**Class:** Final Year B.Tech(Computer Science and Engineering)

**Year:** 2025-26 **Semester:** 1

**Course:** High Performance Computing Lab

**Practical No. 2**

**Exam Seat No: 22510015**

**Title of practical: Study and implementation of basic OpenMP clauses**

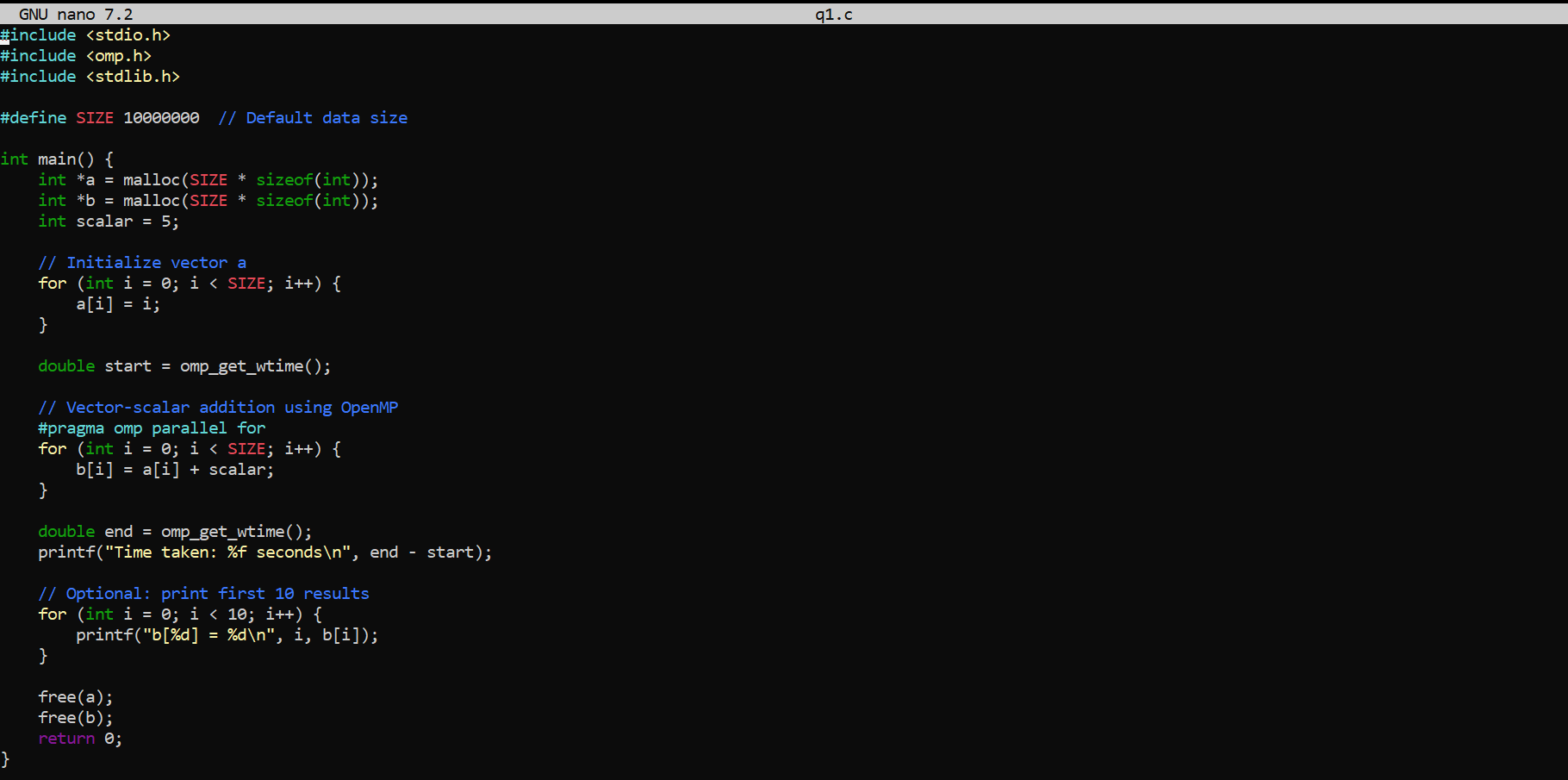
Implement following Programs using OpenMP with C:

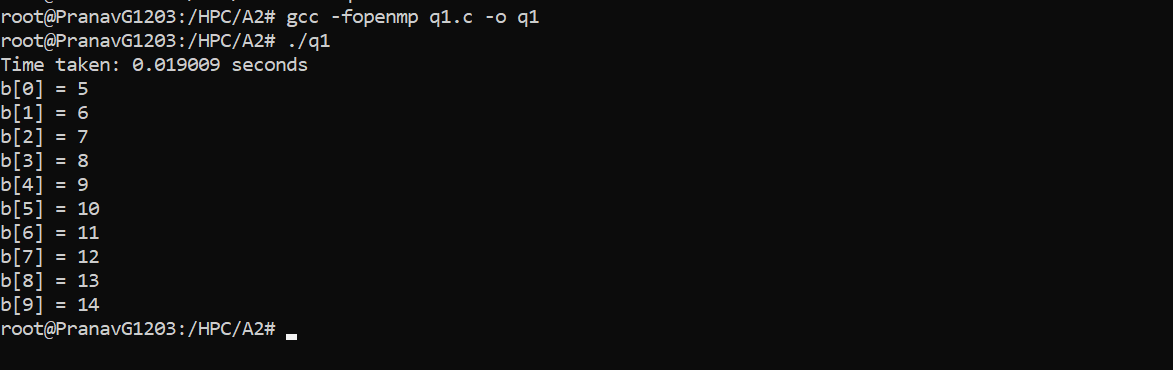
1. Vector Scalar Addition
2. Calculation of value of Pi

Analyse the performance of your programs for different number of threads and Data size.

