

Microprocessor Architecture

1. What processor is inside the Linux lab machines? How did you find out? What is the “codename” for this processor? What do the parts of the numeric processor name mean? What is the processor speed and what does it mean? What is the peak flops/s of this processor? See <http://www.realworldtech.com/sandy-bridge/> for more information.
2. List the generations of Intel processors, starting with Nehalem/Westmere. See <http://ark.intel.com/> for information.

Exercise 1.1, p. 12. Let us compare the speed of a classical FPU and a pipelined one. Let l be the number of states in the pipeline and let s be the startup cost. Let n be the number of operations. Show that the result rate for the pipelined FPU is dependent on n : give a formula for $r(n)$ and for $r_\infty = \lim_{n \rightarrow \infty} r(n)$. What is the asymptotic improvement over the non-pipelined case? Let $n_{1/2}$ be the number of operations that achieves half the asymptotic rate. Find $n_{1/2}$ in terms of s and l .

Exercise 1.2. p. 13. A linked triad is an operation of the form $a_i \leftarrow b_i + c \cdot d_i$. Find the result rate and $n_{1/2}$ on an architecture where it is possible to feed one pipeline into another without going back to memory in between.

Exercise 1.4, p.13. Find the result rate and $n_{1/2}$ for a processor with p pipelines that operate in parallel.