EE 382V: Parallel Algorithms

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Assignment 3: Summer 2020
Deadline: July 29, 2020

The goal of this assignment is to learn CUDA programming. For each of the problems in this assignment use an efficient parallel algorithm.

1. **(40 points)** Write a parallel program in CUDA that reads a text file "inp.txt" and performs various computations on the data in the file. The file contains a list of integers in the range [0-999] separated by commas. Your program should read this file in an array A of integers.

   (a) (20 points) Compute $minA$, the minimum value in the array.

   (b) (20 points) Compute an array B such that $B[i]$ is the last digit of $A[i]$ for all i.

2. **(60 points)** Read an array A as in the first question.
   (a) (20 points) Create an array B of size 10 that keeps a count of the entries in each of the ranges:$[0, 99], [100, 199], [200, 299], \ldots, [900, 999]$. For this part of the problem, maintain array B in global memory of GPU.

   (b) (20 points) Repeat part (a) but first use the shared memory in a block for updating the local copy of B in each block. Once every block is done, add all local copies to get the global copy of B.

   (c) (20 points) Create an array of size 10 that uses B to compute C which keeps count of the entries in each of the ranges:[0,99], [0,199], [0,299],. . . , [0, 999]. Note that the ranges are different from the part (a). For this part of the problem, you must not use array A.