

2. In this exercise, assume that we are considering enhancing a quad-core machine by adding encryption hardware to it. When computing encryption operations, it is 20 times faster than the normal mode of execution. We will define percentage of encryption as the percentage of time in the original execution that is spent performing encryption operations. The specialized hardware increases power consumption by 2%.

A. Draw a graph that plots the speedup as a percentage of the computation spent performing encryption. Label the y-axis "Net speedup" and label the x-axis "Percent encryption."

B. With what percentage of encryption will adding encryption hardware result in a speedup of 2?

C. What percentage of time in the new execution will be spent on encryption operations if a speedup of 2 is achieved?

3. When parallelizing an application, the ideal speedup is speeding up by the number of processors. This is limited by two things: percentage of the application that can be parallelized and the cost of communication. Amdahl's Law takes into account the former but not the latter.

A. What is the speedup with N processors if 80% of the application is parallelizable, ignoring the cost of communication?

B. What is the speedup with eight processors if, for every processor added, the communication overhead is 0.5% of the original execution time. execution time?