

Compute Prime Number:

Problem: Count the number of primes less than given integer.

Methodology:

Naive approach, For each number within the range check if it is prime or not.

Sequential Version:

```
for ( i = 2; i <= n; i++ )
{
    prime = 1;

    for ( j = 2; j < i; j++ )
    {
        if ( i % j == 0 )
        {
            prime = 0;
            break;
        }
    }
    total = total + prime;
}
```

OpenMP Version:

```
# pragma omp parallel shared ( n ) private ( i, j, prime )
# pragma omp for reduction ( + : total )
for ( i = 2; i <= n; i++ )
{
    prime = 1;

    for ( j = 2; j < i; j++ )
    {
        if ( i % j == 0 )
        {
            prime = 0;
            break;
        }
    }
    total = total + prime;
}
```

Output:

N	Pi	Time
5	3	0.000024
50	15	0.000008
500	95	0.000016
5000	669	0.000630
50000	5133	0.044429

MPI Version:

```
//broadcast the n value
```

```
MPI_Bcast ( &n, 1, MPI_INT, 0, MPI_COMM_WORLD );
```

```
//Each processor s count the number of primes for a range e independently
```

```
primes_part = prime_number ( n, id, p );
```

```
//Find the total count by reduction operation
```

```
MPI_Reduce ( &primes_part, &primes, 1, MPI_INT, MPI_SUM, 0, MPI_COMM_WORLD );
```