

## Simple Parallel Data Structures-3

by

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#### 1. Exercise: Finding PI using MPI collective operations

This exercise presents a simple program to determine the value of pi. The algorithm suggested here is chosen for its simplicity. The method evaluates the integral of  $4/(1+x^2)$  between 0 and 1. The method is simple: the integral is approximated by a sum of  $n$  intervals; the approximation to the integral in each interval is  $(1/n)*4/(1+x^2)$ . The master process (rank 0) asks the user for the number of intervals; the master should then broadcast this number to all of the other processes. Each process then adds up every  $n$ 'th interval ( $x = \text{rank}/n, \text{rank}/n+\text{size}/n, \dots$ ). Finally, the sums computed by each process are added together using a reduction.

You may want to use these MPI routines in your solution:  
MPI\_Bcast MPI\_Reduce

#### 2. Exercise: Fairness in message passing

Write a program to test how fair the message passing implementation is. To do this, have all processes except process 0 send 100 messages to process 0. Have process 0 print out the messages as it receives them, using MPI\_ANY\_SOURCE and MPI\_ANY\_TAG in MPI\_Recv. Is the MPI implementation fair?