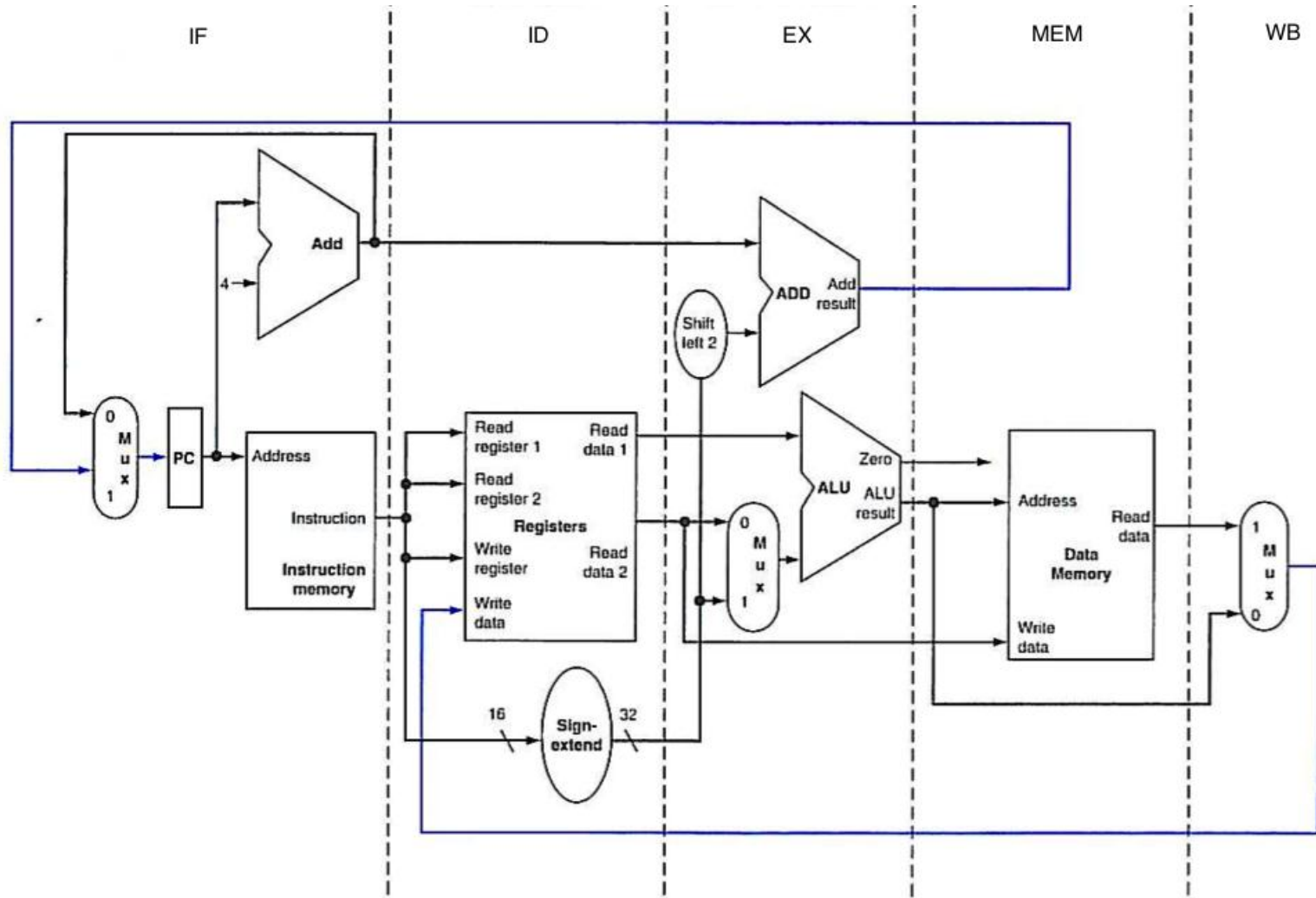


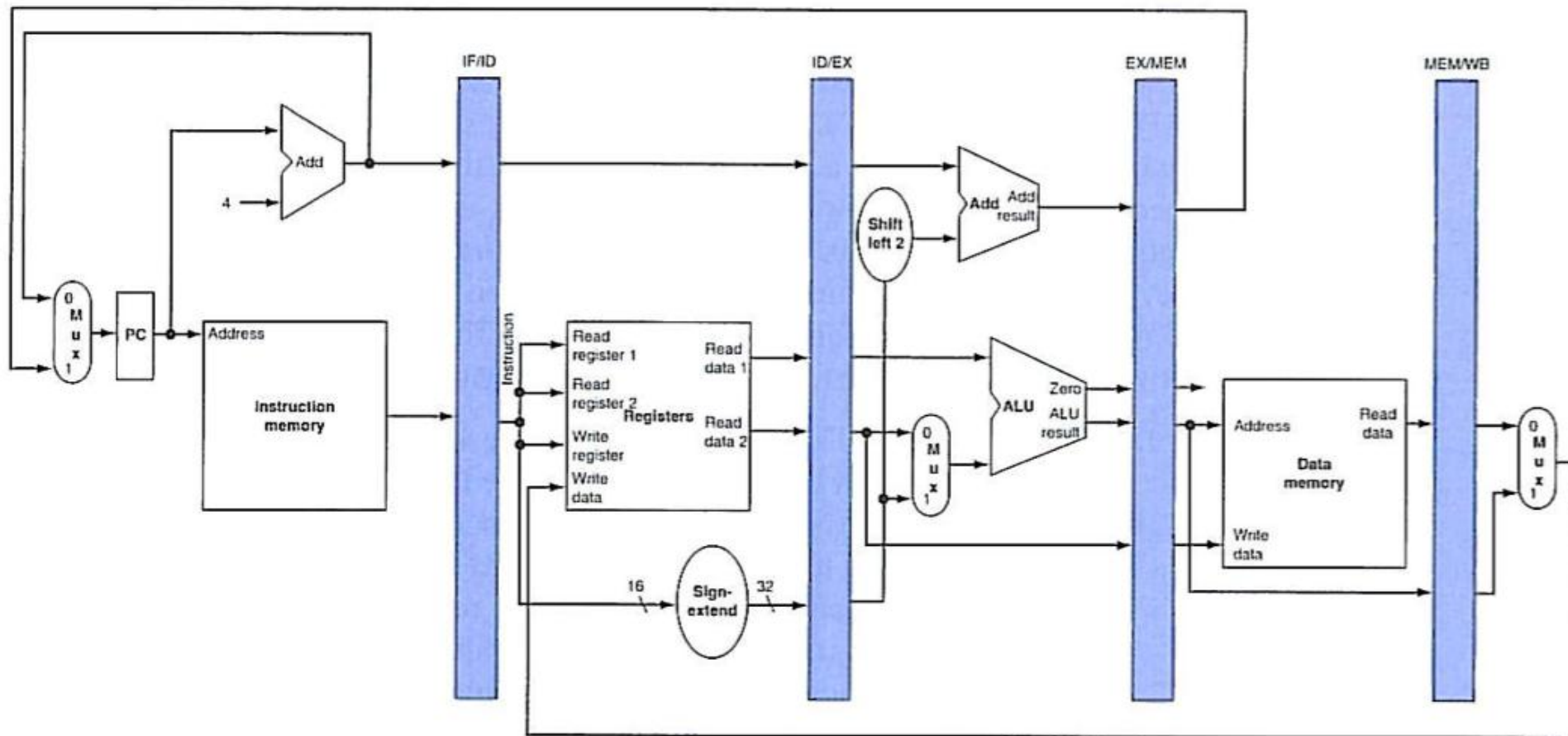
Datapath și Control-ul în pipeline



