CS 613 (01) Homework 2 Spr '13

due Jan. 28, 2013
40 points

1. (6 pts. total) Define *power gating* and *kernel-based benchmark*. Be sure to give appropriate academic definitions for these computer architecture terms.

2. (9 pts. total) Consider the Figure 1.22 and then complete this problem. In this problem, we will imagine that IBM is considering producing a variant on the IBM Power 5. This variant, the IBM Power 5-613, has identical characteristics to the Power 5 shown in the figure, except that die size is 386 mm^2. For the Power 5-613, assume that $\alpha = 4$ and that wafer yield is 100%. The Power 5-613 will be manufactured on a 13 inch wafer which costs $5000. Ignore the cost of testing and packaging.

    a. (4 pts.) What is the yield for the Power 5-613? (Show all work.)

    b. (5 pts.) What is the cost per saleable die for the Power 5-613 prior to packaging? (Show all work.)

3. (5 pts.) Complete problem 1.8 (b) from the textbook. Show all work.

4. (10 pts.) Complete problem 1.15 from the textbook. Show all work.

4. (10 pts. total) [modelled after textbook items] Your company is trying to choose between purchasing an Opteron or Itanium 2 machine. An internal analysis of company computing use reveals that 60% of the time applications similar to swim (see Fig. 1.17) will be run, 20% of the time applications similar to wupwise (see Fig. 1.17) will be run, and 20% of the time applications similar to facerec (see Fig. 1.17) will be run. Show all work for all parts of this problem.

    a. (3 pts.) What is the weighted average of execution times for one run of this mix of applications (find a value for each of the two machines)?

    b. (3 pts.) What is the speedup (for your mix of applications) of Itanium 2 over Opteron?

    c. (4 pts.) If you were choosing based instead (only) on overall SPEC performance, which machine would you choose?