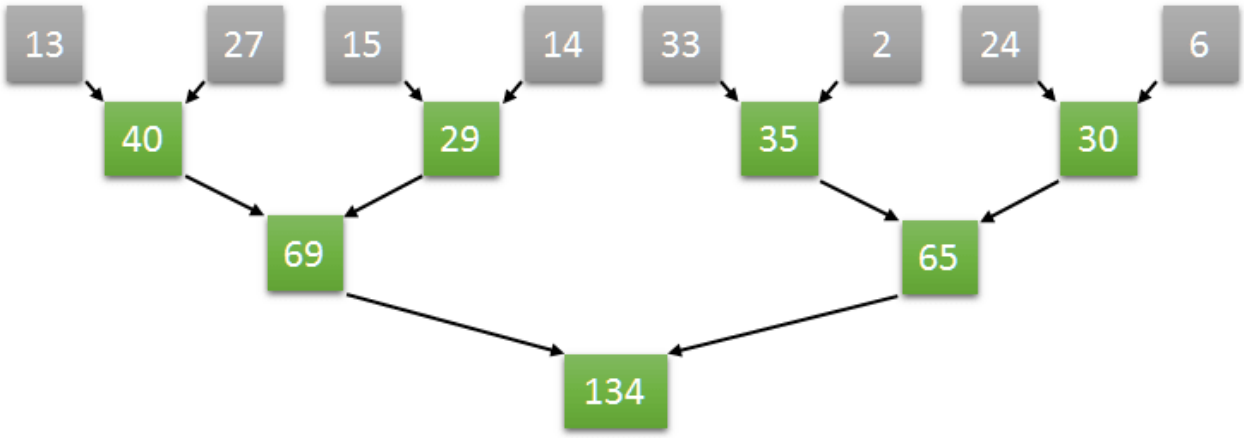
Lab Assignment 4
Time: 2:30 hours
Marks: 30

Reduction is a popular parallel programming pattern. The following example shows how the sum can be computed in parallel using the reduction pattern, where all the computations in a certain level can be performed in parallel using multiple threads. The same can be computed in MPI using MPI_reduce.
Your task in this assignment is to compute the sum of a given input array with and without using MPI_reduce.



1) Implement Sum using the above pattern using MPI but without using MPI_reduce: Calculate the sum of N randomly generated numbers using reduction. [20 marks]

2) Implement Sum using the above pattern using MPI using MPI_reduce: Calculate the sum of N randomly generated numbers using reduction. [10 marks]

Note:

- For programs to be implemented using MPI only, each node solves its part sequentially. The number of nodes may range from 1 to 4.
- Number of threads in a node (with OpenMP) may range from 1 to 8.
- Assume N to be a power of 2.
- NO doubts will be entertained. The instructions are self-explanatory. Any assumptions you make have to be explicitly mentioned as comments in the code at the top.
- You are required to submit the codes with proper file extension (.c/.cpp) in a single zip file with your enrollment number as the filename.
- Submit the codes within the deadline. Late submission will be penalized to be fair to timely submissions. Just submit how much ever you're able to complete.