Walchand College of Engineering, Sangli
Department of Computer Science and Engineering

Name: Meet Vipul Gandhi

PRN: 2020BTECS00112

Class: Final Year (Computer Science and Engineering)

Year: 2023-24   **Semester:** 1

Course: High Performance Computing Lab
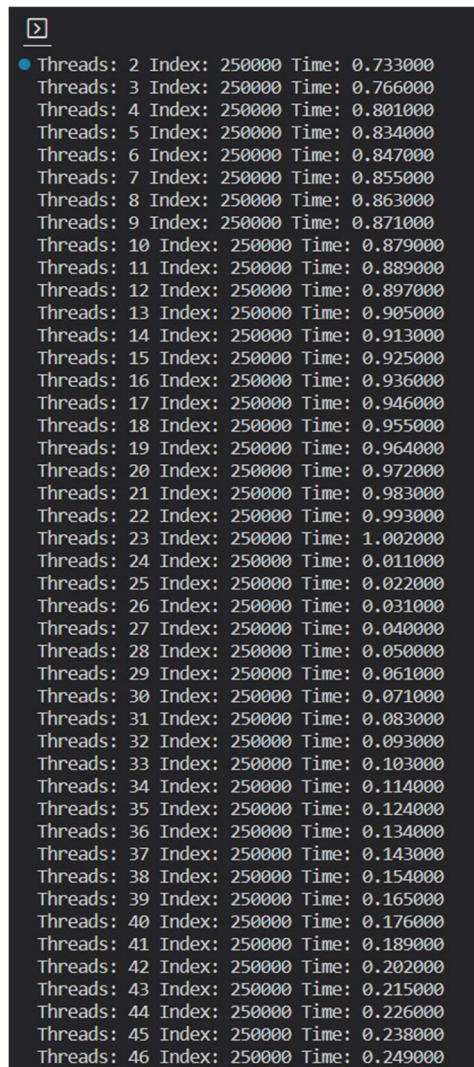
Practical No. 6

Title of practical: Implementation of OpenMP programs.

Implement following Programs using OpenMP with C:
1. Implementation of Prefix sum.
2. Implementation of Matrix-Vector Multiplication.

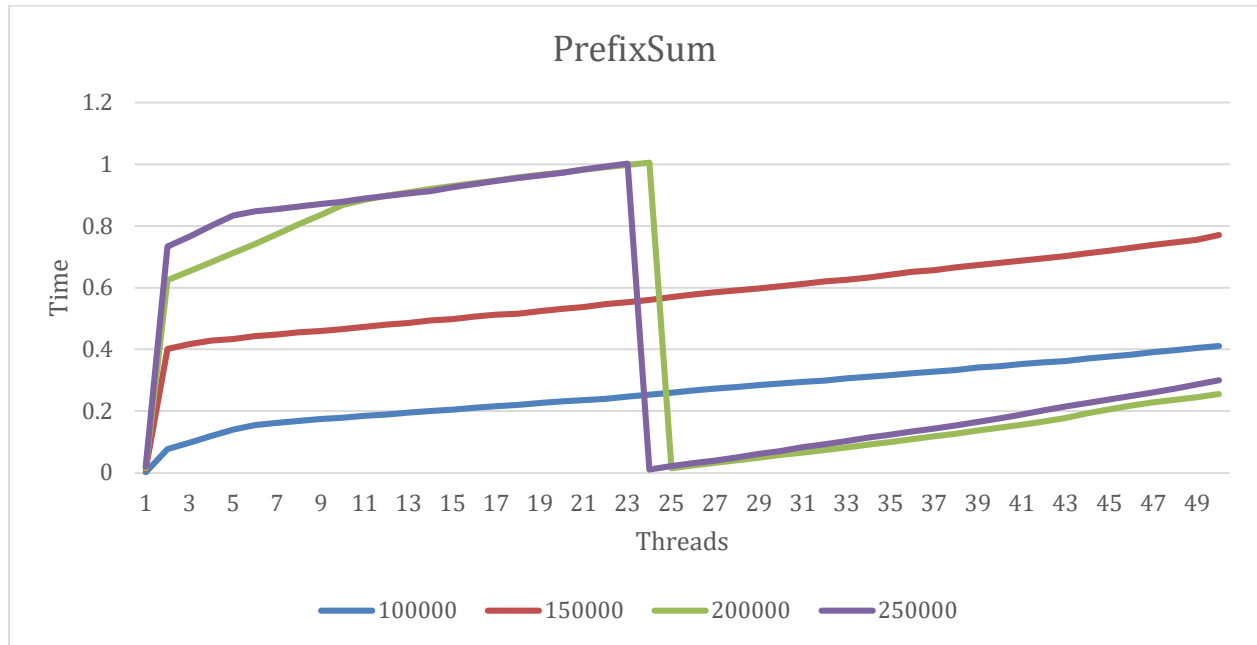**Problem Statement 1:** Implementation of Prefix sum.
Screenshots:

```
Threads: 2 Index: 250000 Time: 0.733000
Threads: 3 Index: 250000 Time: 0.766000
Threads: 4 Index: 250000 Time: 0.801000
Threads: 5 Index: 250000 Time: 0.834000
Threads: 6 Index: 250000 Time: 0.847000
Threads: 7 Index: 250000 Time: 0.855000
Threads: 8 Index: 250000 Time: 0.863000
Threads: 9 Index: 250000 Time: 0.871000
Threads: 10 Index: 250000 Time: 0.879000
Threads: 11 Index: 250000 Time: 0.889000
Threads: 12 Index: 250000 Time: 0.897000
Threads: 13 Index: 250000 Time: 0.905000
Threads: 14 Index: 250000 Time: 0.913000
Threads: 15 Index: 250000 Time: 0.925000
Threads: 16 Index: 250000 Time: 0.936000
Threads: 17 Index: 250000 Time: 0.946000
Threads: 18 Index: 250000 Time: 0.955000
Threads: 19 Index: 250000 Time: 0.964000
Threads: 20 Index: 250000 Time: 0.972000
Threads: 21 Index: 250000 Time: 0.983000
Threads: 22 Index: 250000 Time: 0.993000
Threads: 23 Index: 250000 Time: 1.002000
Threads: 24 Index: 250000 Time: 0.011000
Threads: 25 Index: 250000 Time: 0.022000
Threads: 26 Index: 250000 Time: 0.031000
Threads: 27 Index: 250000 Time: 0.040000
Threads: 28 Index: 250000 Time: 0.050000
Threads: 29 Index: 250000 Time: 0.061000
Threads: 30 Index: 250000 Time: 0.071000
Threads: 31 Index: 250000 Time: 0.083000
Threads: 32 Index: 250000 Time: 0.093000
Threads: 33 Index: 250000 Time: 0.103000
Threads: 34 Index: 250000 Time: 0.114000
Threads: 35 Index: 250000 Time: 0.124000
Threads: 36 Index: 250000 Time: 0.134000
Threads: 37 Index: 250000 Time: 0.143000
Threads: 38 Index: 250000 Time: 0.154000
Threads: 39 Index: 250000 Time: 0.165000
Threads: 40 Index: 250000 Time: 0.176000
Threads: 41 Index: 250000 Time: 0.189000
Threads: 42 Index: 250000 Time: 0.202000
Threads: 43 Index: 250000 Time: 0.215000
Threads: 44 Index: 250000 Time: 0.226000
Threads: 45 Index: 250000 Time: 0.238000
Threads: 46 Index: 250000 Time: 0.249000
```

