# SOFT400127: Computer Organization and Architecture 2022-Fall

# Homework- **12** Solutions

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2022 年 11 月 6 日

**Honor Code: I promise that I finished the homework solutions on my own without copying other people's work.**

## CPU Structure and Function

**1.**

- In the Von Neumann architecture, we can set PC point at executing instruction.
- In the Harvard architecture, we can store instruction and date in different memory.

**2.**

**1).**

IX represents Instruction X.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| I1 | FI | DI | EX | MA | WB | | | | | | | | | | | |
| I2 | | FI | DI | EX | MA | WB | | | | | | | | | | |
| I3 | | | FI | DI | EX | MA | WB | | | | | | | | | |
| I4 | | | | FI | DI | EX | MA | WB | | | | | | | | |
| I5 | | | | | FI | DI | EX | MA | WB | | | | | | | |
| I6 | | | | | | FI | DI | EX | MA | WB | | | | | | |
| I7 | | | | | | | FI | DI | EX | MA | WB | | | | | |
| I8 | | | | | | | | FI | DI | EX | MA | WB | | | | |
| I9 | | | | | | | | | FI | DI | EX | MA | WB | | | |
| I10 | | | | | | | | | | FI | DI | EX | MA | WB | | |
| I11 | | | | | | | | | | | FI | DI | EX | MA | WB | |
| I12 | | | | | | | | | | | | FI | DI | EX | MA | WB |

**2).**

$$\text{speedup} = \frac{12 \times 5}{5 + 12 - 1} = 3.75$$

$$\text{throughput} = \frac{12}{(5+12-1)\tau} = 7.5 \times 10^6/s$$

**3.**

**a.**

$$\text{clock cycle} = \frac{1}{2.5\text{GHz}} = 0.4\text{ns}.$$

$$\text{speedup} = \frac{1.5\text{ M} \times 5}{1.5\text{ M} + 5 - 1} = 5$$

**b.**

$$\text{throughput} = \frac{1.5\text{M}}{(5+1.5\text{ M}-1)\tau} = 2.5 \times 10^9/s.$$

## Other things

- LaTeX code refer to these things and was complied on texlive2020.
  - UCB-CS70's given homework template.
  - A free website useful to edit LaTeX formula code.
- Some context refer to Professor Li. 's PPT.

The purpose of writing in English is to adapt to bilingual teaching and to improve my poor English writing skills in preparation for a possible future exchange program.

Thanks for your correcting and grading :).