Excepții

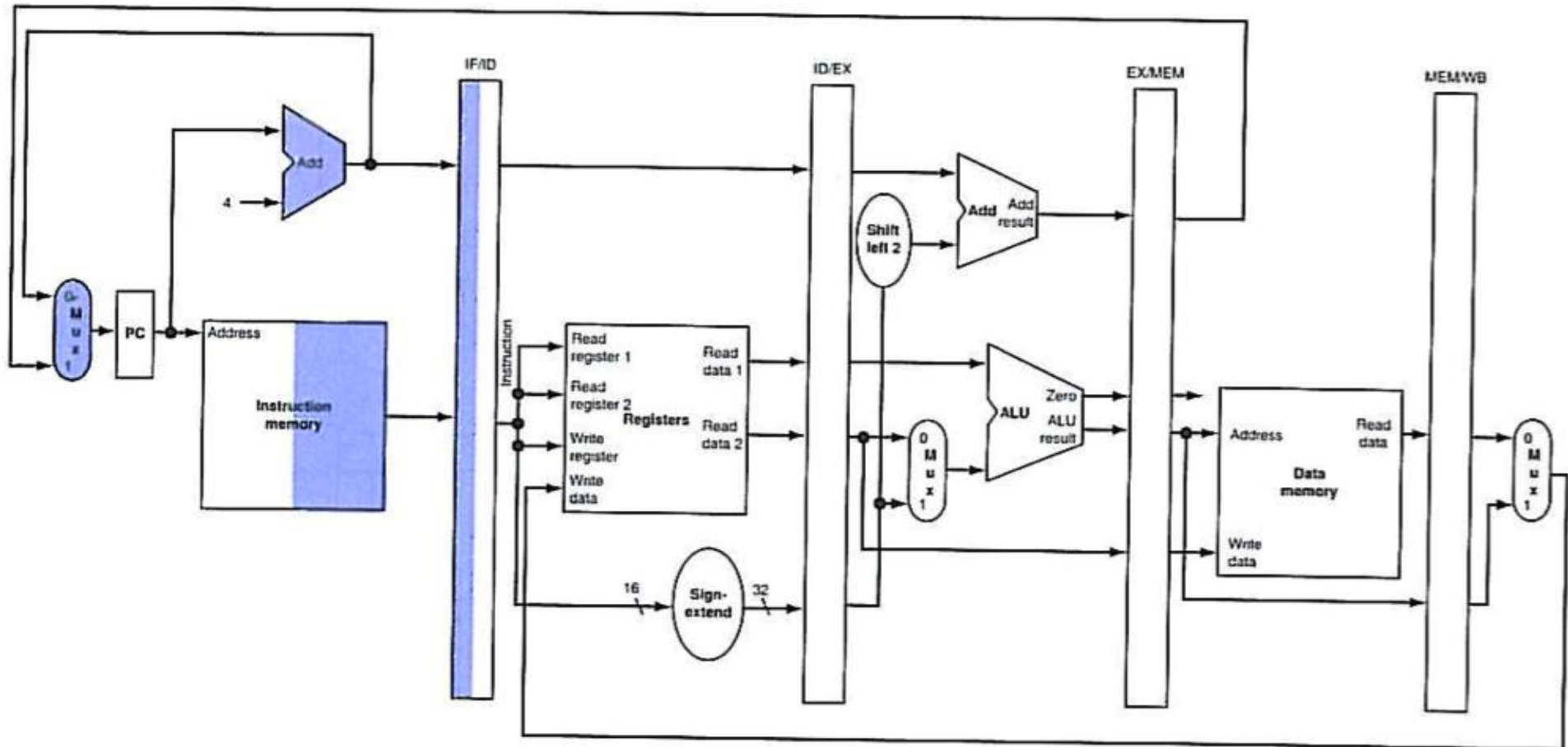
- Stagiul write-back
- Selecția următoarei valorii din PC

