Nagar Yuwak Shikshan Sanstha's
Yeshwantrao Chavan College of Engineering
(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University) Hingna Road, Wanadongri, Nagpur - 441 110
NAAC A++
Ph.: 07104-237919, 234623, 329249, 329250 Fax: 07104-232376, Website: www.ycce.edu
Department of Computer Technology

Vision of the Department

To be a well-known centre for pursuing computer education through innovative pedagogy, value-based education and industry collaboration. **Mission of the Department**

To establish learning ambience for ushering in computer engineering professionals in core and multidisciplinary area by developing Problem-solving skills through emerging technologies.

Session 2025-2026

Vision: Dream of where you want.	**Mission:** Means to achieve Vision

Program Educational Objectives of the program (PEO): (broad statements that describe the professional and career accomplishments)

PEO1	**Preparation**	**P: Preparation**	**Pep-CL abbreviation pronounce as Pep-si-lL easy to recall**
PEO2	**Core Competence**	**E: Environment (Learning Environment)**	
PEO3	**Breadth**	**P: Professionalism**	
PEO4	**Professionalism**	**C: Core Competence**	
PEO5	**Learning Environment**	**L: Breadth (Learning in diverse areas)**	

Program Outcomes (PO): (statements that describe what a student should be able to do and know by the end of a program)

Keywords of POs:
Engineering knowledge, Problem analysis, Design/development of solutions, Conduct Investigations of Complex Problems, Engineering Tool Usage, The Engineer and The World, Ethics, Individual and Collaborative Team work, Communication, Project Management and Finance, Life-Long Learning

PSO Keywords: Cutting edge technologies, Research

"I am an engineer, and I know how to apply engineering knowledge to investigate, analyse and design solutions to complex problems using tools for entire world following all ethics in a collaborative way with proper management skills throughout my life." *to contribute to the development of cutting-edge technologies and Research.*

Integrity: I will adhere to the Laboratory Code of Conduct and ethics in its entirety.

SEJAL LAMBAT
26-08-2025
Name and Signature of Student and Date
(Signature and Date in Handwritten)

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Session	**2025-26 (ODD)**	**Course Name**	**HPC Lab**
Semester	**7**	**Course Code**	**22ADS706**
Roll No	22	**Name of Student**	Sejal Lambat

Practical Number	03
Course Outcome	Upon successful completion of the course the students will be able to 1. Understand and Apply Parallel Programming Concepts 2. Analyze and Improve Program Performance. 3. Demonstrate Practical Skills in HPC Tools and Environments.
Aim	Introduction to OpenMP
Problem Definition Theory (100 words) Procedure and Execution (100 Words)	OpenMP is a programming interface designed to make it easier to write parallel programs for systems that use shared memory. It allows developers working in C, C++ and Fortran to split work among multiple threads so that tasks can run at the same time on different CPU cores. The programming model follows a fork–join structure, where one main thread starts execution and then creates helper threads to complete sections of code in parallel. OpenMP is controlled using compiler directives, runtime library functions, and environment variables, offering both simplicity and good performance scaling on multi-core processors. Algorithm: **Open/Create a File** vi practical3.c **Save and Exit** :wq **Compile the Program** gcc -o practical3 practical3.c **Run the Program** ./practical3

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Code:

lab1@localhost:~ — /usr/bin/vim example3_nested.c

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

int main() {
    omp_set_nested(1); // Enable nested parallelism

    #pragma omp parallel num_threads(2)
    {
        int id = omp_get_thread_num();

        printf("Outer thread %d starting\n", id);

        #pragma omp parallel num_threads(2)
        {
            int inner_id = omp_get_thread_num();
            printf("  Inner thread %d of outer thread %d\n", inner_id, id);
        }
    }

    return 0;
}
```

lab1@localhost:~ — /usr/bin/vim example1_schedule.c

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

int main() {
    int i;
    int n = 12;

    #pragma omp parallel for schedule(static, 3)
    for (i = 0; i < n; i++) {
        printf("Thread %d processing iteration %d\n", omp_get_thread_num(), i);
    }

    return 0;
}
```

