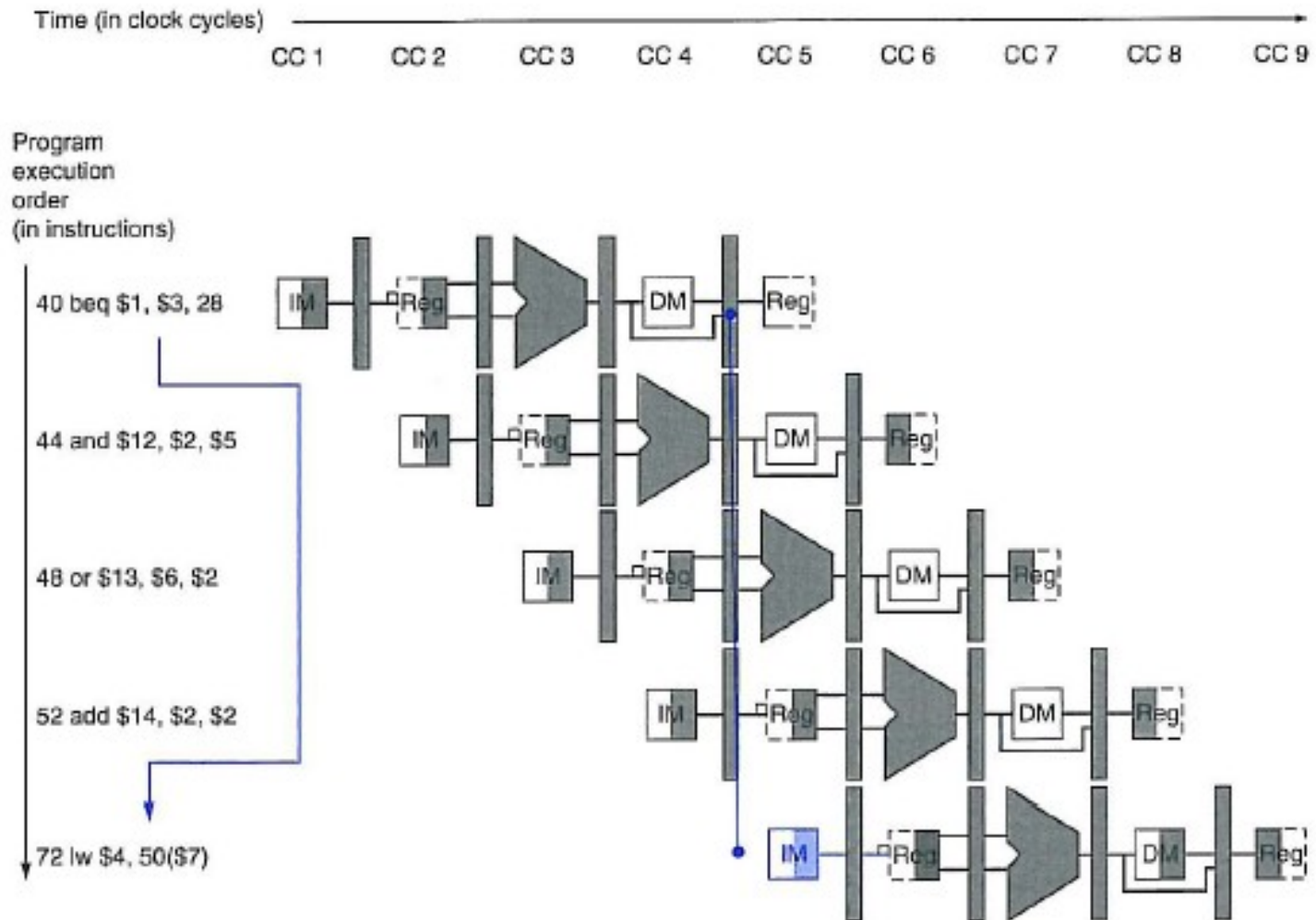


CONTROL HAZARDS 1/8

Pipe Line e Instrucciones de Salto



CONTROL HAZARDS 2/8

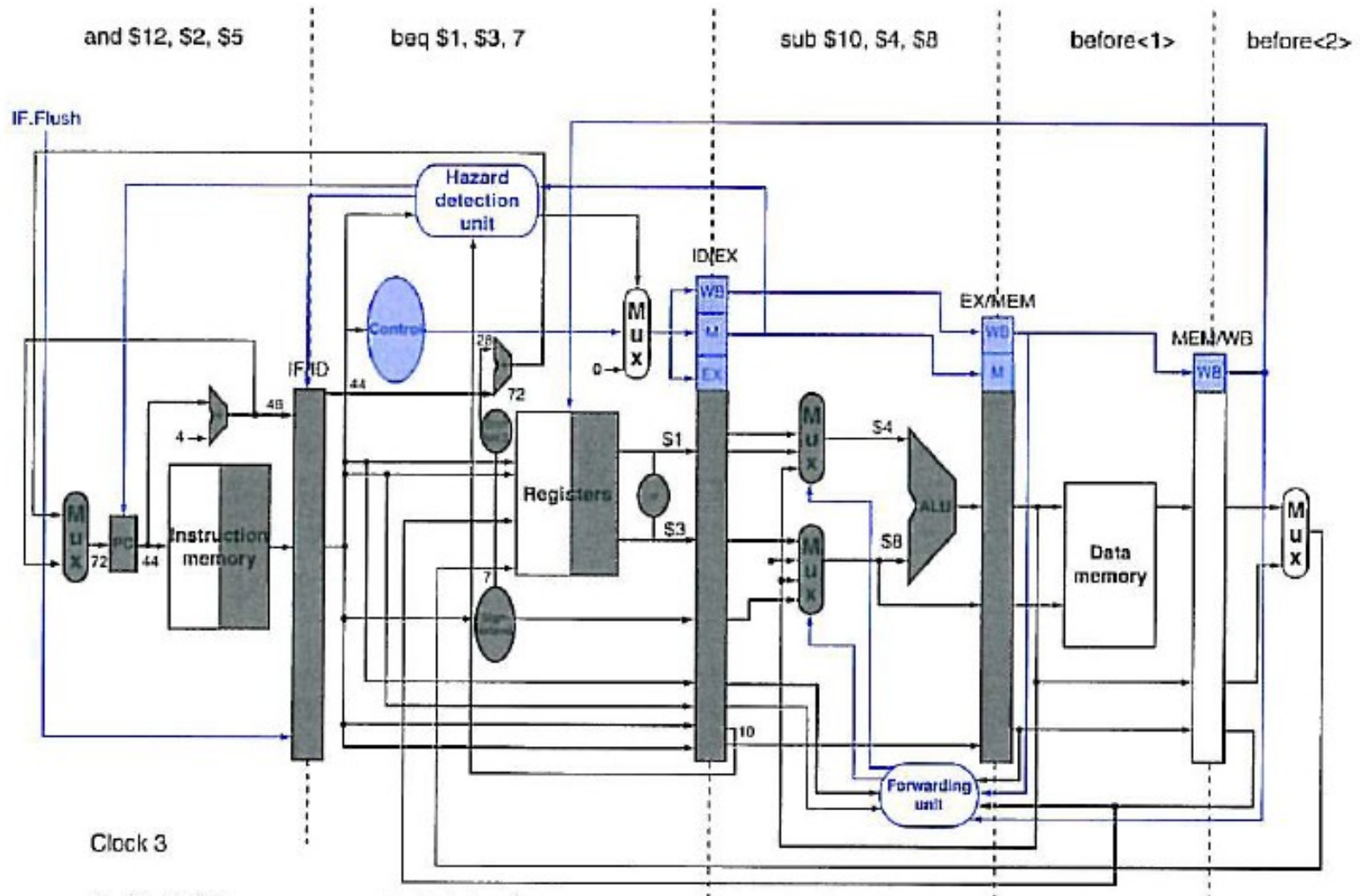
Un salto en un Pipeline

```
36 sub $t0, $4, $8
40 beq $t1, $t3, 7 # PC-relative branch to 40+4+7*4=72
44 and $t2, $t2, $5
48 or  $t3, $t2, $6
52 add $t4, $4, $2
56 slt $t5, $t6, $7

. . .
72 lw  $t4, 50($t7)
```