Versiunea pipe a căii de date



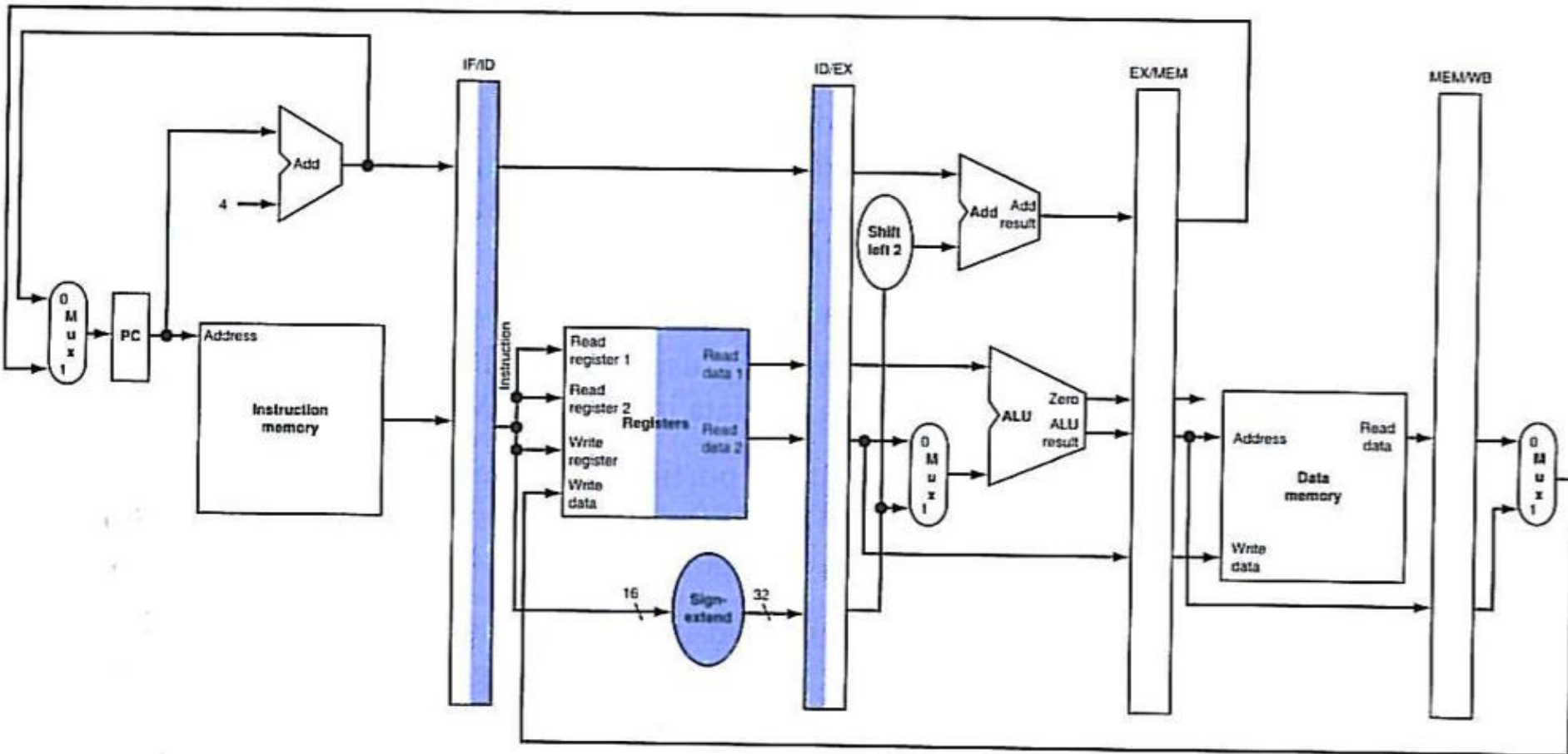
Execuția instrucțiunii lw

lw
