

COMP 322: Fundamentals of Parallel Programming (Spring 2014)

Instructor: Vivek Sarkar

Worksheet 1: due at end of class today

Name: _____

Honor Code Policy: You are free to discuss all aspects of in-class worksheets with your other classmates, the teaching assistants and the professor during the class. You can work in a group and write down the solution that you obtained as a group. If you use any material from external sources, you must provide proper attribution.

Parallelizing Matrix Multiply

Consider the sequential version of a matrix-multiply algorithm shown below that computes the product of two $N \times N$ matrices A and B into an $N \times N$ matrix C, assuming that all entries in C were initialized to zeros. (Matrices are represented as 2D arrays in Java.)

Indicate in the space provided where you can insert `async` and `finish` pseudocode annotations to ensure that the parallel version always computes the same result as the sequential version, while maximizing the available parallelism. (You don't need to worry about the exact Java syntax for the `async` and `finish` calls in HJlib.)

Sequential version:

```
for (int i = 0 ; i < N ; i++)
  for (int j = 0 ; j < N ; j++)
    for (int k = 0 ; k < N ; k++)
      C[i][j] += A[i][k] * B[k][j];
```

```
System.out.println(C[0][0]);
```

Parallel version with `async` & `finish` annotations inserted (to be completed):