20BCE1025
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Parallel and Distributed Computing(CSE4001)

Lab 7 -Profiling

profiling of 2,4,8 threads in matrix multiplication
CODE:

```
#include <omp.h>
#include <pthread.h>
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#define N 10
int A[N][N];
int B[N][N];
int C[N][N];
int main() {
      int i, j, k;
      for (i = 0; i < N; i++) {
            for (j = 0; j < N; j++) {
                  A[i][j] = 2;
                  B[i][j] = 2;
            }
      }

      int arr[] = {2, 4, 8};
      for (int t = 0; t < 3; t++) {
            double start = omp_get_wtime();
#pragma omp parallel for private(i, j, k) shared(A, B, C)
num_threads(arr[t])
            for (i = 0; i < N; i++) {
                  for (j = 0; j < N; j++) {
                        for (k = 0; k < N; k++) {
                              C[i][j] += A[i][k] * B[k][j];
                        }
                  }
            }
            double end = omp_get_wtime();
            printf("%d threads, : %f seconds\n", arr[t], end -
      start);
      }

      return 0;
}
```

Commands:

```
abhishek_n_n_20bce1025@ud:/mnt/D/ccpp/lab7$ kinst-ompp gcc -fopenmp lab7.c -o lab7
abhishek_n_n_20bce1025@ud:/mnt/D/ccpp/lab7$ ./lab7
2 threads, : 0.000180 seconds
4 threads, : 0.000101 seconds
8 threads, : 0.062241 seconds
```

output:

##BEG header separator=											
Start Date	Fri Sep 16 00:26:14 2022										
End Date	Fri Sep 16 00:26:14 2022										
Duration	0.062575	sec									
Application Name	unknown										
Type of Report	final										
Thread Count	8										
ompP Version Major	0										
ompP Version Minor	8										
ompP Version Revision	99										
ompP Build Date	Sep 15 2022 22:54:34										
PAPI Support	not available										
##END header											
##BEG region overview											
PARALLEL LOOP	1										
R00001	PARALLEL LOOP	lab7.c	23	30							
##END region overview											
##BEG ompp callgraph											
Inclusive	(%)	Exclusive	(%)								
0.062575	100	0.000165	0.264041	0	[unknown: 8 threads]						
0.06241	99.735959	0.06241	99.735959	1	R00001	PARALLEL LOOP	lab7.c	23	30		
##END ompp callgraph											

##BEG flat region profiles									
##BEG R00001 flat profile									
R00001	PARALLEL LOOP	lab7.c	23	30					
TID	execT	execC	bodyT	exitBarT	startupT	shutdwnT	taskT		
0	0.06241	3	0.000016	0.000008	0.030384	0.031999	0		
1	0.06241	3	0.000013	0.015993	0.014398	0.032001	0		
2	0.06241	3	0.000007	0.015992	0.014335	0	0		
3	0.06241	3	0.000005	0.015993	0.014337	0	0		
4	0.06241	3	0.000003	0.01599	0.014246	0	0		
5	0.06241	3	0.000003	0.01599	0.014246	0	0		
6	0.06241	3	0.000003	0.014597	0.015639	0	0		
7	0.06241	3	0.000002	0.031991	0.014245	0	0		
SUM	0.499279	24	0.000051	0.126554	0.13183	0.064	0		
##END R00001 flat profile									
##END flat region profiles									
##BEG callgraph region profiles									
##BEG R00001 callgraph profile									
[*00]	unknown								
[=01]	R00001	PARALLEL LOOP	lab7.c	23	30				
TID	execT	execC	bodyT/I	bodyT/E	exitBarT	startupT	shutdwnT	taskT	
0	0.06241	3	0.000015	0.000015	0.000006	0.030386	0.031997	0	
1	0.06241	3	0.000013	0.000013	0.015992	0.0144	0.031999	0	
2	0.06241	3	0.000007	0.000007	0.015992	0.014337	0	0	
3	0.06241	3	0.000007	0.000007	0.015991	0.014337	0	0	
4	0.06241	3	0.000003	0.000003	0.015989	0.014247	0	0	
5	0.06241	3	0.000003	0.000003	0.015989	0.014247	0	0	
6	0.06241	3	0.000003	0.000003	0.014597	0.01564	0	0	
7	0.06241	3	0.000002	0.000002	0.031991	0.014246	0	0	
SUM	0.499279	24	0.000052	0.000052	0.126547	0.13184	0.063996	0	
##END R00001 callgraph profile									
##END callgraph region profiles									
##BEG overhead analysis report									
Total runtime (wallclock) [secs]	0.062575								
Number of threads	8								
Number of parallel regions	1								
Parallel coverage [secs]	0.06241								
Parallel coverage [percent]	99.735959								
##BEG parallel regions sorted by wallclock time									
	Type	Wallclock	(%)						
R00001	PARLOOP	0.06241	99.735959						
SUM	0.06241		99.735959						
##END parallel regions sorted by wallclock time									

##BEG overheads for parallel region															
	Total		Ovhds	(%)	Synch	(%)		Imbal	(%)	Limpar	(%)	Mgmt	(%)		
R00001	0.499279		0.322383	64.569692	0	0		0.126547	25.346015	0	0	0.195836	39.223677		
##END overheads for parallel region															
##BEG overheads for whole program															
	Total		Ovhds	(%)	Synch	(%)		Imbal	(%)	Limpar	(%)	Mgmt	(%)		
R00001	0.499279		0.322383	64.399201	0	0		0.126547	25.279091	0	0	0.195836	39.12011		
SUM	0.499279		0.322383	64.399201	0	0		0.126547	25.279091	0	0	0.195836	39.12011		
##END overheads for whole program															
##END overhead analysis report															