

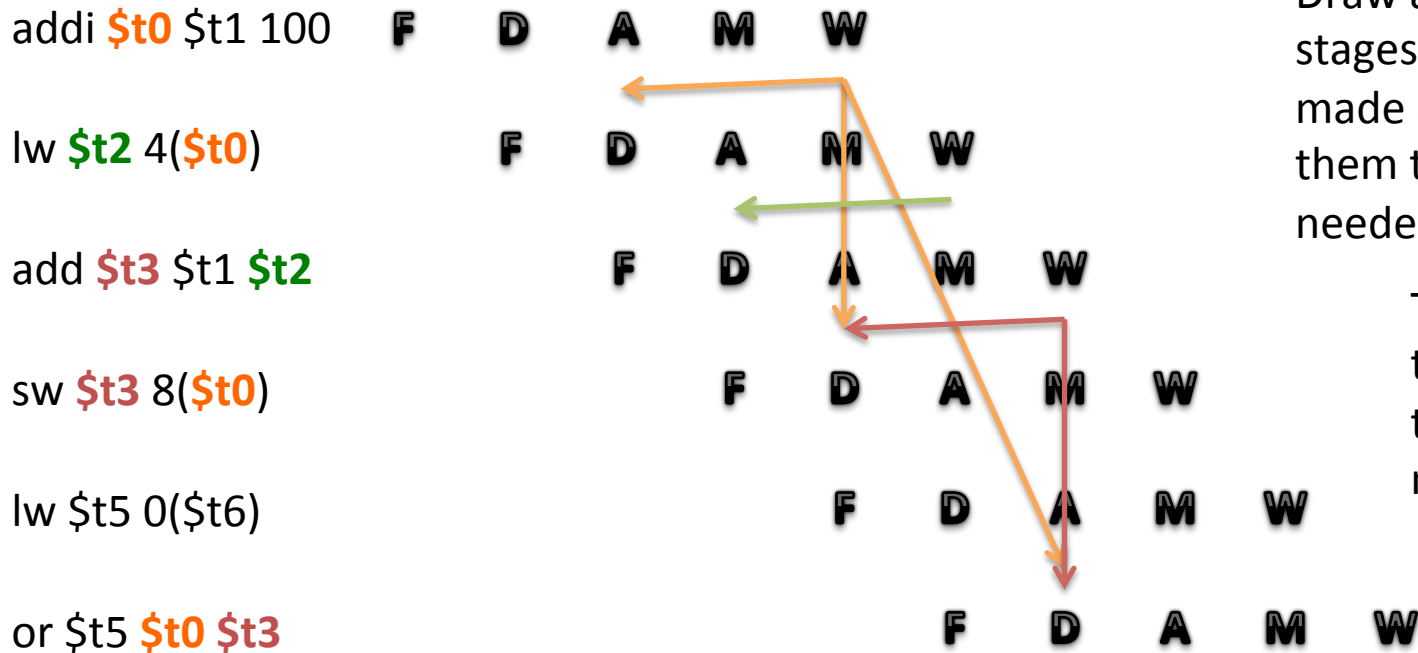
addi \$t0 \$t1 100	F	D	A	M	W					
lw \$t2 4(\$t0)		F	D	A	M	W				
add \$t3 \$t1 \$t2			F	D	A	M	W			
sw \$t3 8(\$t0)				F	D	A	M	W		
lw \$t5 0(\$t6)					F	D	A	M	W	
or \$t5 \$t0 \$t3						F	D	A	M	W

Draw arrows from the stages where the data is made available, and direct them to where they are needed. **No forwarding**

addi \$t0 \$t1 100	F	D	A	M	W					
lw \$t2 4(\$t0)		F	D	A	M	W				
add \$t3 \$t1 \$t2			F	D	A	M	W			
sw \$t3 8(\$t0)				F	D	A	M	W		
lw \$t5 0(\$t6)					F	D	A	M	W	
or \$t5 \$t0 \$t3						F	D	A	M	W

Draw arrows from the stages where the data is made available, and direct them to where they are needed. **No forwarding**

First, you should mark all dependencies: where the same data is used.