IF - citirea instrucțiunii



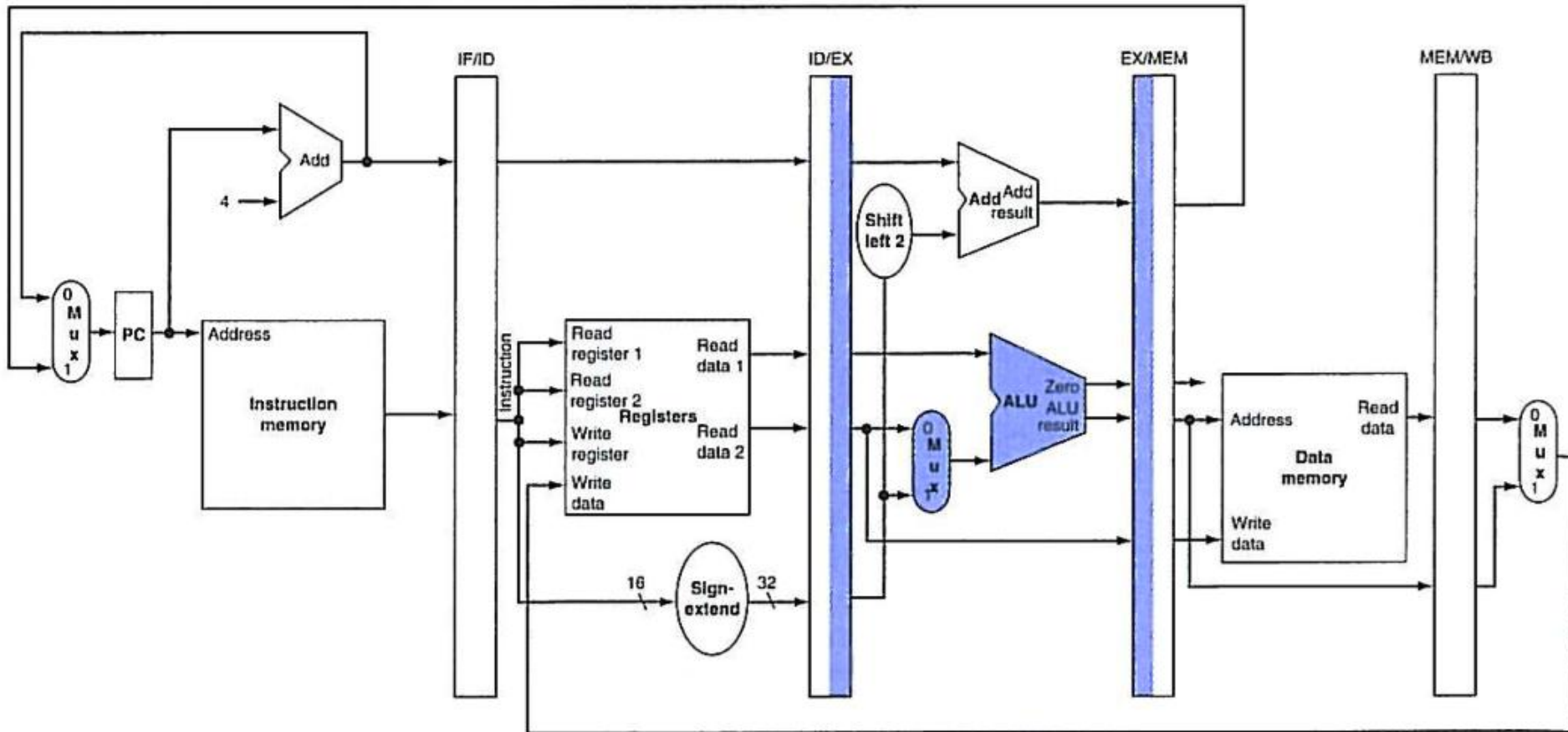
Execuția instrucțiunii lw

Iw
