

## CS/IS F422 Parallel Computing - Assignment 2

- Team Size: 2 or 3 students per team; students may form their own teams.
- Marks : 10
- Due Date: Friday 11<sup>th</sup> March. 11.00pm
- Problem Definition:
  - Breaking News Problem – Standard (BNPS)
    - i. Multiple reporters of ABCD News Channel are reporting from different states of India regarding the recent developments from those areas.
    - ii. The editor needs the most recent and valid news in order to approve for a live telecast.
    - iii. The source of news can be anything external to ABCD News Channel.
    - iv. Reporters need to know if they have the latest news with them and if there are other reporters working on the same news.
  - Breaking News Problem – Multiplex (BNPM)
    - i. There are multiple editors and each editor manages (i.e. receives news reports through) a subset of reporters. No reporter sends news to more than one editor.
    - ii. The editors have to agree on the latest valid news of any topic.
- Exercise:
  - 1. Implement solutions for BNPS and BNPM using MPI in an SPMD/MPMD model with a mechanism for the reporters and the editors to figure out the recent valid news w.r.t any topic or region.
  - 2. Evaluate the performance and scalability of your solution:
    - i. Derive an expression for the number of MPI calls for a given number of reporters and a given partition of them.
    - ii. Measure the total time taken for completion. Repeat this for different numbers of reporters and numbers of editors, as well as for different partitions.
    - iii. Plot the following curves/graphs:
      - a) Time Taken vs. Number of Reporters (BNPS) [fixed number of nodes in the cluster]
      - b) Time Taken vs. Number of Editors (BNPM with the same number of reporters per editor and BNPM with varying number of reporters per editors) [fixed number of nodes in the cluster]
      - c) Time Taken vs. Number of nodes in the cluster (BNPS w. fixed number of reporters, BNPM w. fixed number of editors and roughly equal division of reporters).
    - iv. Explain your results – in particular the scalability or lack of it. Relate your results to (i).

Caveat (for 2-person teams): You may complete

- only BNPS and BNPM with fixed number of editors and fixed number of reporters per editor and
- performance evaluation items (i), (ii), (iii)-a and (iii)-c.