Final Year: High Performance Computing Lab 2023-24 Sem I

Information:

Analysis:

Threads / Size	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
100000	0.002	0.077	0.098	0.119	0.14	0.155	0.162	0.168	0.174	0.179	0.185	0.189	0.195	0.2	0.204
150000	0.012	0.402	0.417	0.429	0.434	0.443	0.448	0.455	0.46	0.466	0.473	0.48	0.486	0.494	0.498
200000	0.015	0.624	0.653	0.683	0.713	0.742	0.774	0.806	0.836	0.868	0.885	0.898	0.909	0.92	0.929
250000	0.02	0.733	0.766	0.801	0.834	0.847	0.855	0.863	0.871	0.879	0.889	0.897	0.905	0.913	0.925

Threads / Size	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
100000	0.211	0.216	0.22	0.226	0.231	0.236	0.24	0.247	0.253	0.259	0.267	0.273	0.278	0.284	0.29
150000	0.506	0.512	0.516	0.524	0.531	0.537	0.547	0.553	0.56	0.57	0.578	0.585	0.591	0.598	0.605
200000	0.939	0.947	0.957	0.966	0.973	0.982	0.99	0.998	1.006	0.015	0.024	0.032	0.041	0.049	0.058
250000	0.936	0.946	0.955	0.964	0.972	0.983	0.993	1.002	0.011	0.022	0.031	0.04	0.05	0.061	0.071

