

## Part 1: Serial Code



serial.txt

### a) Compilation and output for Small value of N (80) and Small value of iteration(50)

```
Quick connect...
[sgurkura@viz02[barkla] ~]$ gedit ass.c
** (gedit:180725): WARNING **: 22:59:14.766: Set document metadata failed: Setting attribute metadata::gedit-position not supported
[sgurkura@viz02[barkla] ~]$
[sgurkura@viz02[barkla] ~]$
[sgurkura@viz02[barkla] ~]$ icc -qopenmp ass.c
[sgurkura@viz02[barkla] ~]$ ./a.out
enter the size of array N*N
80
enter the number of iterations required
50

Time: 2.110958 milliseconds on 1 threads
0th row t[0][0]
10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000
10th row t[10][0]
9.815219 8.197605 4.737066 2.386744 1.813437 1.758567 1.761967 10.000000
20th row t[20][0]
10.000000 9.746871 7.718841 3.576897 0.828273 0.162696 0.098615 0.105563 10.000000
30th row t[30][0]
10.000000 9.742282 7.690061 3.510573 0.740200 0.069343 0.004695 0.070614 100.000000
40th row t[40][0]
10.000000 9.742193 7.689506 3.509269 0.738432 0.067450 0.002816 0.093161 100.000000
50th row t[50][0]
10.000000 9.742192 7.689502 3.509258 0.738418 0.067437 0.002808 0.093892 100.000000
60th row t[60][0]
10.000000 9.742194 7.689768 3.513194 0.750587 0.083884 0.019883 0.077241 10.000000
70th row t[70][0]
10.000000 9.748291 7.836761 4.194575 1.945912 1.432957 1.385258 1.395047 10.000000
80th row t[80][0]
10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000
How many values do you want to check? 1
Enter the position of value which you want to check in 10,20 format 70,10
The value in t[70][10] position is 9.748291
[sgurkura@viz02[barkla] ~]$
```

Time taken: 2.110958 milliseconds

### b) Compilation and output for N=1024 and 100000 number of iterations

```
[sgurkura@viz02[barkla] ~]$ icc -qopenmp ass.c
[sgurkura@viz02[barkla] ~]$ ./a.out
enter the size of array N*N
1024
enter the number of iterations required
100000

Time: 250950.752974 milliseconds on 1 threads
0th row t[0][0]
10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000
128th row t[128][0]
10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000
256th row t[256][0]
10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000
384th row t[384][0]
10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 100.000000
512th row t[512][0]
10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 100.000000
640th row t[640][0]
10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 100.000000
768th row t[768][0]
10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000
896th row t[896][0]
10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000
1024th row t[1024][0]
10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000
How many values do you want to check? 2
Enter the position of value which you want to check in 10,20 format 896,1152
The value in t[896][1152] position is 10.000000
Enter the position of value which you want to check in 10,20 format 640,1024
The value in t[640][1024] position is 100.000000
[sgurkura@viz02[barkla] ~]$
```

