Parallel Computing

Institut für Informatik der Ludwig-Maximilians-Universität München
Vorlesung und Übung im Wintersemester 2017/18
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Work sheet 4
Due Thursday, 30. November 2017, 23:59 am on Uniworx.

Please submit your answers **in a single PDF document** if not stated otherwise.

Access to SuperMUC

- If you have not already done so, log in with your SuperMUC account at http://idportal.lrz.de/ and change the password.

- Access to SuperMUC is protected by a firewall.
  The following hosts of the CIP pool are whitelisted:

  baerentatze.cip.ifi.lmu.de
  birkenpilz.cip.ifi.lmu.de
  nebelkappe.cip.ifi.lmu.de
  hexenroehrling.cip.ifi.lmu.de
  braetling.cip.ifi.lmu.de
  braunkappe.cip.ifi.lmu.de
  bueschelrasling.cip.ifi.lmu.de

  Notes on CIP pool access provided by the CIP administration:
  http://www.rz.ifi.lmu.de/FAQ/Aussenzugriff.faq.html/

- First, log into one of these hosts by SSH with your CIP Pool account.
  Then, you can log into the SuperMUC as described by the LRZ:
  http://www.lrz.de/services/compute/supermuc/access_and_login/#TOC2

- Familiarize yourself with the SuperMUC programming environment
  http://www.lrz.de/services/compute/supermuc/programming/
  and read the module and compiler sections carefully.
  A job file (job.cmd) is provided but it helps to have an idea how it works.

Estimating Pi with the Monte Carlo Method

1. Find an iterative Monte Carlo Method to estimate Pi
   (see for example https://en.wikipedia.org/wiki/Pi#Monte_Carlo_methods)

2. Write a serial version in C.
3. Write a parallelized version using MPI point-to-point operations.
4. Write a parallelized version using MPI collective operations.
5. Compare the wall clock time of both variants (3,4) with different numbers of MPI processes.

Note: Use at least 64 processes. Execute the Application on the SuperMUC
Hint: Only 1 MPI process needs to know the estimated Pi value.

Please submit both your code and benchmark results.