Draw arrows from the stages where the data is made available, and direct them to where they are needed. **No forwarding**

Then, draw out where the data is available, to where it is necessary.

addi \$t0 \$t1 100

F D A M W

lw \$t2 4(\$t0)

F D A M W

add \$t3 \$t1 \$t2

F D A M W

sw \$t3 8(\$t0)

F D A M W

lw \$t5 0(\$t6)

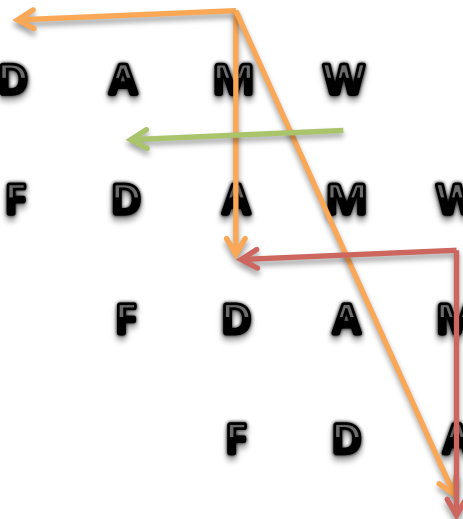
F D A M W

or \$t5 \$t0 \$t3

F D A M W

How many stalls do we need?

B U B B L E



addi \$t0 \$t1 100

F D A M W

How many stalls do we need?

B U BB L E

B U BB L E

B U BB L E

lw \$t2 4(\$t0)

F D A M W

add \$t3 \$t1 \$t2

F D A M W

sw \$t3 8(\$t0)

F D A M W

lw \$t5 0(\$t6)

F D A M W

or \$t5 \$t0 \$t3

F D A M W

NOTE: When you resolve an earlier dependency of the same data, you most likely will also resolve later ones! (not always, but most likely)

addi \$t0 \$t1 100

F D A M W

How many stalls do we need?

B U BB L E

B U BB L E

B U BB L E

lw \$t2 4(\$t0)

F D A M W

B U BB L E

B U BB L E

add \$t3 \$t1 \$t2

F D A M W

sw \$t3 8(\$t0)

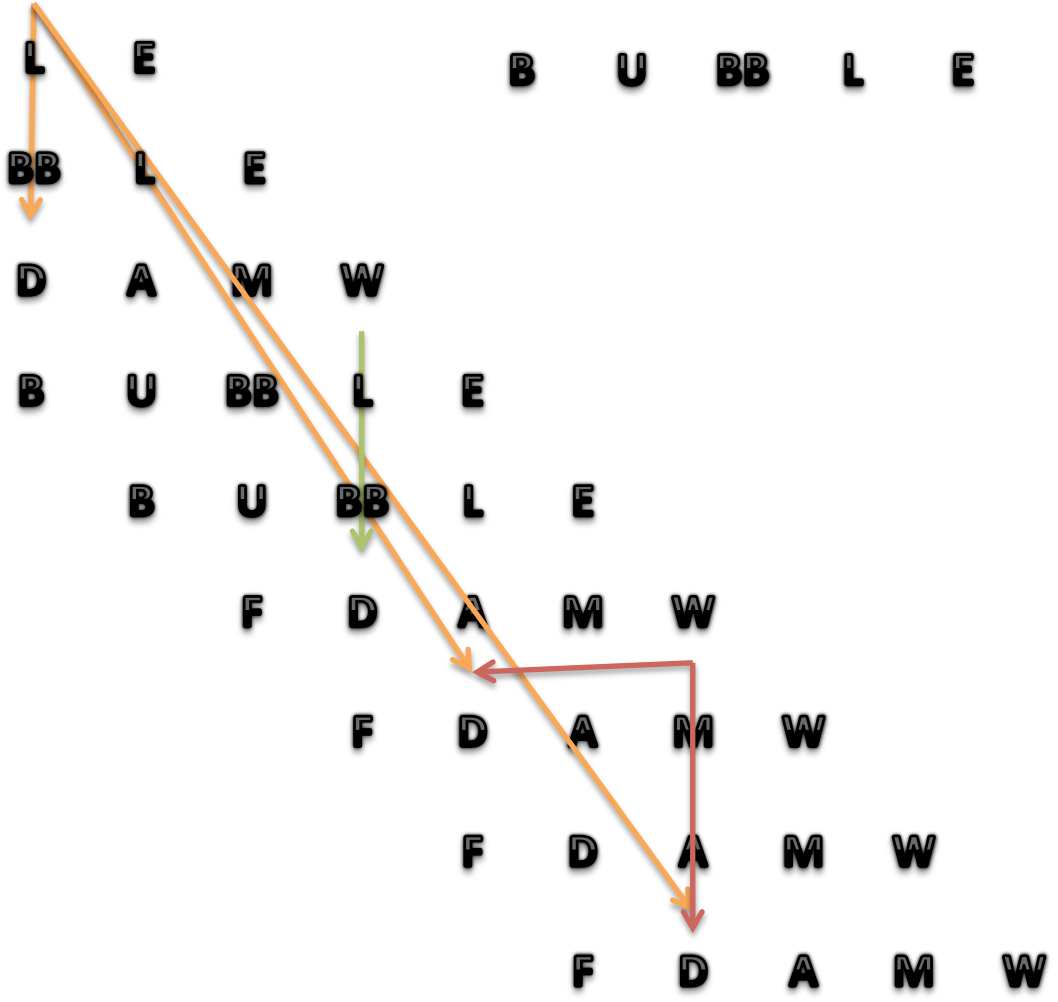
F D A M W

lw \$t5 0(\$t6)

