Lab #4: MPI Introduction

Overview

For this lab you will implement some simple exercises using MPI. The purpose is to become familiar with building and running MPI programs and to practice simple message passing in MPI.

Part 1: Environment

You can access the MPI tools on the department machines from `/home/akeen/public/mpi/bin`.

1. Download "mpi_basic.c" from the course website.
2. Compile this program using `mpicc` (`mpicc mpi_basic.c`).
3. Run this program with using three processes using `mpirun` (`mpirun -np 3 a.out`). The program should print the size of the world three times.
4. Write a new MPI program that functions with three processes. The root process (0) waits to receive a string from each of the other processes. One process should send "Hello, " to the root and the other should send "MPI." The root process receives this messages and then prints the combined result.

Part 2: Message Ring

Create an MPI program that forms a ring of processes. The size of this ring will depend on the size of the world (i.e., this is based on the number of processes created by `mpirun`). Processes in this ring will receive messages from one neighbor and send messages to the next.

This program will take as a command-line argument the number of messages to send around this ring. Each message traverses the entire ring and is collected at the root process. Each message should be an integer value, initialized to 0, and incremented by one each time a process receives the message.

Measure the time it takes to send messages around the ring (read about `MPI_Wtime` and `MPI_Wtick`).

Experiment with the number of process and the number of messages to see how the running time is affected.

Demonstration

Demonstrate your solutions to the instructor in lab.