**Bonus Assignment**

**Multilevel-Caching Benefits**

Since there is a fundamental tradeoff between latency and hit rate in regards to cache, with a larger cache one yields a longer latency. A benefit that could instant be seen by implementing a multi-level cache would be the reduced latency, which in turn would speed up the access of memory. With the smaller fast caches back by larger slow caches, the multi-level cache usually works by starting with the fastest cache first which again would yield another benefit in this choice of caching. Another factor to consider is that the latency difference between a computers main memory and the fastest cache can gradually become larger, this yields an obvious draw back.

With the speed of cache being inversely proportional to the unit which attempts to access it, communication can risk getting a lot slower as the time requires to access it goes up. If we implemented a single cache then we would require a short path in order to enable a faster access time. With the implementation of the multilevel cache we thus maximize speed and locality, however size is lost which can be also be seen as a disadvantage

A benefit to the use of multi-level caches would be ability to use multiple levels on chip-cache as processors have begun to utilize in modern times. An example of these would be the Alpha 21164, IBM POWER4, Intel Core I7, and many more.

Overall the increase in speed in regards to multi-level caching puts forth a great advantage, especially in an era of computing were accessing information as fast as possible, and seems to be at the forefront of the market. With telecommunication commies consistently speeding up their networks, wireless phone companies also following suite. We can quickly see just how important quick access is to the general public and with multilevel caching we indeed take a step towards this.

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