_end = TimeValue\_Final.tv\_sec \* 1000000 + TimeValue\_Final.tv\_usec;

time\_overhead = (time\_end - time\_start)/1000000.0;

printf("\n\n\tTime in Seconds (T) : %lf\n",time\_overhead);

pi=pi/N;

printf("\n \tPi is %f\n\n",pi);

}

**---------------------------------------------------------------------------------------------**

**2. Write a sequential program to add elements of two arrays (c[i]=a[i]\*b[i]. Convert the same program for parallel execution. Initialize array with random numbers. Consider an array size as 10k, 50k and 100k. Analyse the result for maximum number of threads and various schedule() function. Based on observation, perform analysis of the total execution time and explain the result by plotting the graph. [increase array size until parallel execution time is less than sequential execution.]**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Schedule() | Total Execution time for number of iterations 5K | Total execution for number of iterations 10K | Total execution for number of iterations 50K | Total execution for number of iterations 100K |
| Sequential execution |  |  |  |  |
| static |  |  |  |  |
| Static, chunksize |  |  |  |  |
| Dynamic, chunksize |  |  |  |  |
| Guided |  |  |  |  |
| runtime |  |  |  |  |

**Plot the graph using any software and write your observation.**

**Results in each Row in the above table=1 mark=> 6 \* 1= 6 Marks**

**Plotting graph=1 Mark**

**Observation =1 Marks**

**Total = 8 Marks**