Pipeline Diagrams

- I'm going to show bubbles two different ways. The first is more common:

  IF   ID   ⟲   EX   M   WB

- But here is another way that is also acceptable. This one is useful here because it makes it clearer what is happening in the bubble (the stage being repeated), and why it is okay to forward (via the reg file) to a bubble stage as in the first example.
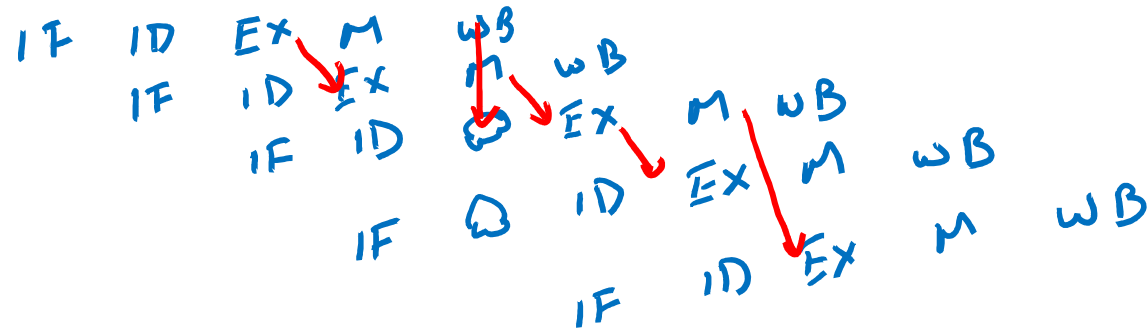
  IF   ID   ID   EX   M   WB

- You could even combine them (but I won't show this in the following examples):

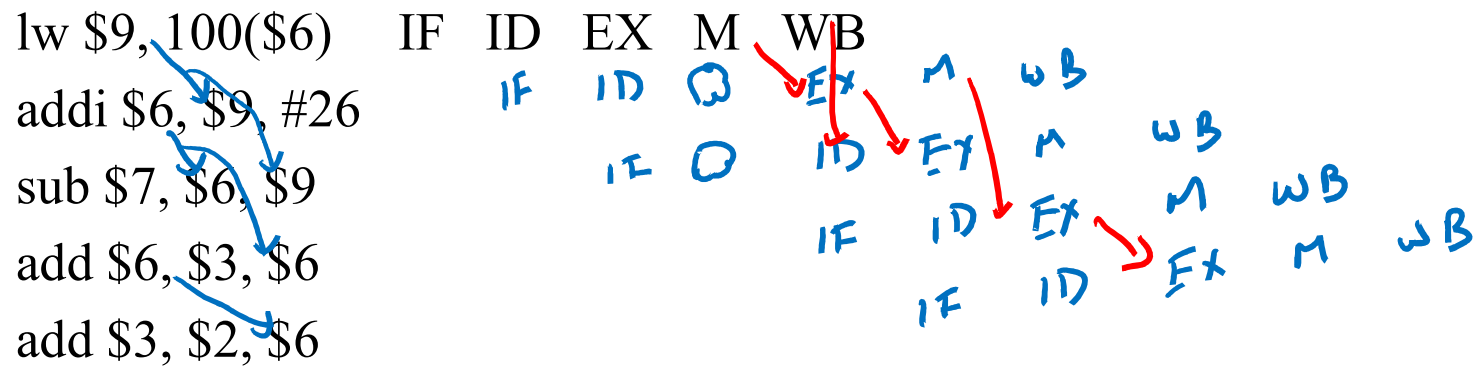 IF   ID   ⟨ID⟩   EX   M   WB

Try this one...

Show bubbles and forwarding for this code

add $3, $2, $1
lw $4, 100($3)
and $6, $4, $3
sub $7, $6, $2
add $9, $3, $6

IF ID EX M WB
IF ID EX M WB
IF ID ⊘ EX M WB
IF ⊘ ID EX M WB
IF ID EX M WB

Dean Tullsen

Another one...

Show bubbles and forwarding for this code

lw $9, 100($6)   IF ID EX M WB

addi $6, $9, #26   IF ID () EX M WB

sub $7, $6, $9   IF () ID EX M WB

add $6, $3, $6   IF ID EX M WB

add $3, $2, $6   IF ID EX M WB

Try this one...

Show bubbles and forwarding for this code

add $3, $2, $1

lw $4, 100($3)
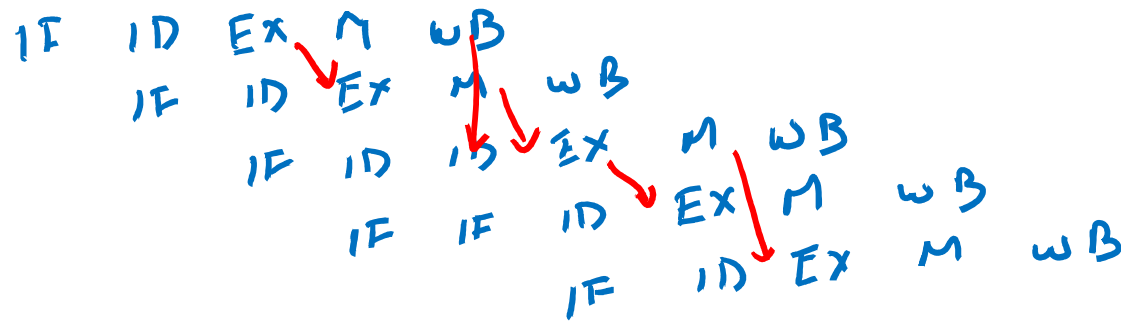
and $6, $4, $3

sub $7, $6, $2

add $9, $3, $6

IF ID EX M WB
   IF ID EX M WB
      IF ID ID EX M WB
         IF IF ID EX M WB
            IF ID EX M WB

Dean Tullsen

Another one...

Show bubbles and forwarding for this code

lw $9, 100($6)   IF ID EX M WB

addi $6, $9, #26   IF ID ID EX M WB

sub $7, $6, $9   IF IF ID EX M WB

add $6, $3, $6   IF ID EX M WB

add $3, $2, $6   IF ID EX M WB