Pipeline MIPS

תרגול כיתה מס' 10
הסבירו איזה מעקווי (bypass/forwarding) בדרש ב- pipeline בדיעבד, בבן חוץ את התכנית הבאה:

add $2, $3, $4
add $4, $5, $6
add $5, $3, $4
add $2, $3, $4

add $4, $5, $6

add $5, $3, $4
Warning: Reading old $4

No forwarding needed.
Rs=3 ≠ Mem: Dst=4
Rs=3 ≠ Wb: Dst=2
Rt=4 = Mem: Dst=4
Rt=4 ≠ Wb: Dst=2
הסירו את העוקף (bypass/forwarding) העיקרי-
כדי>Last hastchnit bah.

add $2, $5, $4
add $4, $2, $5
Sw $5, 100($2)
add $3, $2, $4
add $2, $5, $4
add $4, $2, $5
sw $5, 100($2)
add $3, $2, $4
Register File Split

- Register file is written during first half of the cycle
- Register file is read during second half of the cycle
  ⇒ Register file is written before it is read ⇒ returns the correct data
main: lw $t0, 0($s0)
    add $s1, $t0, $t1
    sub $s2, $t0, $t1

- Forward unit can not resolve the load hazard conflict.
- Bubble insertion is needed.
Clk 3 – hazard detection unit

Hazard detection unit

opcode

rs=8($t0)
rt=9($t1)

exe.rdest=8($t0) (=exe.rt)
exe.MemRead

sub $s2, $t0, $t1
add $s1, $t0, $t1
lw $t0, 0($s0)
Don't Load the sub to the ID/IF reg. Keep the add there for the next clk. Cycle.

Don't Increment PC – keep read the sub Inst. From Memory.

Insert a bubble to exe stage – by zeroing the Control bits that moves to the next pipe stage.

Address of: sub $s2, $t0, $t1

Don't Load the sub to the ID/IF reg. Keep the add there for the next clk. Cycle.

Don’t Increment PC – keep read the sub Inst. From Memory.
חומר רקע

חומר רקע
Instruction$
Control$
WB
M
EX
WB
M
EX/MEM
MEM/WB
IF/ID
ID/EX