Decodificarea instrucțiunii



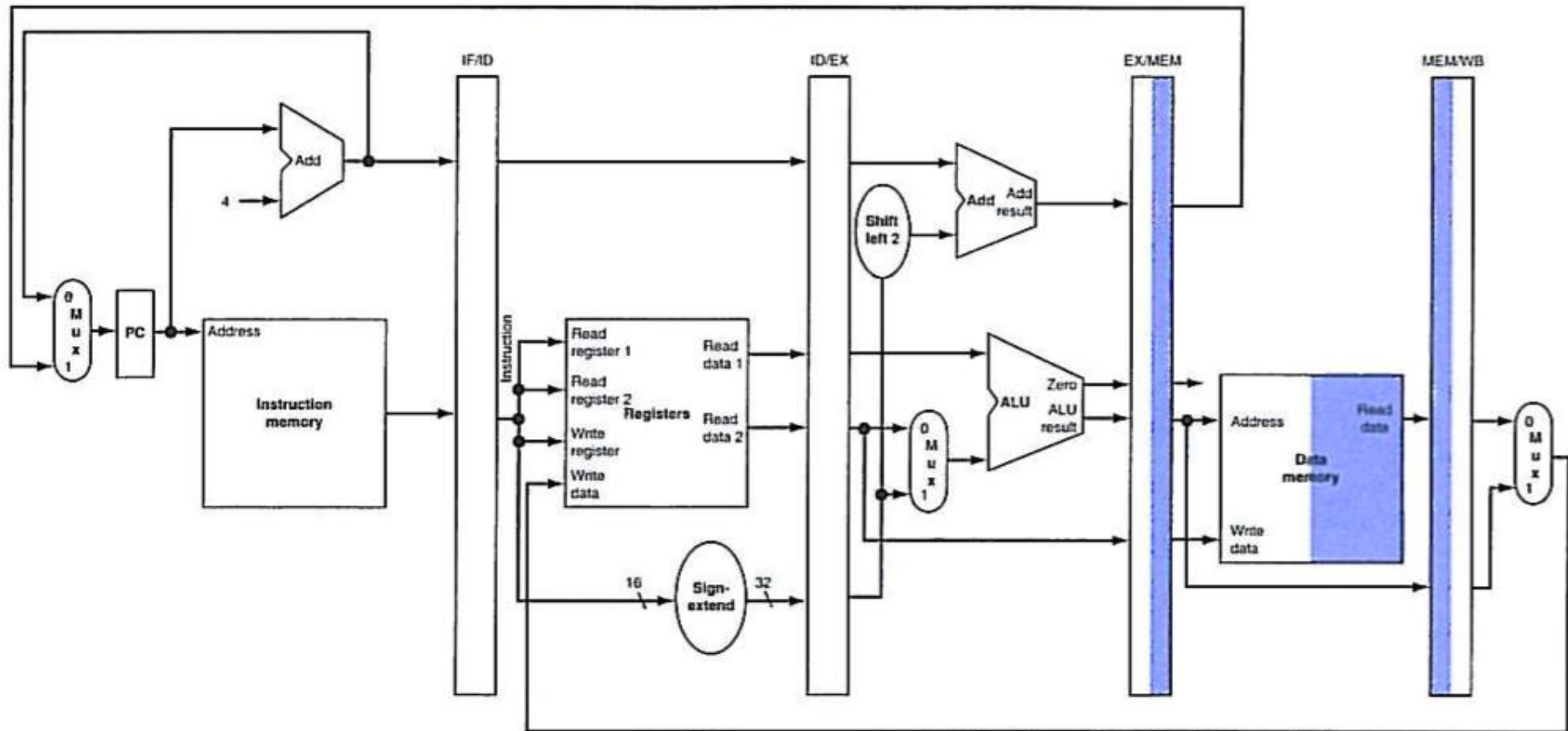
Execuția instrucțiunii lw

lw
Execuția

