

Introduction to Parallel Processing

Home Assignment #1

Topic: Embarrassingly Parallel Computations with MPI

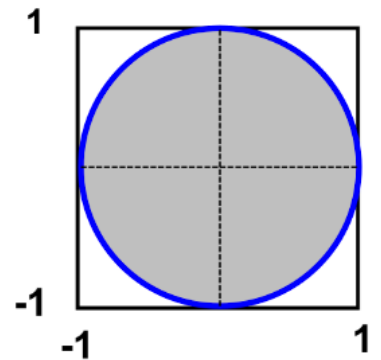
Goal: Estimate π by Monte-Carlo computations

Estimate π using the following algorithm:

Throw darts at a square:

- Sample x & y randomly on $(-1,1)$
- If $x^2 + y^2 < 1$, tally a hit

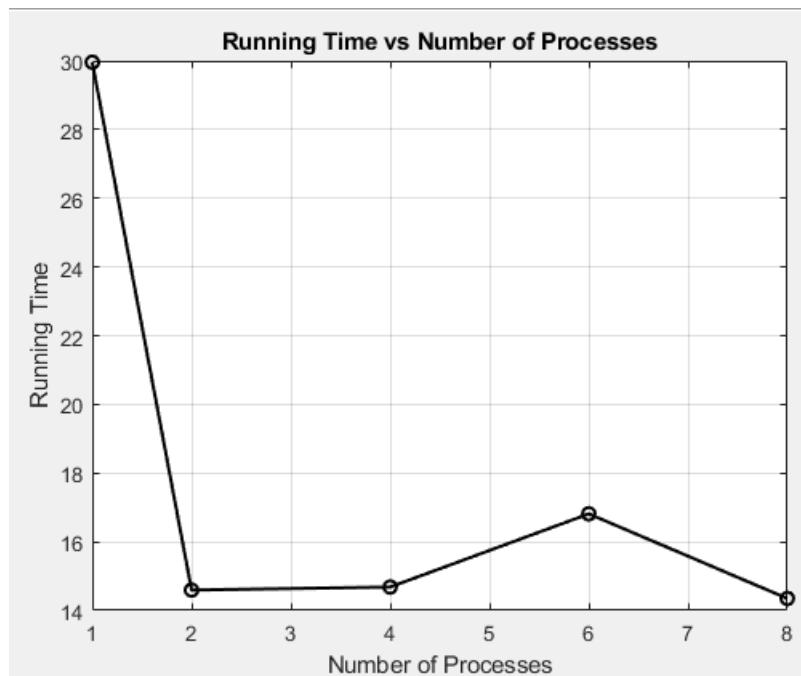
$$\pi \sim 4 * [\text{\# hits}] / [\text{\# tries}]$$



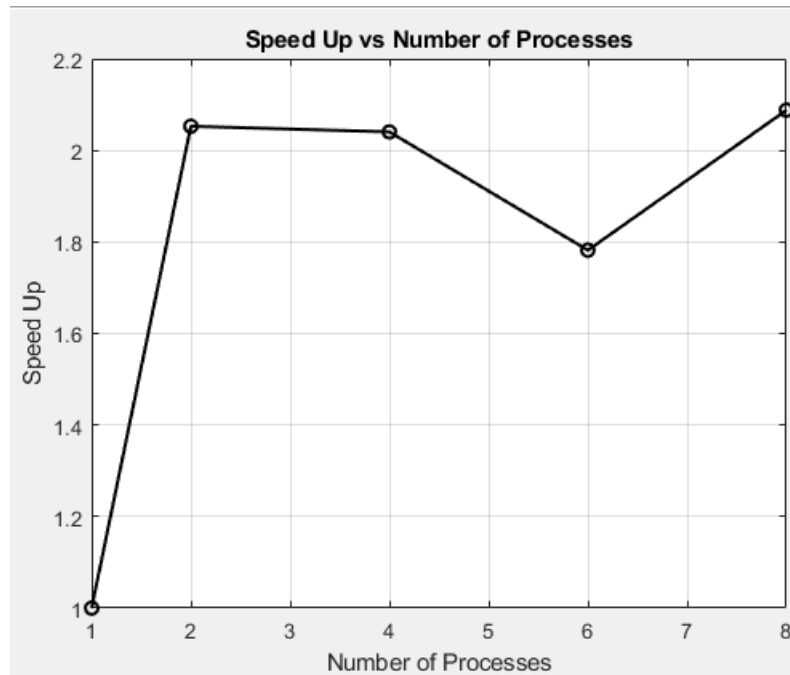
#Processes	pie By Monte Carlo Approx is:	Error	$t_p[sec]$	Speedup	Efficiency
1	3.1416864000000002	0.0000937464102071	29.959281	1	1
2	3.1417448399999999	0.0001521864102068	14.594670	2.052771875	1.026385937
4	3.1418344399999998	0.0002417864102067	14.682718	2.04046199	0.5101154994
6	3.1418084999999998	0.0002158464102067	16.813202	1.781904964	0.2969841606
8	3.1417183999999998	0.0001257464102067	14.349218	2.087885772	0.2609857215

$$Efficiency := \frac{t_s}{p \cdot t_n}, \quad Speedup := \frac{t_s}{t_n}$$

: Running Time vs Number of Processes •



: Speed Up vs Number of Processes •



: Efficiency vs Number of Processes •

