

Homework Problems on “Performance”

Some of which have been blatantly stolen from
“Computer Architecture, A Quantitative Approach”
by John Hennessy & David Patterson

1. Suppose we have three machines which each run a set of 4 programs. Below are the execution times and frequency of execution for each of the programs and machines.

Program	DEC 3000		IBM PS590		Intel Xpress		Intel	
	Time	Frequency	Time	Frequency	Time	Frequency	Time	Frequency
Spice2g6	97	15	128	5	64	20		
Wave5	123	5	151	20	57	5		
Nasa7	265	5	344	5	61	15		
Mdljsp2	76	10	96	10	48	5		

- a) Rank the machines in order of speed Good, Better, Best
- b) How much faster (i.e. by what percentage) is Best faster than Better? Best faster than Good? Better faster than Good?

2. Implementations for floating-point (FP) square root vary significantly in performance. Suppose FP square root (FPSQR) is responsible for 20% of the execution time of a critical benchmark on a machine. One proposal is to add FPSQR hardware that will speed up this operation by a factor of 10. The other alternative is just to try to make all FP instructions run faster. FP instructions are responsible for a total of 50% of the execution time. The design team believes they can make all FP instructions run 2 times faster with the same effort as would be required for the FPSQR improvement. Which design alternative will bring the best results? By what percentage would the better design be over the slower?