

6.033 Handson Exercise 3

Michael Salib

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I ran the latency program on an IBM Thinkpad laptop with an Intel Pentium III processor and 256 MB of memory as well as a Sun Blade with an Ultra Sparc III processor.

1. I can see three different levels of memory hierarchy for both machines.
2. The first level is about 16,000 bytes. The second level is about 192,000 bytes for the Intel machine and 230,000 bytes for the Sparc. The third level appears to be the size of total system RAM.
3. It takes about 4 nanoseconds for either processor to load data from the first level of the memory hierarchy. The Intel machine takes about 9 ns to load data from the second level of the memory hierarchy while the Sparc takes about 20 ns. The Sparc takes about 100 ns to access the third level of the memory hierarchy while the Intel takes about 125 ns.
4. It is difficult to compare the memory systems of these two machines. Their performance is identical for memory accesses that only hit the first layer of the hierarchy. The Intel box is twice as fast for medium level accesses while the Sparc is about 20 percent faster for large accesses. The Sparc's memory system would perform better for workloads in which the working set exceeded the size of the second level of cache. Conversely, the Intel machine would perform better on workloads where the working set could fit within the second level of cache. For jobs whose working set fits entirely in the first layer of cache, their performance is the same.
5. I spent one hour working on this assignment.