F D A M W

or \$t5 \$t0 \$t3

F D A M W



addi \$t0 \$t1 100

F D A M W

How many stalls do we need? 6

B U BB L E

B U BB L E

B U BB L E

lw \$t2 4(\$t0)

F D A M W

B U BB L E

B U BB L E

add \$t3 \$t1 \$t2

F D A M W

B U BB L E

B U BB L E

sw \$t3 8(\$t0)

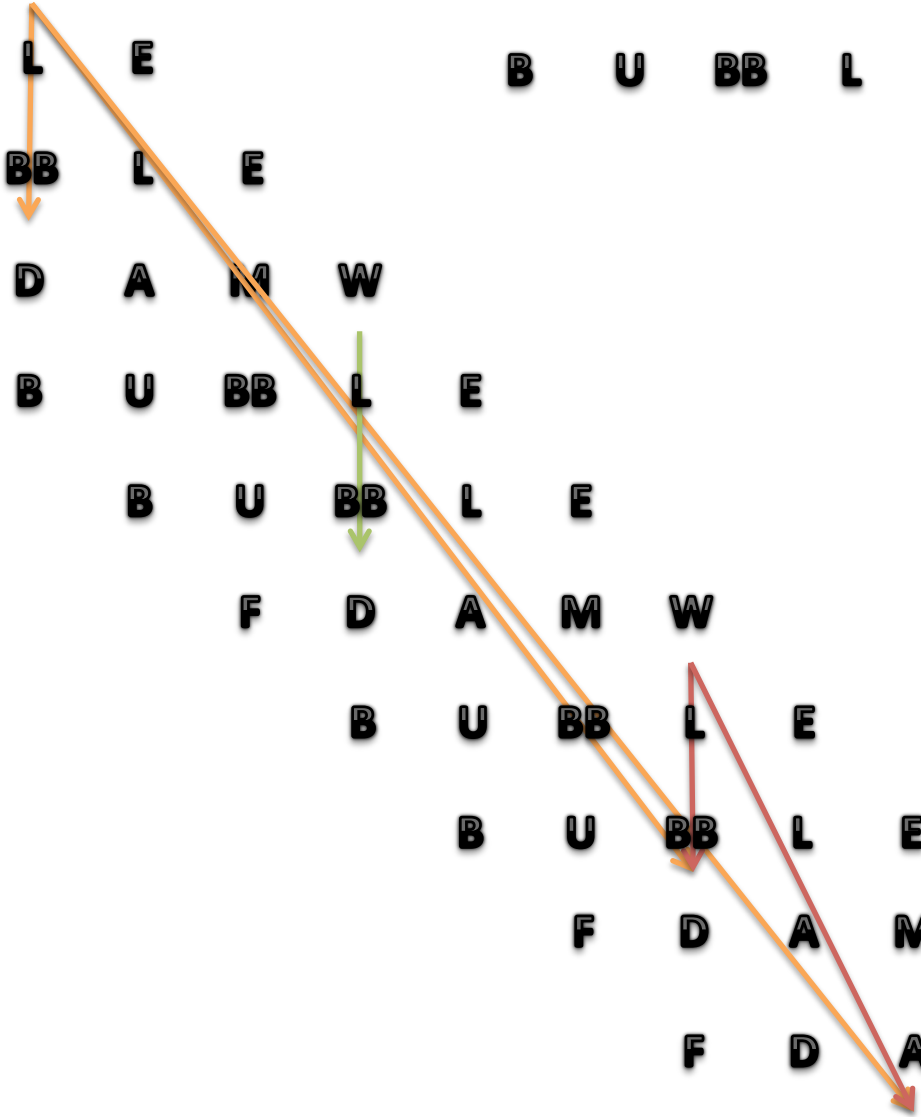
F D A M W

lw \$t5 0(\$t6)

F D A M

or \$t5 \$t0 \$t3

F D A



addi \$t0 \$t1 100	F	D	A	M	W					
lw \$t2 4(\$t0)		F	D	A	M	W				
add \$t3 \$t1 \$t2			F	D	A	M	W			
sw \$t3 8(\$t0)				F	D	A	M	W		
lw \$t5 0(\$t6)					F	D	A	M	W	
or \$t5 \$t0 \$t3						F	D	A	M	W

Draw arrows from the stages where the data is made available, and direct them to where they are needed. **Forwarding**

First, you should mark all dependencies: where the same data is used.



