

# Parallel Computing - Lab 06

## IT23398184

### Exercise 02

```
→ PC_l6 nano fib_parallel.c
→ PC_l6 gcc-15 -fopenmp fib_parallel.c -o fib_parallel
→ PC_l6 OMP_NUM_THREADS=4 ./fib_parallel

Fib(30) = 832040
Time: 0.569501 seconds
→ PC_l6 OMP_NUM_THREADS=4 ./fib_parallel
```

### Exercise 03

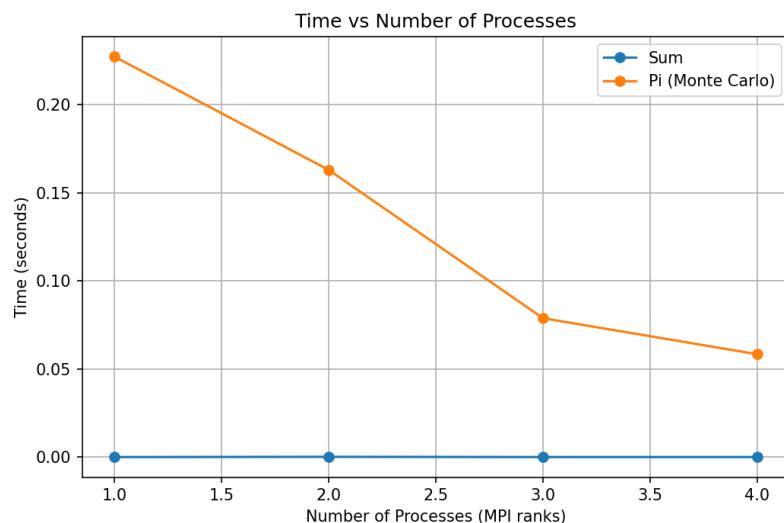
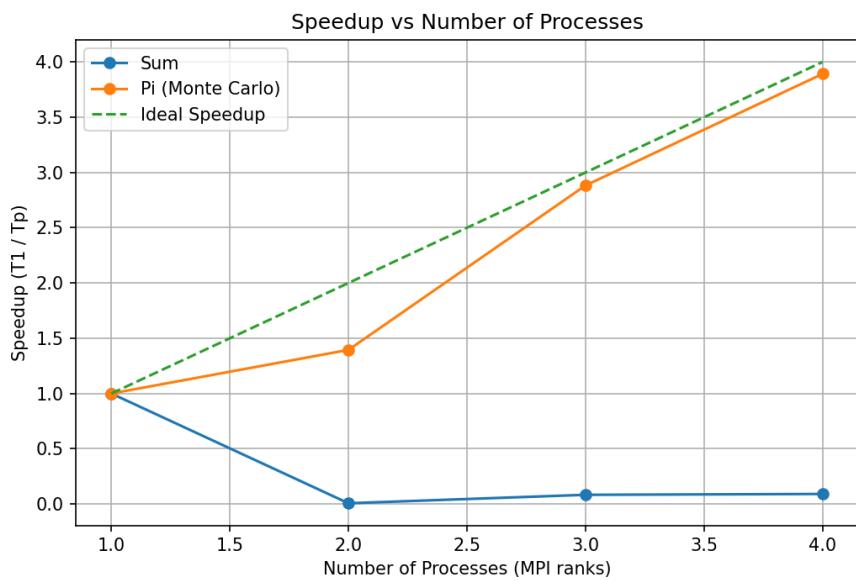
```
[→ PC_l6 nano sum_mpi.c
[→ PC_l6 mpicc sum_mpi.c -o sum_mpi
[→ PC_l6 mpirun -np 4 ./sum_mpi
Total Sum = 50000005000000
Time: 0.000010 seconds
[→ PC_l6 mpirun -np 2 ./sum_mpi
Total Sum = 50000005000000
Time: 0.000069 seconds
```

## Exercise 04.

```
[→ PC_l6 nano pi_mpi.c
[→ PC_l6 mpicc pi_mpi.c -o pi_mpi
[→ PC_l6 mpirun -np 4 ./pi_mpi
N=100000000 ranks=4 pi=3.1416300000 time=0.042310 s
[→ PC_l6 mpirun -np 2 ./pi_mpi
N=100000000 ranks=2 pi=3.1413184000 time=0.068192 s
[→ PC_l6 mpirun -np 4 ./pi_mpi
N=100000000 ranks=4 pi=3.1419168000 time=0.034903 s
```

## Exercise 05

```
[→ PC_l6 nano plot_graphs.py
[→ PC_l6 python3 plot_graphs.py
```



## Exercise 06.

```
[→ PC_l6 mpicc -O2 message_mismatch.c -o message_mismatch
[→ PC_l6 mpirun -np 2 ./message_mismatch

Rank 0: sending to rank 2 (may error or hang if rank 2 not present)
[Vidaths-MacBook-Air:00000] *** An error occurred in MPI_Send
[Vidaths-MacBook-Air:00000] *** reported by process [2990473217,0]
[Vidaths-MacBook-Air:00000] *** on communicator MPI_COMM_WORLD
[Vidaths-MacBook-Air:00000] *** MPI_ERR_RANK: invalid rank
[Vidaths-MacBook-Air:00000] *** MPI_ERRORS_ARE_FATAL (processes in this communicator will now abort,
[Vidaths-MacBook-Air:00000] *** and MPI will try to terminate your MPI job as well)

prterun has exited due to process rank 0 with PID 0 on node Vidaths-MacBook-Air calling
"abort". This may have caused other processes in the application to be
terminated by signals sent by prterun (as reported here).
```

```
→ PC_l6 mpicc -O2 message_bsend.c -o message_bsend
[→ PC_l6 mpirun -np 2 ./message_bsend

Rank 0: calling MPI_Bsend(message=12345) to rank 1
Rank 0: MPI_Bsend returned
Rank 1: received 12345
```

## Exercise 07

```
[→ PC_l6 nano sum_mpi_ptp.c
[→ PC_l6 mpicc -O2 sum_mpi_ptp.c -o sum_mpi_ptp

[→ PC_l6 mpirun -np 4 ./sum_mpi_ptp

Total Sum = 50000005000000
[→ PC_l6 nano sum_mpi_any.c
[→ PC_l6 mpicc -O2 sum_mpi_any.c -o sum_mpi_any

[→ PC_l6 mpirun -np 4 ./sum_mpi_any

Root: received 9375001250000 from rank 1
Root: received 15625001250000 from rank 2
Root: received 21875001250000 from rank 3
Total Sum (ANY_SOURCE) = 50000005000000
→ PC_l6
```

## Exercise 08

```
[→ PC_l6 nano msg_miss_match.c
[→ PC_l6 mpicc -Wall -O2 msg_miss_match.c -o msg_miss_match
[→ PC_l6 mpirun -np 2 ./msg_miss_match

Rank 0: MPI_Bsend -> rank 1 (message=999)
Rank 0: returned from MPI_Bsend
Rank 1: received 999
→ PC_l6 ]
```