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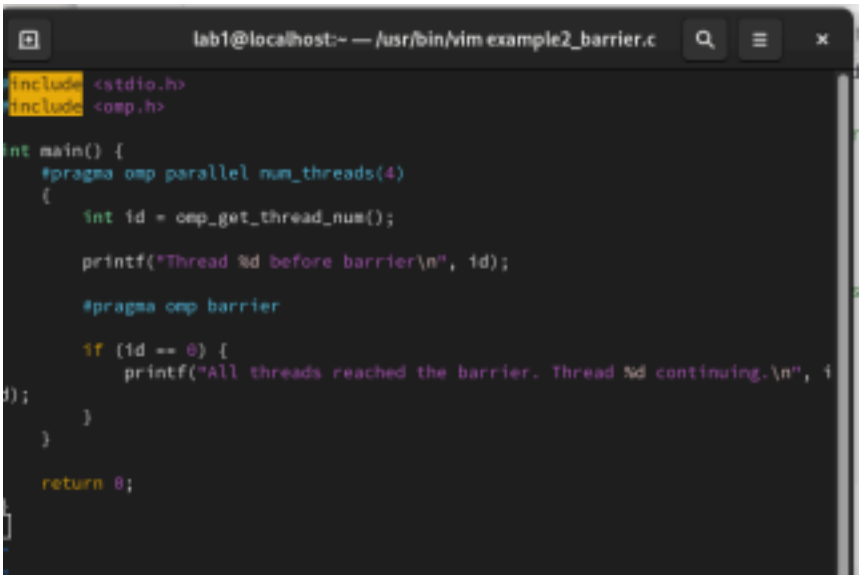
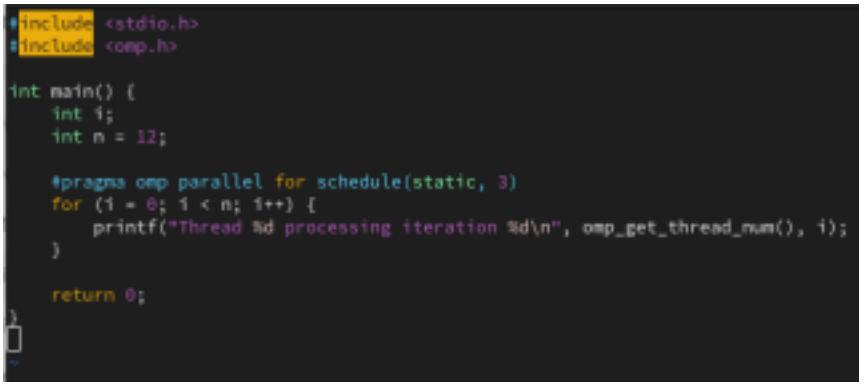


Output:



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```
[lab1@localhost ~]$ vi example1_schedule.c
[lab1@localhost ~]$ vi example2_barrier.c
[lab1@localhost ~]$ gcc -fopenmp -o example2_barrier example2_barrier.c
[lab1@localhost ~]$ export OMP_NUM_THREADS=4
./example2_barrier
Thread 1 before barrier
Thread 3 before barrier
Thread 2 before barrier
Thread 0 before barrier
All threads reached the barrier. Thread 0 continuing.
[lab1@localhost ~]$
```

```
[lab1@localhost ~]$ vi example1_schedule.c
[lab1@localhost ~]$ gcc -fopenmp -o example1_schedule example1_schedule.c
[lab1@localhost ~]$ export OMP_NUM_THREADS=4
[lab1@localhost ~]$ ./example1_schedule
Thread 0 processing iteration 0
Thread 0 processing iteration 1
Thread 0 processing iteration 2
Thread 2 processing iteration 6
Thread 2 processing iteration 7
Thread 2 processing iteration 8
Thread 1 processing iteration 3
Thread 1 processing iteration 4
Thread 1 processing iteration 5
Thread 3 processing iteration 9
Thread 3 processing iteration 10
Thread 3 processing iteration 11
[lab1@localhost ~]$
```

Output Analysis	The program executes loop iterations in parallel using multiple threads. Each thread computes squares of assigned indices and prints its thread ID with results. Output order may differ in each run due to concurrent execution. Increasing threads improves performance, highlighting OpenMP's ability to utilize multi-core processors effectively.

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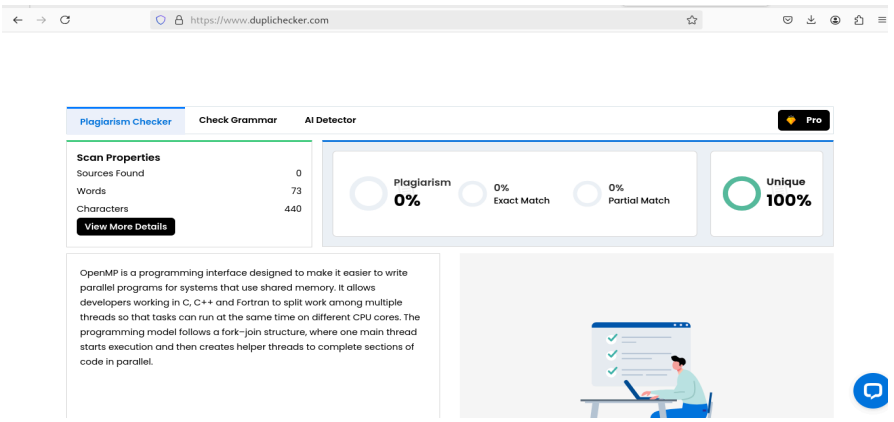
Link of student Github profile where lab assignment has been uploaded	https://github.com/SejalLambat19/HPC-LAB.git
Conclusion	Hence we successfully use openMP commands
Plag Report (Similarity index < 12%)	
Date	26-08-2025