Birla Institute of Technology & Science, Pilani
Pilani Campus

II SEMESTER 2020-2021
Assignment-1

Course No.:	**CS F422**	**Course Title:**	**Parallel Computing**
Deadline:	**19th March 2021 (As per Canvas)**	**Maximum Marks:**	**60M (15%)**

Note:
- Maximum of three students per group.

P1. Consider the problem of searching a large file for a given set of words (with the option of AND or OR combination of words). Program should print line numbers, and lines where the specified words occur along with the word position. File path, AND/OR, set of words are taken on command-line.

(a) Identify suitable tasks resulting task-dependency-graph and task-interaction-graph. Compute average-degree-of-concurrency, critical-path-length.
(b) Analyse the options available for mapping the tasks to given set of processes using standrd methodologies. Decide on suitable mapping with justification.
(c) Describe parallel algorithm and implement the algorithm using MPI.
(d) Analyse the speedup, efficiency, cost and scalability of your algorithm.
(e) Plot a graph for the parameters in (d) with respect to either work or number of processors.

Deliverables:

- Design Document (.pdf). Must contain answers for (a), (b), documentation of (c), (d), (e)
- Source code for c: search_parallel.c

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P2. Consider the Cholesky factorization algorithm (given as Algorithm 8.6 in the text book) for solving a system of linear equations.

(a) Identify suitable tasks resulting task-dependency-graph and task-interaction-graph. Compute average-degree-of-concurrency, critical-path-length.
(b) Analyse the options available for mapping the tasks to given set of processes using standrd methodologies. Decide on suitable mapping with justification.
(c) Describe parallel algorithm and implement the algorithm using MPI.
(d) Analyse the speedup, efficiency, cost and scalability of your algorithm.
(e) Plot a graph for the parameters in (d) with respect to either work or number of processors.

Deliverables:

- Design Document (.pdf). Must contain answers for (a), (b), documentation of (c), (d), (e)
- Source code for c: matrix_cholesky.c

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P3. Consider the Sollin's algorithm for finding minimum spanning tree(MST).

(a) Identify suitable tasks resulting task-dependency-graph and task-interaction-graph. Compute average-degree-of-concurrency, critical-path-length.

(b) Analyse the options available for mapping the tasks to given set of processes using standrd methodologies. Decide on suitable mapping with justification.

(c) Describe parallel algorithm and implement the algorithm using MPI.

(d) Analyse the speedup, efficiency, cost and scalability of your algorithm.

(e) Plot a graph for the parameters in (d) with respect to either work or number of processors.

Deliverables:

- Design Document (.pdf). Must contain answers for (a), (b), documentation of (c), (d), (e)
- Source code for c: mst_sollins.c

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