Time taken: 250950.752974 milliseconds

## Part 2: Comparison of SERIAL and PARALLEL



ca2.txt

- a) Compilation and output for small N (80) and small number of iteration (50) and 5 number of threads

```
Quick connect...
[2. barkia7.liv.ac.uk (sgrkuria)]
[sgrkuria@viz02[barkla] ~]$ gedit ca2.c
** (gedit:189351): WARNING **: 23:03:27.030: Set document metadata failed: Setting attribute metadata::gedit-position not supported
[sgrkuria@viz02[barkla] ~]$
[sgrkuria@viz02[barkla] ~]$ gcc -qopenmp ca2.c
[sgrkuria@viz02[barkla] ~]$
[sgrkuria@viz02[barkla] ~]$ ./a.out
enter the size of array N*N
80
enter the number of iterations required
50
enter the number of threads required
5

SERIAL Execution
Time: 2.882004 milliseconds on 1 threads
0th row t[0][0]
10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000
10th row t[10][0]
10.000000 9.815219 8.197605 4.737066 2.386744 1.813437 1.758567 1.761967 10.000000
20th row t[20][0]
10.000000 9.746871 7.718841 3.576897 0.828273 0.162696 0.098615 0.105563 10.000000
30th row t[30][0]
10.000000 9.742282 7.690061 3.510573 0.740200 0.069343 0.004695 0.070614 100.000000
40th row t[40][0]
10.000000 9.742193 7.689506 3.509269 0.738432 0.067450 0.002816 0.093161 100.000000
50th row t[50][0]
10.000000 9.742192 7.689502 3.509258 0.738418 0.067437 0.002808 0.093892 100.000000
60th row t[60][0]
10.000000 9.742194 7.689768 3.513194 0.750587 0.083884 0.019883 0.077241 10.000000
70th row t[70][0]
10.000000 9.748291 7.836761 4.194575 1.945912 1.432957 1.385258 1.395047 10.000000
80th row t[80][0]
10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000

PARALLEL Execution with 5 number of threads
Time: 0.386953 milliseconds on 5 threads
Time: 0.389814 milliseconds on 5 threads
Time: 0.404835 milliseconds on 5 threads
Time: 0.413895 milliseconds on 5 threads
Time: 0.416040 milliseconds on 5 threads
0th row t[0][0]
10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000
10th row t[10][0]
10.000000 6.371398 0.520508 0.289069 0.288939 0.288947 0.288906 0.288693 10.000000
20th row t[20][0]
10.000000 5.336273 0.170810 0.000067 0.000050 0.000046 0.000042 0.005455 10.000000
30th row t[30][0]
10.000000 5.279760 0.157177 0.000016 0.000000 0.000000 0.000001 0.044087 100.000000
40th row t[40][0]
10.000000 4.981317 0.122055 0.000016 0.000000 0.000000 0.000001 0.049684 100.000000
50th row t[50][0]
10.000000 4.478233 0.058571 0.000001 0.000000 0.000000 0.000001 0.045741 100.000000
60th row t[60][0]
10.000000 3.527137 0.021948 0.000001 0.000001 0.000001 0.000001 0.016749 10.000000
70th row t[70][0]
10.000000 3.912127 0.077221 0.051646 0.051646 0.051646 0.051646 0.055476 10.000000
80th row t[80][0]
10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000

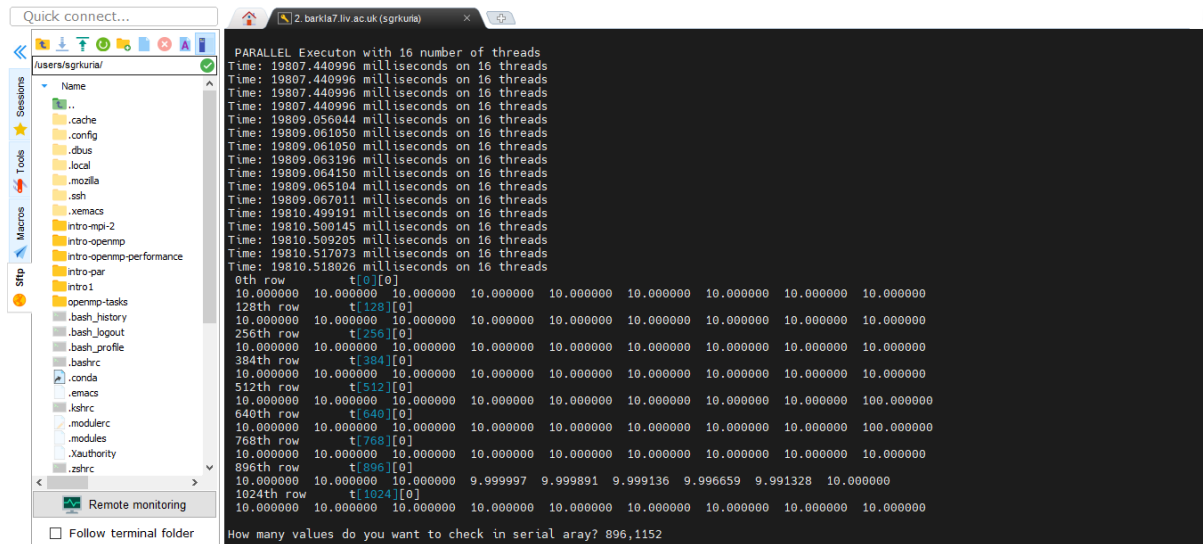
How many values do you want to check in serial array? 1
Enter the position of value which you want to check in 10,20 format 70,10
The value in t[70][10] position is 9.748291

How many values do you want to check in parallel array? 1
Enter the position of value which you want to check in 10,20 format 70,20
The value in t[70][20] position is 0.077221
[sgrkuria@viz02[barkla] ~]$
[sgrkuria@viz02[barkla] ~]$
```

