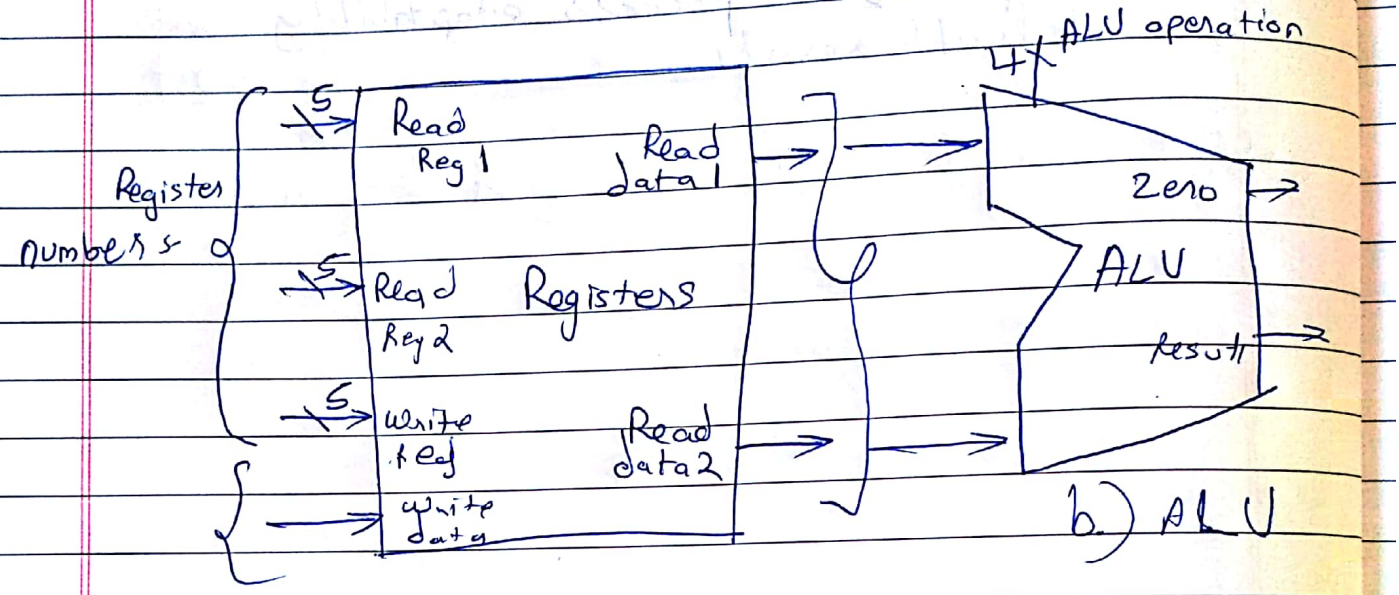
Assignment 6

4.4.1 If the only thing we need to do in a process is fetch consecutive instructions, what would the cycle be.



Solution:

There can be two paths from which are candidates for the critical path:

1) PC → ADD = 70ps
2) PC → I-Mem = 200ps

As the second path is longest it is critical path.

cyclic time = 200ps

4. 4.2] Consider a datapath similar to the one in Fig. 4.11, but for a processor that only has one type of instruction: unconditional PC-relative branch. What would the cycle time for this datapath.

Ans) Candidates for the critical path:

1) PC → I-Mem → Regs (read) → ALU → MUX → Regs (write)

= 200 + 90 + 90 + 20 + 90

= 490 ps

2) PC → I-Mem → Sign-Extend → Mux → Regs (write)

= 200 + 15 + 20 + 90 + 20 + 90

= 435 ps

As the first path is the longest, it is the critical path. Thus the cycle time is 490 ps.

4.4.3 Repeat 4.4.2, but this time we need to support only conditional PC-relative branches

The critical path for a conditional PC-relative branch requires

Imem → Reg → MUX → ALU → MUX

Cycle Time = 200 + 90 + 20 + 90 + 20
= 420 ps