**Problem Statement 1:**

**Screenshots:**

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**Information:**

 We used #pragma omp parallel for to distribute loop iterations across threads.

 The scalar value is added to each element in the vector a to produce vector b.

**Analysis:**

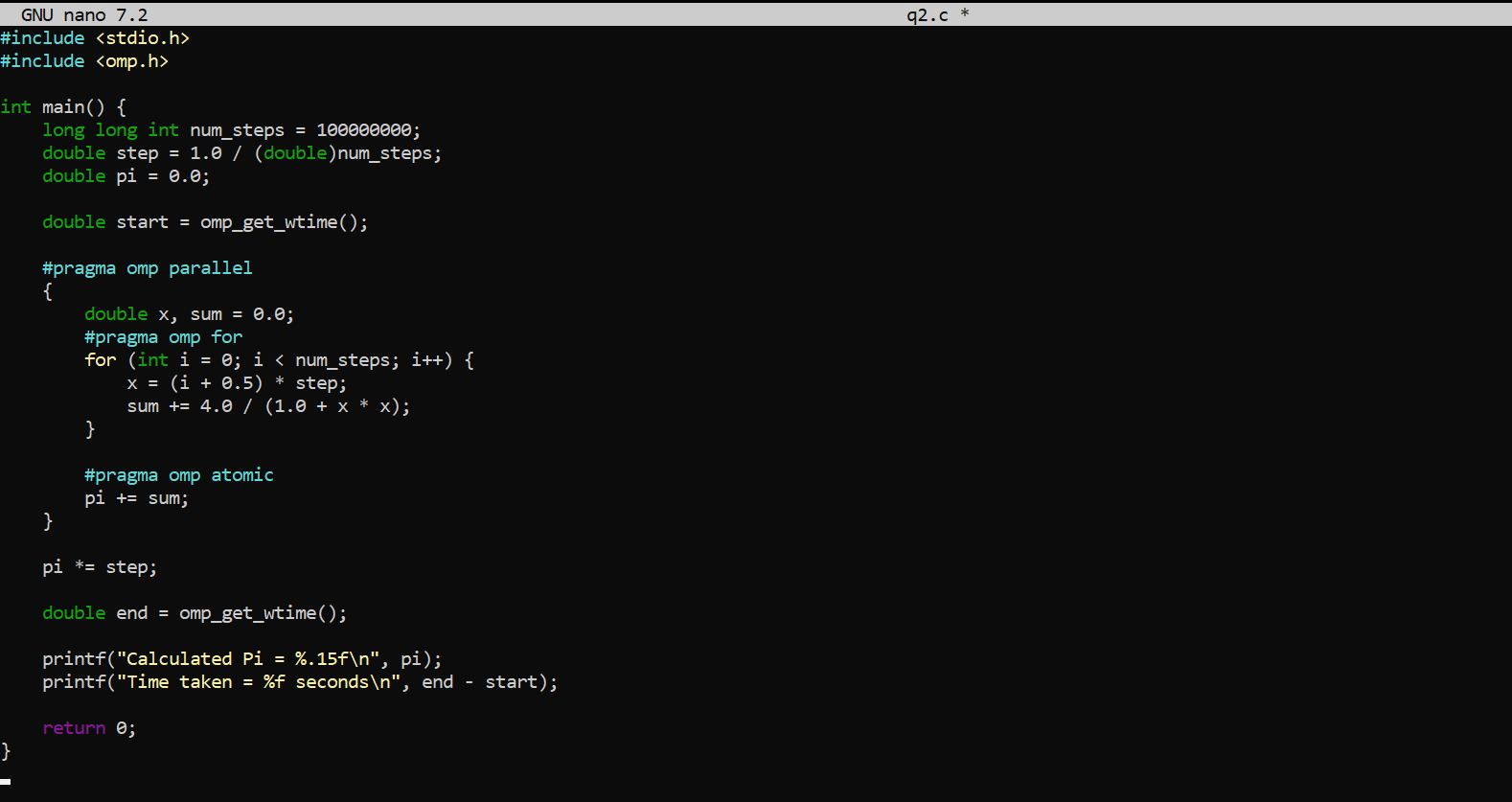
 Performance improves with higher thread count due to parallelism.

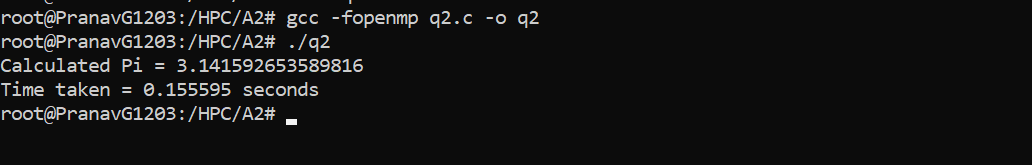
 Diminishing returns may be observed as thread count exceeds core count.

 Optimal performance for large SIZE and up to physical core limit.

**Problem Statement 2:**

**Screenshots:**

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**Information:**

 Integration method used: Riemann sum approximation.

 Work is divided among threads using #pragma omp for.

 #pragma omp atomic ensures correct accumulation of partial sums.

**Analysis:**

* More threads improve performance by parallelizing the loop.
* Pi value remains consistent, accuracy depends on num\_steps.
* Best speed-up is achieved with high num\_steps and cores ≤ physical cores.

**Github Link:** https://github.com/amitwasnik1906/HPC\_Lab.git