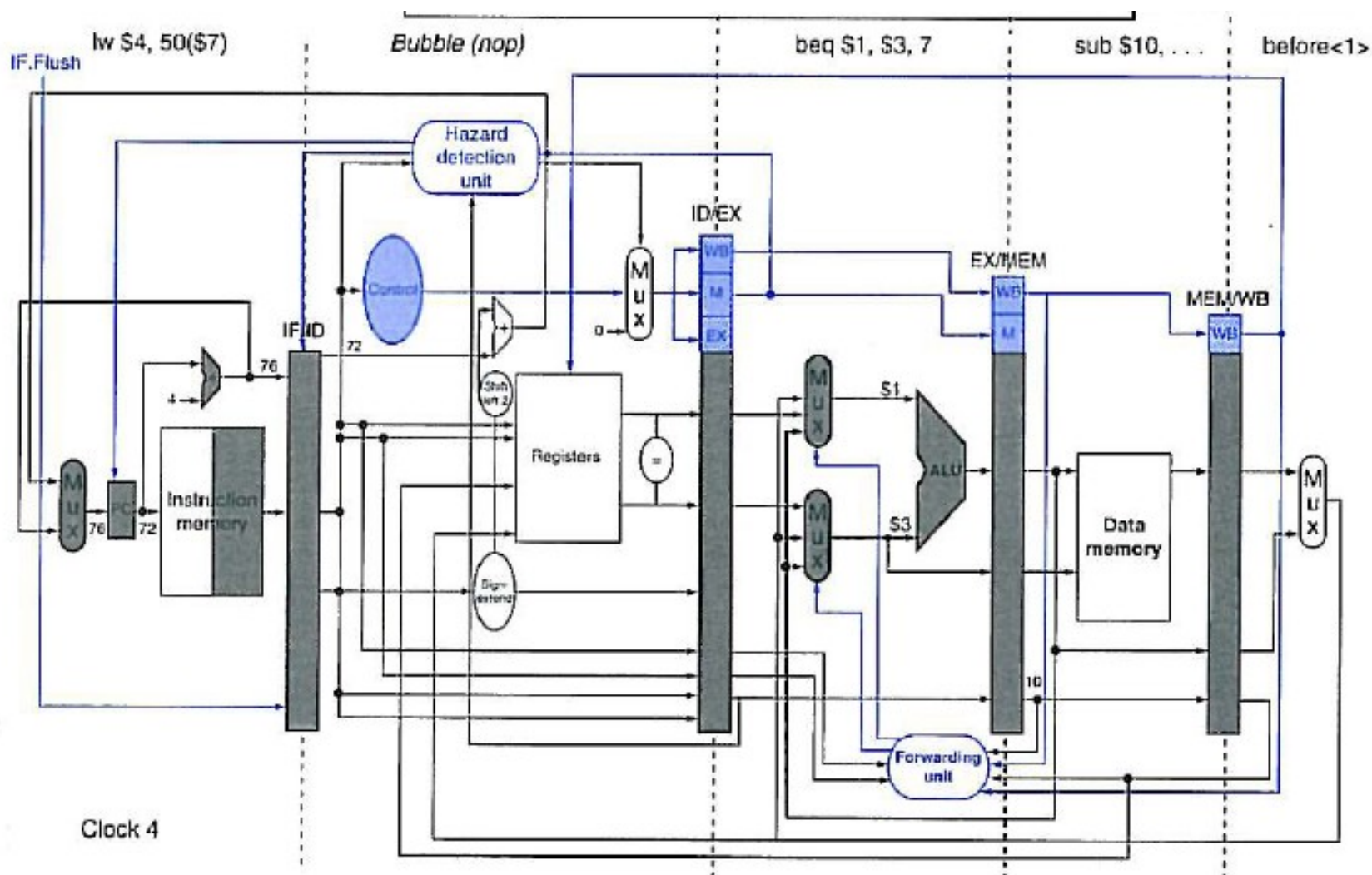
CONTROL HAZARDS 3/8

Situación de Salto en un gráfico Single-Clock



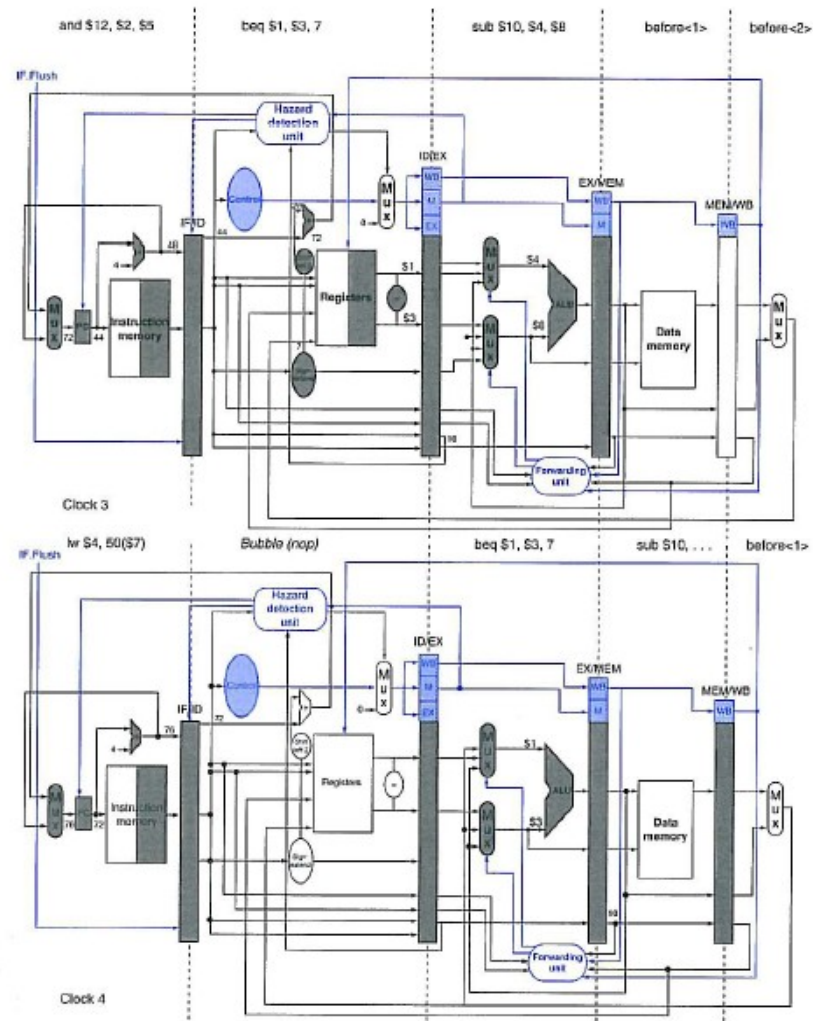
CONTROL HAZARDS 4/8

Situación de Salto en un gráfico Single-Clock



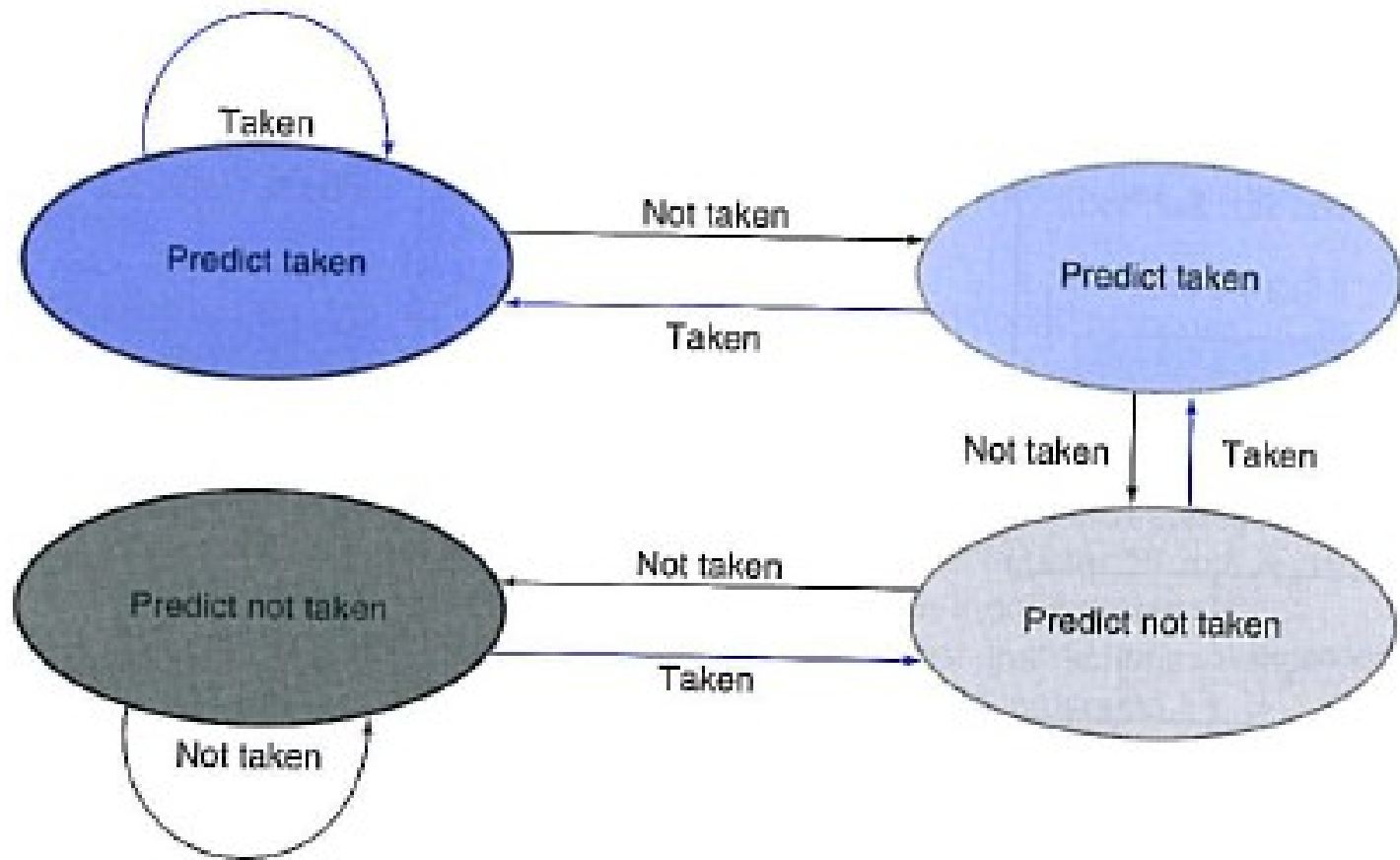
CONTROL HAZARDS 5/8

