

Bài tập Pipeline

Câu 1

a) Processor có pipeline, 500 ps (trong 5 công đoạn)

$$\text{Processor } K^o \text{ pipeline: } 500 + 400 + 350 + 300 + 100 = 1650 \text{ ps}$$

b) Processor có pipeline, 200 ps

$$\text{Processor } K^o \text{ pipeline: } 500 + 150 + 120 + 190 + 140 = 800 \text{ ps}$$

Câu 2

a) Tỷ lệ có pipeline: $500 * 5 = 2500 \text{ ps}$

$$\text{tỷ lệ } K^o \text{ pipeline: } 500 + 400 + 350 + 300 + 100 = 1650 \text{ ps}$$

b) tỷ lệ có pipeline: $5 * 200 = 1000 \text{ ps}$

$$K^o \text{ pipeline: } 800 \text{ ps}$$

Hỏi thêm về lệnh add

$$\text{có pipeline: } 5 * 500 = 2500 \text{ ps}$$

K^o pipeline nhưng còn chưa kỹ: ~~500~~ b: 1650 ps

Câu 3 a) tỷ lệ xử lý mà chip có ở lưu, sự % của

$$\text{a) \% KMEM} = 15\% + 10\% = 25\%$$

QT

h) $30\% + 15\% = 45\%$
 a) $50\% + 15\% = 65\%$
 b) $30\% + 30\% = 60\%$

	IF	ID	Ex	MEM	WB
lw	X	X	X	X	X
sw	X	X	X		
ALU (add, sub, and, or, slt)	X	X			X
Branch (beq)	X	X			

Case 4

1) Chu kỳ xung clock
 - thời kỳ pipeline

a) 500 ps

b) 900 ps

- đơn chu kỳ

a) 1650

b) 1500

- đa chu kỳ, quá pipeline

a) 4.15 ($0.15 \times 5 + 0.85 \times 4$)

b) 4.3 ($0.3 \times 5 + 0.7 \times 4$)

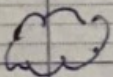
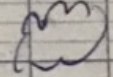
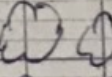
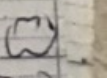
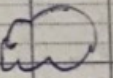
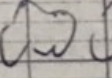
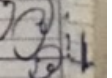
Q1

hình 2

(Ghi)

a) lw \$1, 40(\$6)
add \$6, \$2, \$2
nop
nop
sw \$6, 50(\$1)

hình minh

lw \$1, 40(\$6)	IF	ID	EX	MEM	WB
add \$6, \$2, \$2		IF	ID	EX	MEM WB
nop					 
nop					 
sw \$6, 50(\$1)					IF ID EX MEM WB

b) lw \$5, -16(\$5)

nop

pop

lw \$5, -16(\$5)

add \$5, \$5, \$5

hình minh

QT

lw \$5, -16(\$5)	IF	ID	EX	MEM	WB		
nop		EX	MEM	WB			
pop			EX	MEM	WB		
sw \$5, -16(\$5)			IF	ID	EX	MEM	WB
add \$5, \$5, \$5			IF	ID	EX	MEM	WB

2) a) sw \$1, 40(\$6)
 add \$6, \$2, \$2
 sw \$6, 50(\$1)

hình ảnh:

lw \$1, 40(\$6)	IF	ID	EX	MEM	WB
add \$6, \$2, \$2		IF	ID	EX	MEM
sw \$6, 50(\$1)			IF	ID	EX

b) lw \$5, -16(\$5)
 nop
 sw \$5, -16(\$5)
 add \$5, \$5, \$5

hình ảnh:

Q1

lw \$5, -16(\$5)

IF ID EX MEM WB

nop

CB CB CB CB CB

lw \$5, -16(\$5)

IF ID EX MEM WB

add \$5, \$5, \$5

IF ID EX MEM WB

5)

c) chuỗi k^o forwarding

lw \$1, 40(\$6)

add \$6, \$2, \$2

nop

nop

lw \$6, 50(\$1)

→ mỗi 9 chu kỳ: $9 \times 300 = 2700ps$

chuỗi có forwarding

lw \$1, 40(\$6)

add \$6, \$2, \$2

lw \$6, 50(\$1)

→ mỗi 7 chu kỳ: $7 \times 400 = 2800ps$

tỷ lệ đạt đc: $\frac{2700}{2800} = 0,96$

→ đây là sự giảm tới

n) tỷ lệ thực thi k^o forwarding: $9 \times 300 = 2700ps$

QT

ty thuộ thi có forwarding: $7 \times 950 = 1750ps$
sự tăng tốc: $\frac{1800}{1750} = 1,0285$
đồng là 1750 sự tăng tốc

Các 4

a)

lw \$1, 40 (\$6)

add \$6, \$2, \$2

nop

lw \$6, 50 (\$1)

b)

lw \$5, -16 (\$5)

nop

nop

lw \$5, -16 (\$5)

add \$5, \$5, \$5

5)

a) ty với ALU-ALU forwarding: $8 \times 325 = 2600ps$
sự tăng tốc: $\frac{2700}{2600} = 1,038$

b) ty với ALU-ALU forwarding $9 \times 270 = 1950ps$
sự tăng tốc được: $\frac{1800}{1950} = 0,91$

Bài 3

Q7

a) h^0 of forwarding

lw \$1, 40(\$2)

add \$2, \$3, \$3

nop

nop

add \$1, \$2, \$2

nop

nop

sw \$1, 90(\$2)

b)

n) add \$1, \$2, \$3

nop

nop

sw \$2, 0(\$1)

lw \$1, 4(\$2)

nop

nop

add \$2, \$2, \$1

cd forwarding

lw \$1, 40(\$2)

add \$2, \$3, \$3

add \$1, \$1, \$2

sw \$1, 90(\$2)

add \$1, \$2, \$3

sw \$2, 0(\$1)

lw \$1, 4(\$2)

nop

add \$2, \$2, \$1

QT

c) lw \$1, 40(\$6)

nop

nop

add \$2, \$3, \$1

add \$2, \$6, \$4

nop *

sw \$2, 20(\$4)

add \$2, \$1, \$4

d) add \$1, \$5, \$3

nop

nop

sw \$1, 0(\$2)

lw \$1, 4(\$2)

nop

nop

add \$5, \$5, \$2

sw \$1, 0(\$2)

lw \$1, 40(\$6)

nop

add \$2, \$3, \$1

add \$1, \$6, \$4

sw \$2, 20(\$4)

add \$1, \$1, \$4

add \$2, \$5, \$3

sw \$1, 0(\$2)

lw \$1, 4(\$2)

nop

add \$5, \$5, \$2

sw \$1, 0(\$2)