Draw arrows from the stages where the data is made available, and direct them to where they are needed. **Forwarding**

Then, draw out where the data is available, to where it is necessary.

addi \$t0 \$t1 100

F D A M W

lw \$t2 4(\$t0)

F D A M W

add \$t3 \$t1 \$t2

F D A M W

sw \$t3 8(\$t0)

F D A M W

lw \$t5 0(\$t6)

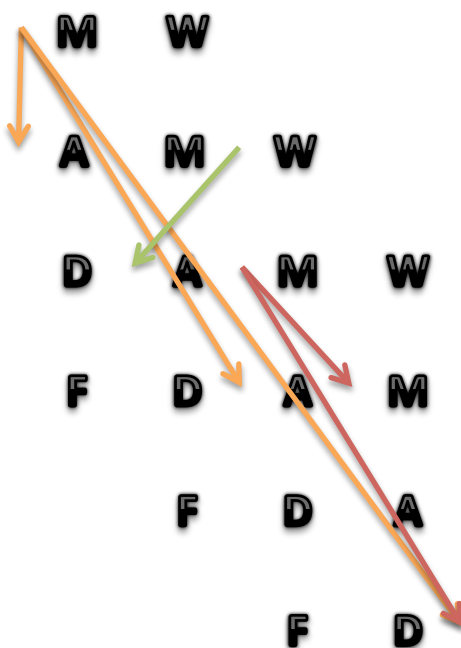
F D A M W

or \$t5 \$t0 \$t3

F D A M W

How many stalls do we need?

B U B B L E



addi \$t0 \$t1 100

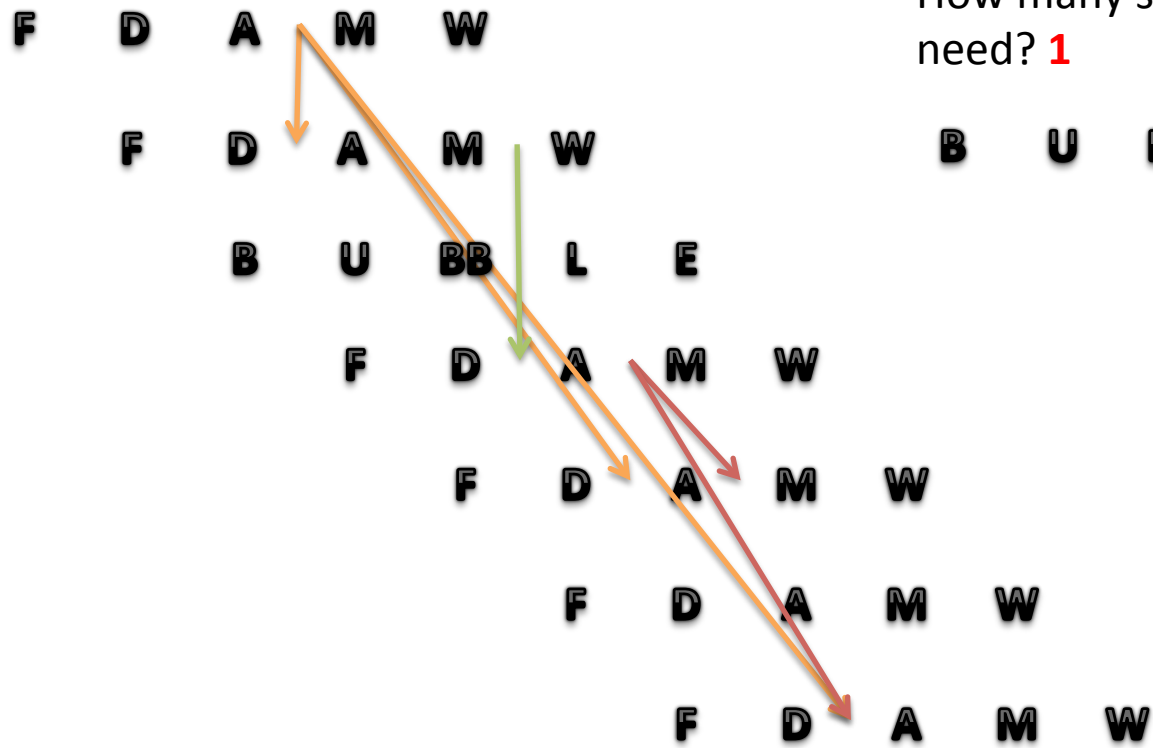
lw \$t2 4(\$t0)

add \$t3 \$t1 \$t2

sw \$t3 8(\$t0)

lw \$t5 0(\$t6)

or \$t5 \$t0 \$t3



How many stalls do we need? **1**

B U B B L E