计算机体系架构　第一周作业

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作业内容：1.1-1.45, 1.50, 1.59

Problem 1.1-1.28

- 1.1: 5 CPU
- 1.2: 1 abstraction
- 1.3: 3 bit
- 1.4: 8 computer family
- 1.5: 19 memory
- 1.6: 10 datapath(why not alu)
- 1.7: 9 control
- 1.8: 11 desktop or pc
- 1.9: 15 embedded system
- 1.10: 22 server
- 1.11: 18 LAN
- 1.12: 27 WAN
- 1.13: 23 supercomputer
- 1.14: 14 DRAM
- 1.15: 13 defect
- i.16: 6 chip
- 1.17: 24 transistor
- 1.18: 12 DVD
- 1.19: 28 yield
- 1.20: 2 assembler

- 1.21: 20 os
- 1.22: 7 compiler
- 1.23: 25 VLSI
- 1.24: 16 instruction
- 1.25: 4 cache
- 1.26: 17 isa
- 1.27: 21 semiconductor
- 1.28: 26 wafer

Problem 1.29-1.45

- assembler: i
- cpp: b
- LCD: e
- compiler: i
- cray-1[1]: h
- DRAM: d
- IBM PC: f
- Java: b
- Scanner: c
- MacOS: f
- microprocessor: d
- ms word: a
- mouse: c
- os: i
- printer: e
- silicon: g
- spreadsheet: a

Problem 1.46

[1]https://en.wikipedia.org/wiki/Cray-1

$$Time_{avg,rot,7200} = 0.5/7200 = 0.000069444s$$

$$Time_{avg,rot,10000} = 0.5/10000 = 0.00005s$$

Problem 1.47

在最外圈，一秒转 $1/1600$ 圈；最内为 $1/570$ ，那么分别存储 $1600 \times 1.35 \times 10^6 = 2160000000Byte$，$570 \times 1.35 \times 10^6 = 769500000Byte$。

Problem 1.50

BPS 指的是每秒传送 Bit (Not Byte) 数。

a) 端对端延时包括建立时间与数据传输时间，即

$$\begin{aligned} T_{delay} &= T_{setup} + T_{trans} \\ &= \frac{m}{s} + \frac{L}{R} \end{aligned}$$

b) 增加了路由的时间

$$\begin{aligned} T_{delay} &= T_{setup} + T_{trans} + T_{route} \\ &= \frac{m}{s} + \frac{L}{R} + t \end{aligned}$$

c) 直接带入 b)

$$T_{delay} = \frac{m}{s} + \frac{2L}{R} + \frac{t}{2}$$

Problem 1.59

成本与实际出产的可用芯片数目成反相关，且 $x = -1, y = -2, z = 3$

$$Cost \propto \frac{1}{\text{(Dies Per Wafer)} \times \text{Yield}}$$

近似可以估计

$$x + y + z = 0$$

词汇

wafer 晶片

yield 产率