

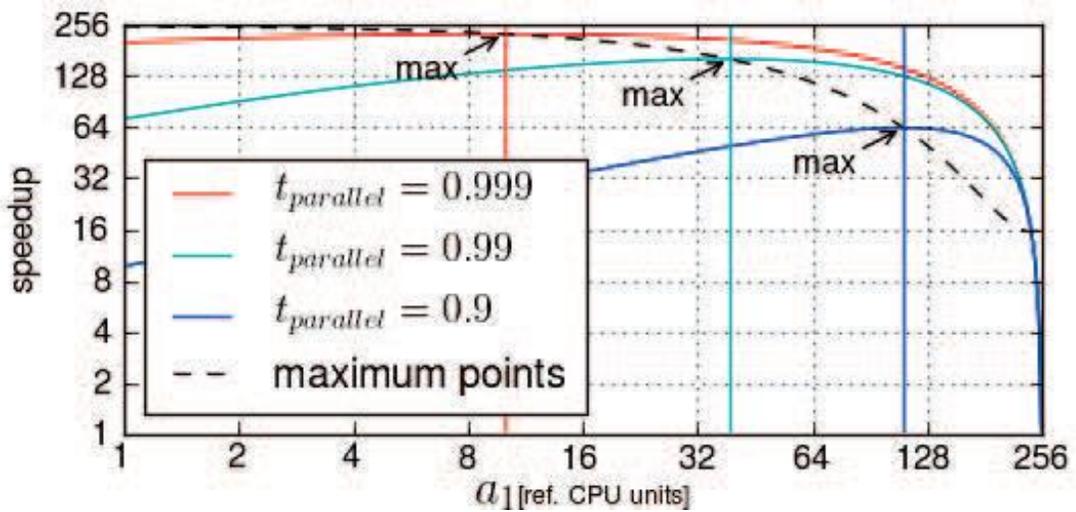
## CMU 15-418/618 Exercise 3

### Miscellaneous Short Answer

The answers to these questions can be as brief as possible.

- A. Imagine you are designing a parallel machine with  $P$  processors to execute convolutions in parallel on a 2D array. (Recall each array element is updated to be a weighed combination of all neighboring values). Do you advocate for a mesh or torus interconnect for this system? Why? (Hint: think about performance/cost trade-offs)

B. The following figure shows the speedup of parallel workloads with asymmetric processors. Along the black dashed line are the maximum speedup for different levels of parallelism. Describe how the maximum points relate between the percentage of core area devoted to the “fat” core and to the percentage of parallelism.



C. Describe the steps involved in an atomic test-and-set. Given MESI, what coherence state(s) are required for executing this atomic? Why?



## Miscellaneous Questions

A. What is the motivation for a content distribution network (CDN)? Why do Facebook images get served to your browser by a CDN but your main news feed is not?

B. Give two reasons why an implementation of a web server might spawn more worker threads than cores present in the machine it is running on?