Situación de Salto en un gráfico Single-Clock



CONTROL HAZARDS 6/8

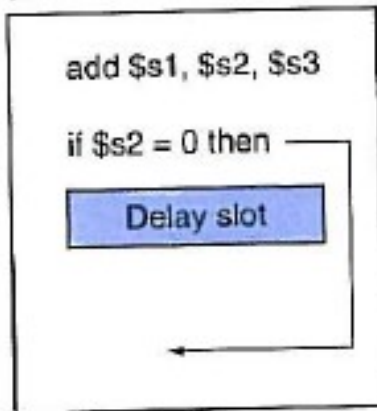
Dinamic Branch Prediction Two bit Prediction Schemme



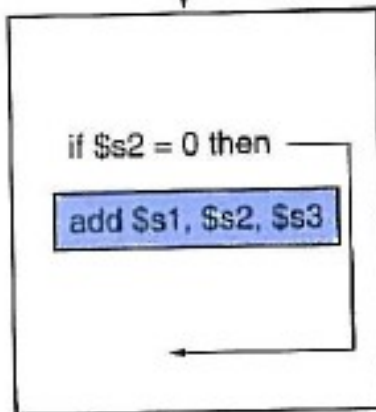
CONTROL HAZARDS 6/8

Branch Delay Slot

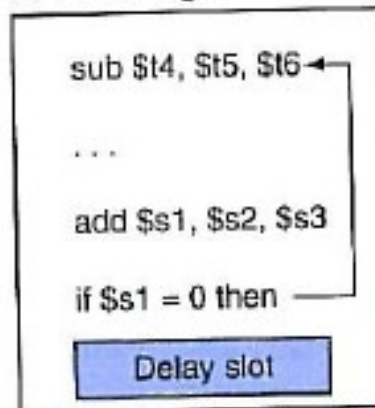
