Assignment 2, Task 1
Parallelization So2011

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- Use the program to compute the following integrals $\int_{0.1}^{10000} \frac{1}{x} dx = 11.512925$ and $\int_{10}^{2000} \sin^2 x dx = 995.399112$
- Measure computation and communication time for sequential and parallel processing and compare the results

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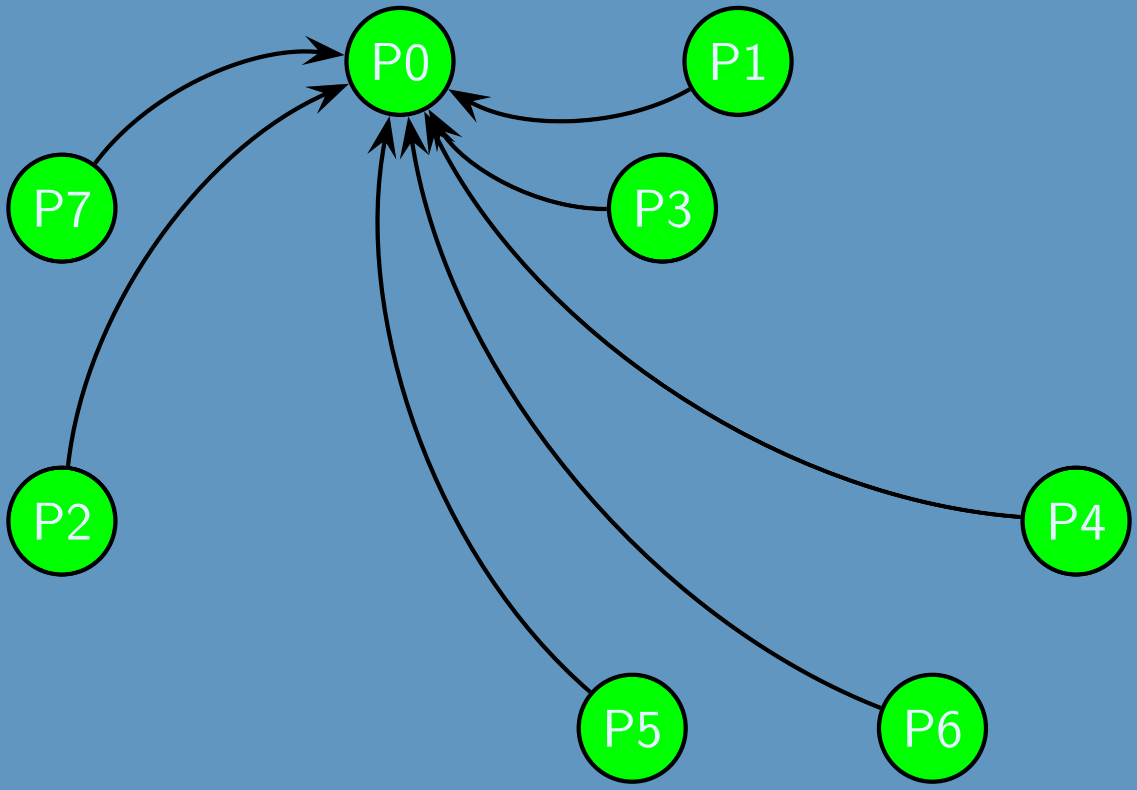
Communication Topology

- Avoid deadlock, do not send and receive to its own node



Performance Analysis

Table 1:

$f(x) = \frac{1}{x}$ with $N = 1000000, 100000000$

Num of Procs	N=1000000					N=100000000				
	comm t	calc t	total t	speedup	efficiency	comm t	calc t	total t	speedup	efficiency
1	0	39414	39414	1.00	1.00	0	2069204	2069204	1.00	1.00
16	2730	3662	6392	6.17	0.39	839	153504	154340	13.41	0.84
32	3058	4153	7218	5.46	0.17	1674	106746	108425	19.08	0.60
128	6002	2381	8383	4.70	0.04	5978	62048	68026	30.42	0.24
256	11343	2934	14277	2.76	0.01	12870	62242	75112	27.55	0.11

Table 2:

$f(x) = \sin^2 x$ with $N = 1000000, 100000000$

Num of Procs	N=1000000					N=100000000				
	comm t	calc t	total t	speedup	efficiency	comm t	calc t	total t	speedup	efficiency
1	0	96592	96592	1.00	1.00	0	8602115	8602115	1.00	1.00
16	1298	11801	13099	7.37	0.46	932	569693	570625	15.07	0.94
32	1818	7764	9582	10.08	0.32	1763	319845	321609	26.75	0.84
128	5655	7793	13448	7.18	0.06	6042	152782	152782	56.30	0.44
256	12081	7821	19902	4.85	0.02	12837	203686	216523	39.73	0.16

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- The more complex the algorithm, the higher the speedup
- The more complex the algorithm, the less the efficiency. As our result shows, when number of processors are 128 and 256, the efficiency can be less than 5%