

COMP 230: Computer Architecture and Organization

HOMEWORK 6

Assigned: November 03, 2017

Due: November 17, 2017

Complete this assignment on a separate sheet of paper.

- Exercise 4.1 from the text.
- Exercise 4.3. The cost/performance ratio is just the cost divided by the performance. In this case we measure performance relative to the original datapath. In other words, the cost/performance ratio of the original datapath is just its cost divided by 1, and the cost/performance ratio of the new datapath is its cost divided by its speedup.

- Consider the non-pipelined datapath show in figure 4.2 in the text. Assume the logic blocks have the following latencies, in ps:

I-Mem	Add	Mux	ALU	Regs	D-Mem	Sign-Extend	Shift-Left-2
200	70	20	90	90	250	15	10

Let's focus on the Shift-left-2 datapath element.

- Which instructions require this element?
 - If you improve this element to take 5ps, which instructions will have reduced latencies, and by how much?
 - If this resource gets degraded to a latency of 130ps, how much must the clock cycle time change (if at all).
- Exercise 4.8, parts 1-3.
 - Exercise 4.18 (all parts)
 - The following three exercises contain 6 parts each. Each exercise deals with a topic that is a slight extension from what we covered in class. In other words, these exercises will required you to (1) read the textbook, and (2) use your independent-thinking skills.

Complete any 6 “parts” (subquestions) of your choosing, but the 6 parts must come from at least two different exercises.

- Exercise 4.12
- Exercise 4.15
- Exercise 4.19