a. From before



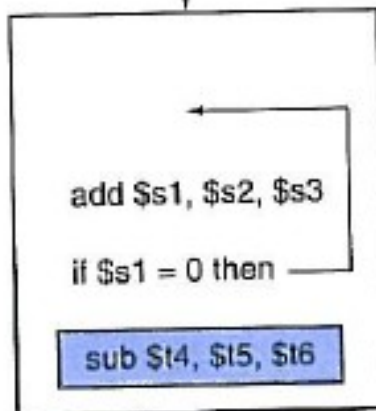
Becomes



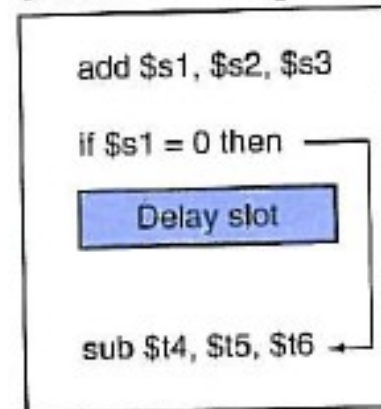
b. From target



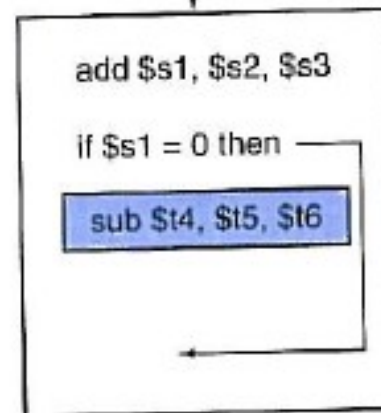
Becomes



c. From fall-through



Becomes



CONTROL HAZARDS 6/8

Data Path Completo

