

CS471: Parallel Processing [2015-2016]

Assignment-3

Assignment Rules:

- This is an individual assignment.
- Upload your file on Acadox, course link: <http://www.acadox.com/class/27556>
- Name folder/file as **A3_yourName_yourID_G#.c**.
- Deadline is on **Thursday (21/4/2016)** at 23:55 PM.

Calculating Factorial:

Write a parallel c program to calculate the factorial using the following two methods:

- a) MPI_Bcast and MPI_Reduce ONLY
- b) MPI_Send and MPI_Receive ONLY

then compare the execution times of both programs.

Given:

An integer n

Output:

The factorial of n

Parallelization Scenario:

Master Process:

- Calculate subrange size $r=n/p$ (if including master) or $n/(p-1)$ processes (without master).
- Broadcast n and r to each slave process using MPI_Bcast (or loop of MPI_Send).
- Accumulate subfactorial using MPI_Reduce (or loop of MPI_Receive).
- Print factorial.

Slave Process:

- Get n and r using MPI_Bcast (or MPI_Receive).
- Calculate lower bound a and upper bound b according to process's rank.
- Calculate partial factorial (between a and b).
- Share this partial factorial with master process using MPI_Reduce (or MPI_Send).

Example:

$n=9 \rightarrow r=9/(4-1)=3$

$p1$: calculate partial factorial from 1 to 3 = $1*2*3 = 6$

$p2$: calculate partial factorial from 4 to 6 = $4*5*6 = 120$

$p3$: calculate partial factorial from 7 to 9 = $7*8*9 = 504$

After reduction, $P0$ will have factorial(9) = $6*120*504 = 362880$