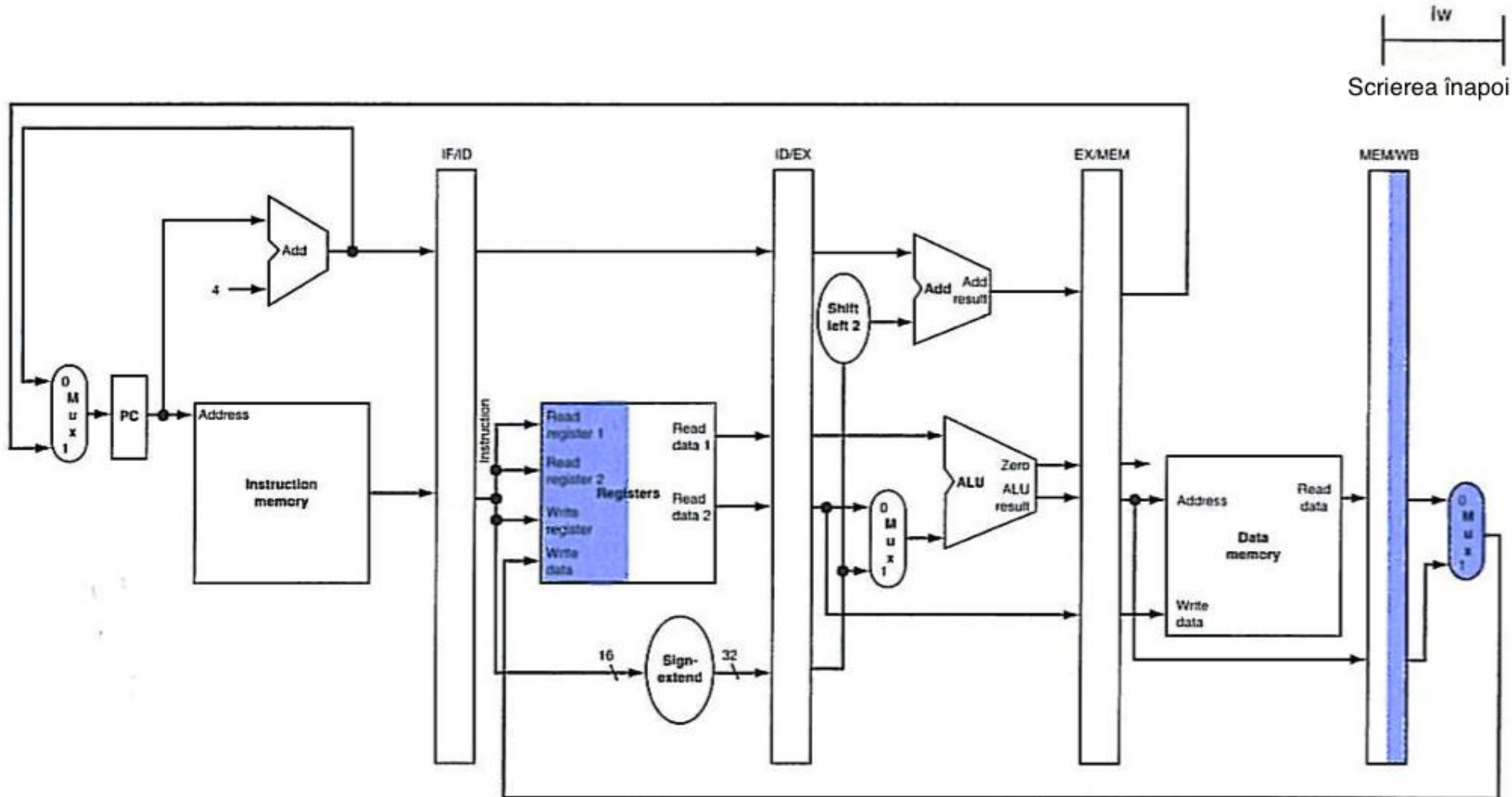


Execuția instrucțiunii lw

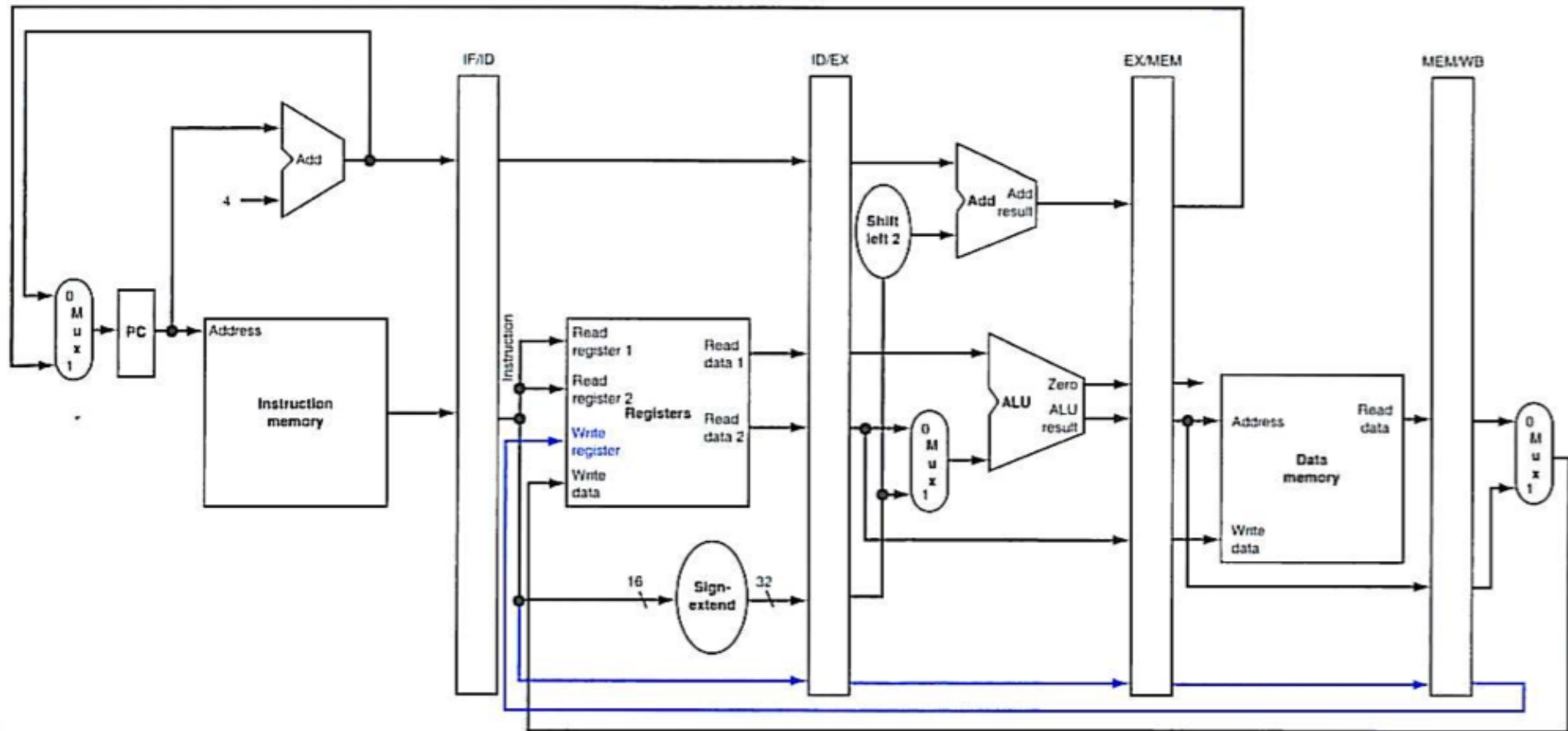
lw
