Problem Set 7

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1a)

2a)

Branch prediction addresses control hazards by

2b)

Instruction scheduling addresses both structural and data hazards.

2c)

Delay slots address data hazards by

2d)

Increased availability of functional units addresses data hazards

3a)

Prediction	Outcome
NT	T
NT	NT
NT	T
NT	T
T	NT

The two-bit predictor is only correct $\frac{1}{5}$ of the time for an accuracy of 20%.

3b)

3c)

3d)

presuming the question meant c, not d:

4a)

Figure 1: Program execution

CYCLE	IF	ID	EX	MEM	WB
1	lw				
1	sub				
2	slt	lw			
2	nop	sub			
3	add	slt	lw		
3	sw	nop	sub		
4		add	slt	lw	
4		sw	nop	sub	
5			add	slt	lw
5			sw	nop	sub
6				add	slt
6				sw	nop
7					add
7					sw

4b)