Recitation 4

CS 3853: Computer Architecture

Tomasulo's Algorithm

The pipeline functional units are described by the following table

FU Type	Cycles in Ex	# of Ex Units	# of Reservation Stations
Integer	1	1	3
FP Add/Sub	2	1	3
FP Mult	6	1	3
FP Div	12	1	3

Workout Table

Instruction	Reservation Station	Exec FU	Issue	Exec begin-end	Mem Access	CDB write
LD F6, 32(R2)						
LD F2, 44(R3)						
MULD F0, F2, F4						
SUBD F8, F2, F6						
DIVD F10, F0, F6						
ADDD F6, F8, F2						
MULD F4, F0, F10						

Workout Table

Instruction	Reservation Station	Exec FU	Issue	Exec begin-end	Mem Access	CDB write
LD F6, 32(R2)	Integer1	Int	1	2	3	4
LD F2, 44(R3)	Integer2	Int	2	3	4	5
MULD F0, F2, F4	FP Mul1	Mul	3	6-11		12
SUBD F8, F2, F6	FP Add/Sub1	Add/Sub	4	6-7		8
DIVD F10, F0, F6	FP Div1	Div	5	13-24		25
ADDD F6, F8, F2	FP Add/Sub2	Add/Sub	6	9-10		11
MULD F4, F0, F10	FP Mul2	Mul	7	26-31		32

Tomasulo's Algorithm

The pipeline functional units are described by the following table

FU Type	Cycles in Ex	# of Ex Units	# of Reservation Stations
Integer	1	1	3
FP Add/Sub	4	1	3
FP Mult	15	1	3
FP Div	15	1	3

Workout Table

Instruction	Reservation Station	Exec FU	Issue	Exec begin-end	Mem Access	CDB write
LD F2, 0(R1)						
LD F4, 8(R1)						
DIVD F6, F2, F4						
MULTD F8, F6, F6						
ADDD F6, F2, F4						
MULTD F10, F6, F6						
S.D F8, 0(R1)						
S.D F10, 8(R1)						

Workout Table

Instruction	Reservation Station	Exec FU	Issue	Exec begin-end	Mem Access	CDB write
LD F2, 0(R1)	Int1	Int	1	2	3	4
LD F4, 8(R1)	Int2	Int	2	3	4	5
DIVD F6, F2, F4	Div1	Div	3	6-20		21
MULTD F8, F6, F6	Mult1	Mult	4	26-40		41
ADDD F6, F2, F4	Add1	Add	5	6-9		10
MULTD F10, F6, F6	Mult2	Mult	6	11-25		26
S.D F8, 0(R1)	Int1	Int	7	8	42	
S.D F10, 8(R1)	Int2	Int	8	9	27	