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第3章

1. (1)  $T_{\text{pipe}} = 2\text{ns} + 0.1\text{ns} = 2.1\text{ns}$

(2)  $S = \frac{T_{\text{old}}}{T_{\text{new}}} = \frac{7}{2.1} = 3.33$

(3) 设  $n$  个流水级

则  $S = \frac{7}{\frac{7}{n} + \frac{1}{10}}$

$\lim_{n \rightarrow \infty} S = 70$

2. 1 2 3 4 5 6

11 -

12 / -

3 WAW RAW -

4 / WAW WAR -

5 RAW RAW RAW RAW -

6 / / / / RAW -

4. (1)  $S = \frac{0.6 \times \frac{11}{8}}{1 + \frac{6}{5}} = \frac{3}{5} \times \frac{11}{8} \times \frac{5}{6} = \frac{11}{16}$

(2) A:  $CPI_A = 20\% \times 5\% \times \frac{6+2}{5} + 99\% \times \frac{6}{5}$   
 $= \frac{8}{5} \times \frac{1}{100} + \frac{6}{5} \times \frac{99}{100} = \frac{602}{500} = 1.204$

B:  $CPI_B = 1\% \times \frac{11+5}{8} + 99\% \times \frac{11}{8}$   
 $= \frac{16}{800} + \frac{1089}{800} = 1.378125$

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6. 11> 1d a1, 0(a2) ①
      odd1 a1, a1, 1 ②
      sd a1, 3(a2) ③
      odd1 a2, a2, 4 ④
      sub a4, a3, a2 ⑤
      bnez a4, Loop ⑥
    
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①②: RAW(a1) ①③ RAW(a1)

②③ RAW(a1)

③⑤ RAW(a2)

④⑤ RAW(a4)

12)

① IF ID EX MEM WB

② IF ID S S EX MEM WB

③ IF S S ID S S EX MEM WB

④ S S IF S S ID EX MEM WB

⑤ S S S S IF ID S S EX MEM WB

⑥ S S S S IF S S ID S S EX MEM WB

$$25 \times 18 = 450.$$

7. (1)

ld a1, a(a2) IF ID EX MEM WB.  
 addi a1, a1, 1 IF ID S EX MEM WB  
 sd a1, a(a2) IF S ID EX MEM WB  
 addi a2, a2, 4 S IF ID EX MEM WB  
 sub a4, a3, a2 S IF ID EX MEM WB  
 bne a4, L2op S IF ID EX MEM WB

$$25 \times 11 = 275$$

$$(2) 25 \times 7 + 4 = 179$$

8 (1)

ld a1, a(a1) IF1 IF2 ID1 ID2 EX1 EX2 M1 M2 WB1 WB2  
 addi a1, a1, 1 IF1 IF2 ID1 ID2 S S S EX1 EX2 M1 M2 WB1 WB2  
 sd a1, a(a1) IF1 IF2 ID1 S S S ID2 S EX1 EX2 M1 M2 WB1 WB2  
 addi a2, a2, 4 IF1 IF2 S S S ID1 S ID2 EX1 EX2 M1 M2 WB1 WB2  
 sub a4, a3, a2 IF1 S S S IF2 S ID1 ID2 S EX1 EX2 M1 M2 WB1 WB2  
 bne a4, L2op S S S IF1 S IF2 ID1 ID2 S EX1 EX2 M1 M2 WB1 WB2

$$25 \times 11 + 9 = 284$$

$$(2) 6: \frac{450}{25 \times 6} = 3$$

$$7(1) \frac{275}{150} = 1.83$$

$$(2) \frac{179}{150} = 1.193$$

$$8 \frac{284}{150} = 1.893$$



1 图层

TXT 画布

图形

套索

+ 缩放

T 文本

← 插入

AI 识别

👉 手触

📁 保存

🔄 同步

+ 页面+

🔍 搜索

⋮ 更多

19. 1) add ✓  
 addi x  
 ld x  
 sd x  
 bne ✓  
 jal x  
 jalr ✓

12)  
 lw a4, 0(a3) IF ID EX MEM WB.  
 addw a1, a4, a1 IF ID1 ID2 S EX MEM WB.  
 addiw a2, a2, -1 IF S S ID EX MEM WB.  
 addiw a3, a3, 4 S S IF ID EX MEM WB.  
 bnez a2, Loop. S S IF ID S EX MEM WB

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13)  
 lw a4, 0(a3) IF ID EX MEM WB  
 addw a1, a4, a1 IF ID S EX MEM WB  
 addiw a2, a2, -1 IF S ID EX MEM WB  
 addiw a3, a3, 4 S IF ID EX MEM WB  
 bnez a2, Loop S IF ID EX MEM WB

10周期