Tut-6

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1)

a) 3-stage branch completion
b) 2-stage branch completion
c) Assume branch not taken
d) Branch prediction
e) Branch target buffer
f) Delayed branches

Incompatible pairs = {a, b}, {c, d}, {c, e}, {c, f}, {d, f}, {e, f}

These two can be considered compatible. Branch predictor can return 3 possible values: 0, 1, don't-know
"Assume branch not taken" can be used when branch predictor does not know

similar argument

These 3 can be considered compatible in the case of
- 3-stage branch
- 1 delay slot only

Answer is correct with some explanatory clauses I have given
-Bhaskar

2)

(a) and $t1 $t0 $t2 — anything not producing s1 is ok

(b) and $s1 $t0 $t1 — anything producing s1 is ok

(c) ~~L8~~ - add $a0 $a3 $0 — anything not producing s2 or s3

(d) addi $a2 $a2 2 — this is not the cleanest answer - may be correct under some assumptions
some instruction producing s2 or s3 is the expected answer
e.g. sub $s2, $s0, $s1

(e) addi $s2 $s1 1 — anything which does not read s2 is ok

(f) addi $s1 $s2 1 — anything which reads s2 is ok

(g) L1 - addi $s2 $s2 0
L7 addi $s2 $s2 3

answer should create a data hazard stall
- which means involving lw followed by a dependent instruction
L4 reads s2, make L7 also read s2 and make L1 load s2
e.g. L1: lw $s2, 4($sp)
L7: sub $s2, $s0, $s1