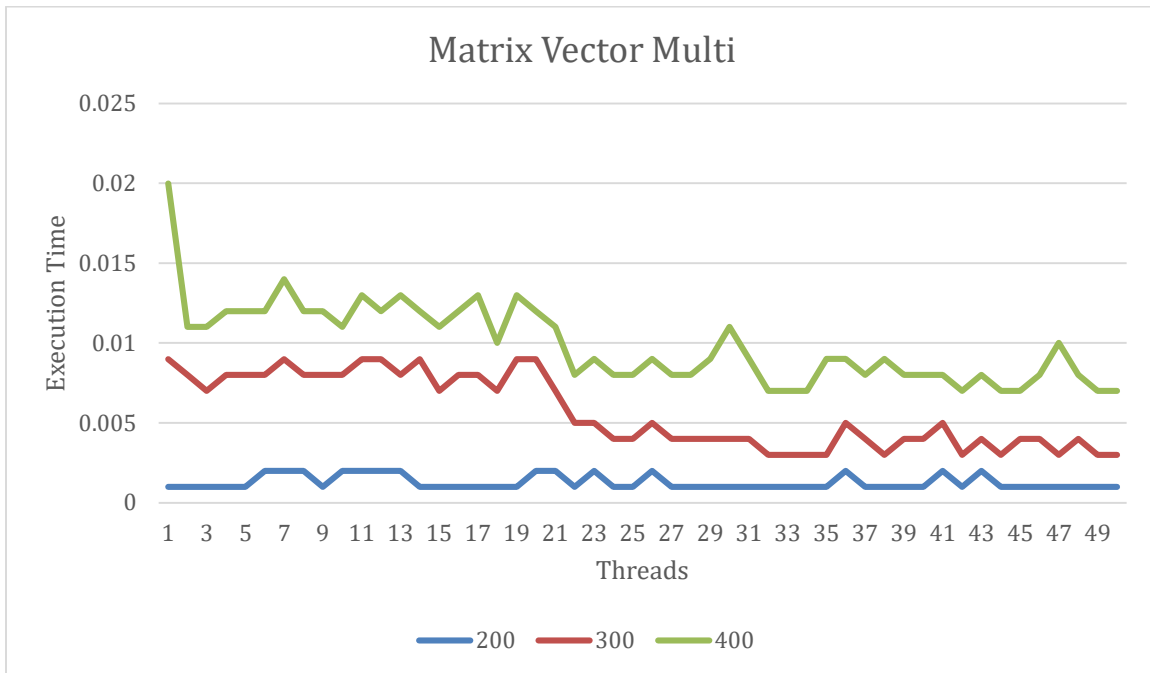Final Year: High Performance Computing Lab 2023-24 Sem I

Problem Statement 2: Implementation of Matrix-Vector Multiplication.

Screenshots:

```
PROBLEMS    OUTPUT    DEBUG CONSOLE    TERMI

PS E:\Acad\Sem VII\HPCL\Assignment 6> .
Threads: 2 Index: 400 Time: 0.011000
Threads: 3 Index: 400 Time: 0.012000
Threads: 4 Index: 400 Time: 0.011000
Threads: 5 Index: 400 Time: 0.011000
Threads: 6 Index: 400 Time: 0.011000
Threads: 7 Index: 400 Time: 0.011000
Threads: 8 Index: 400 Time: 0.010000
Threads: 9 Index: 400 Time: 0.011000
Threads: 10 Index: 400 Time: 0.011000
Threads: 11 Index: 400 Time: 0.010000
Threads: 12 Index: 400 Time: 0.011000
Threads: 13 Index: 400 Time: 0.012000
Threads: 14 Index: 400 Time: 0.012000
Threads: 15 Index: 400 Time: 0.011000
Threads: 16 Index: 400 Time: 0.013000
Threads: 17 Index: 400 Time: 0.013000
Threads: 18 Index: 400 Time: 0.011000
Threads: 19 Index: 400 Time: 0.012000
Threads: 20 Index: 400 Time: 0.012000
Threads: 21 Index: 400 Time: 0.014000
Threads: 22 Index: 400 Time: 0.012000
Threads: 23 Index: 400 Time: 0.004000
Threads: 24 Index: 400 Time: 0.005000
Threads: 25 Index: 400 Time: 0.004000
Threads: 26 Index: 400 Time: 0.003000
Threads: 27 Index: 400 Time: 0.003000
Threads: 28 Index: 400 Time: 0.004000
Threads: 29 Index: 400 Time: 0.003000
Threads: 30 Index: 400 Time: 0.004000
Threads: 31 Index: 400 Time: 0.003000
Threads: 32 Index: 400 Time: 0.004000
Threads: 33 Index: 400 Time: 0.003000
Threads: 34 Index: 400 Time: 0.004000
Threads: 35 Index: 400 Time: 0.004000
Threads: 36 Index: 400 Time: 0.004000
Threads: 37 Index: 400 Time: 0.003000
Threads: 38 Index: 400 Time: 0.003000
Threads: 39 Index: 400 Time: 0.004000
Threads: 40 Index: 400 Time: 0.003000
Threads: 41 Index: 400 Time: 0.003000
Threads: 42 Index: 400 Time: 0.003000
Threads: 43 Index: 400 Time: 0.004000
Threads: 44 Index: 400 Time: 0.003000
Threads: 45 Index: 400 Time: 0.004000
```

Final Year: High Performance Computing Lab 2023-24 Sem I

Information:

Analysis:

Threads Size	1	2	3	4	5	6	7	8	9	10
200	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.001	0.002
300	0.008	0.007	0.006	0.007	0.007	0.006	0.007	0.006	0.007	0.006
400	0.011	0.003	0.004	0.004	0.004	0.004	0.005	0.004	0.004	0.003

Threads Size	11	12	13	14	15	16	17	18	19	20
200	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.002
300	0.007	0.007	0.006	0.008	0.006	0.007	0.007	0.006	0.008	0.007
400	0.004	0.003	0.005	0.003	0.004	0.004	0.005	0.003	0.004	0.003

GitHub Link: https://github.com/meetgandhi692/HPC-Lab/tree/5ba5368c99d35186e97c9284188f2b6142dca912/Assignment%206

Final Year: High Performance Computing Lab 2023-24 Sem I