- b) Compilation and output for N=1024 and 100000 number of iterations

```
Quick connect...
[2. barkia7.liv.ac.uk (sgrkuria)]
[sgrkuria@viz02[barkla] ~]$ ./a.out
enter the size of array N*N
1024
enter the number of iterations required
100000
enter the number of threads required
16

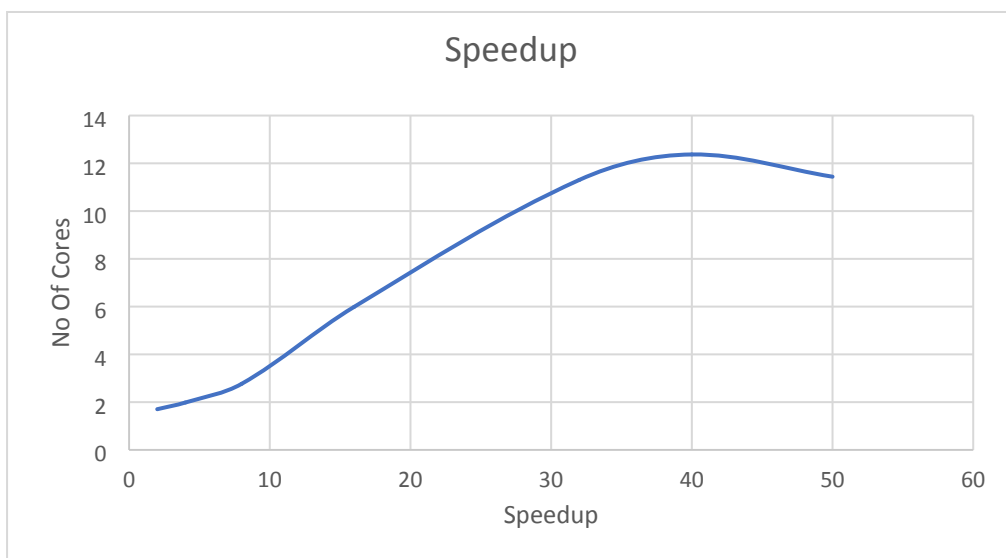
SERIAL Execution
Time: 430764.681101 milliseconds on 1 threads
0th row t[0][0]
10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000
128th row t[128][0]
10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000
256th row t[256][0]
10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000
384th row t[384][0]
10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 100.000000
512th row t[512][0]
10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000
640th row t[640][0]
10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000
768th row t[768][0]
10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000
896th row t[896][0]
10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000
1024th row t[1024][0]
10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000 10.000000
```



Serial time: 430764.681101 milliseconds

Time taken for Parallel execution:

No.of cores	Runtime(millisecond)	Runtime(s)	Speedup	Efficiency(%)
0				
1	176371.5019	1763.715019		
2	103529.6659	1035.296659	1.70358	85.1792094
4	88901.03984	889.0103984	1.98391	49.59770499
8	63751.53899	637.5153899	2.76655	34.58181259
16	29442.17801	294.4217801	5.99044	37.440229
32	15601.53198	156.0153198	11.3048	35.32736042
40	14256.75988	142.5675988	12.3711	30.92769734
50	15417.2678	154.172678	11.4399	22.87973514



Minimum runtime is at 40 which is 142.5675988 sec.



CA2.xlsx