Memorarea



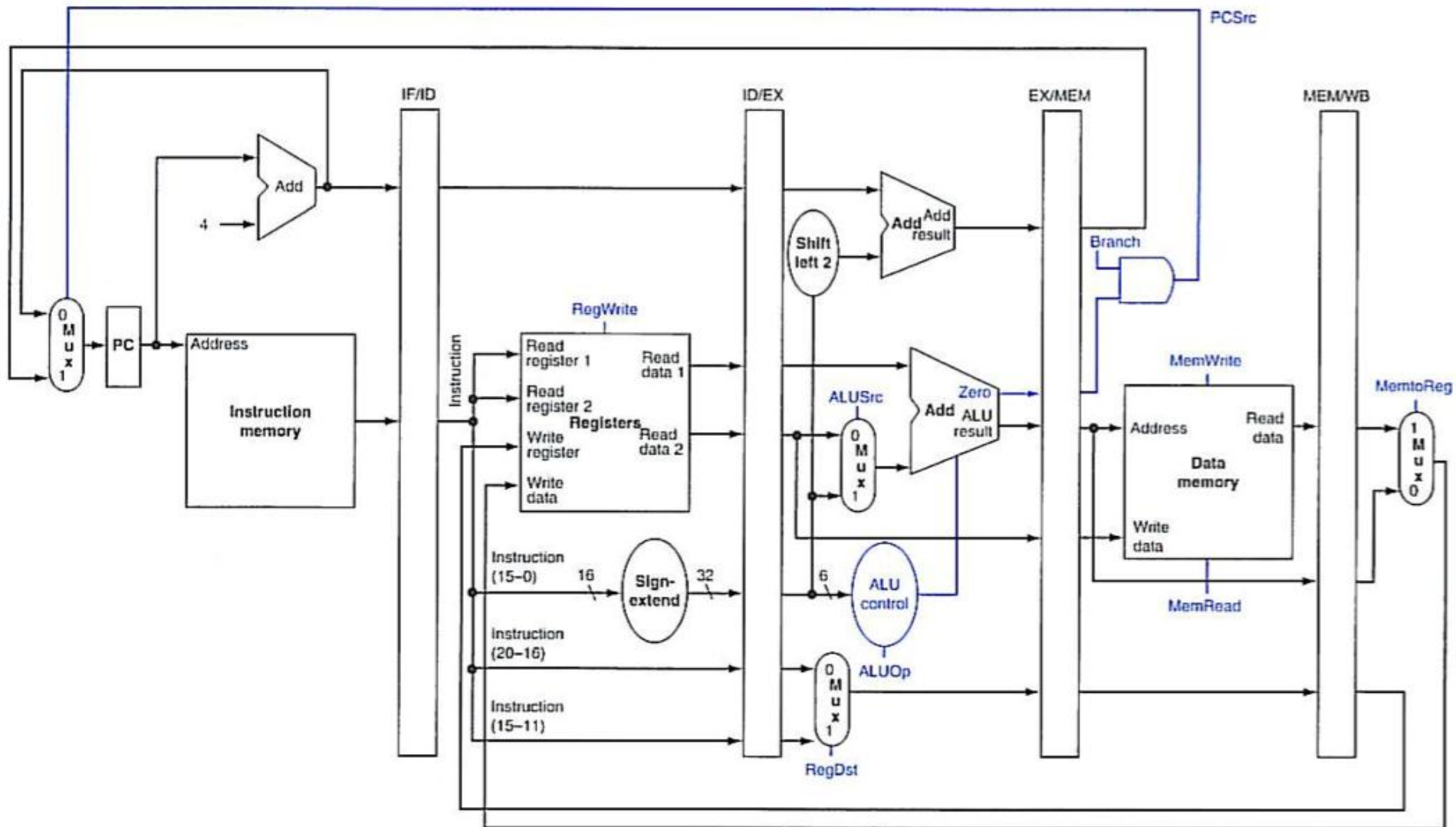
Execuția instrucțiunii lw



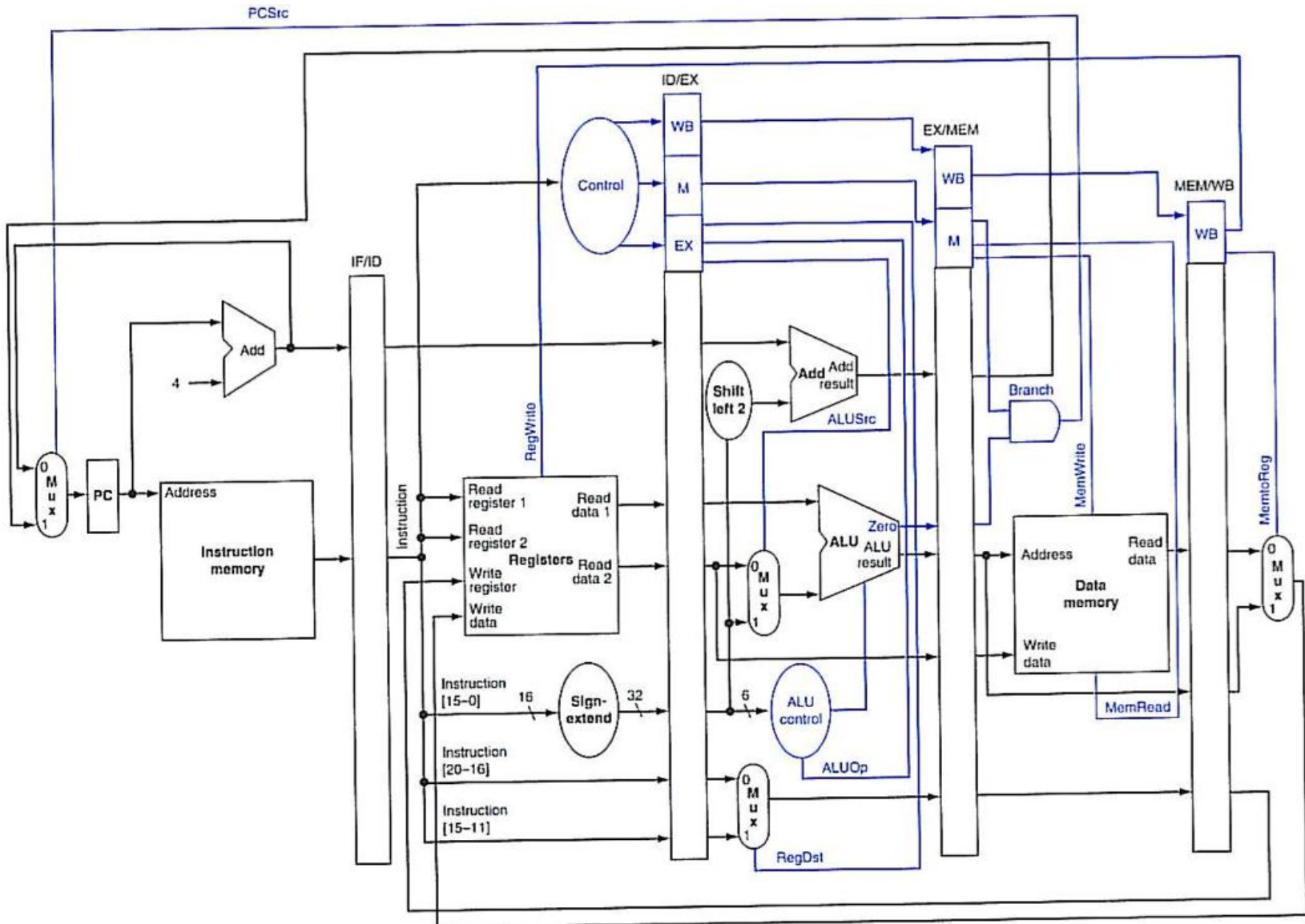
Execuția instrucțiunii lw – versiunea corectă



Controlul în pipeline



Versiunea finală



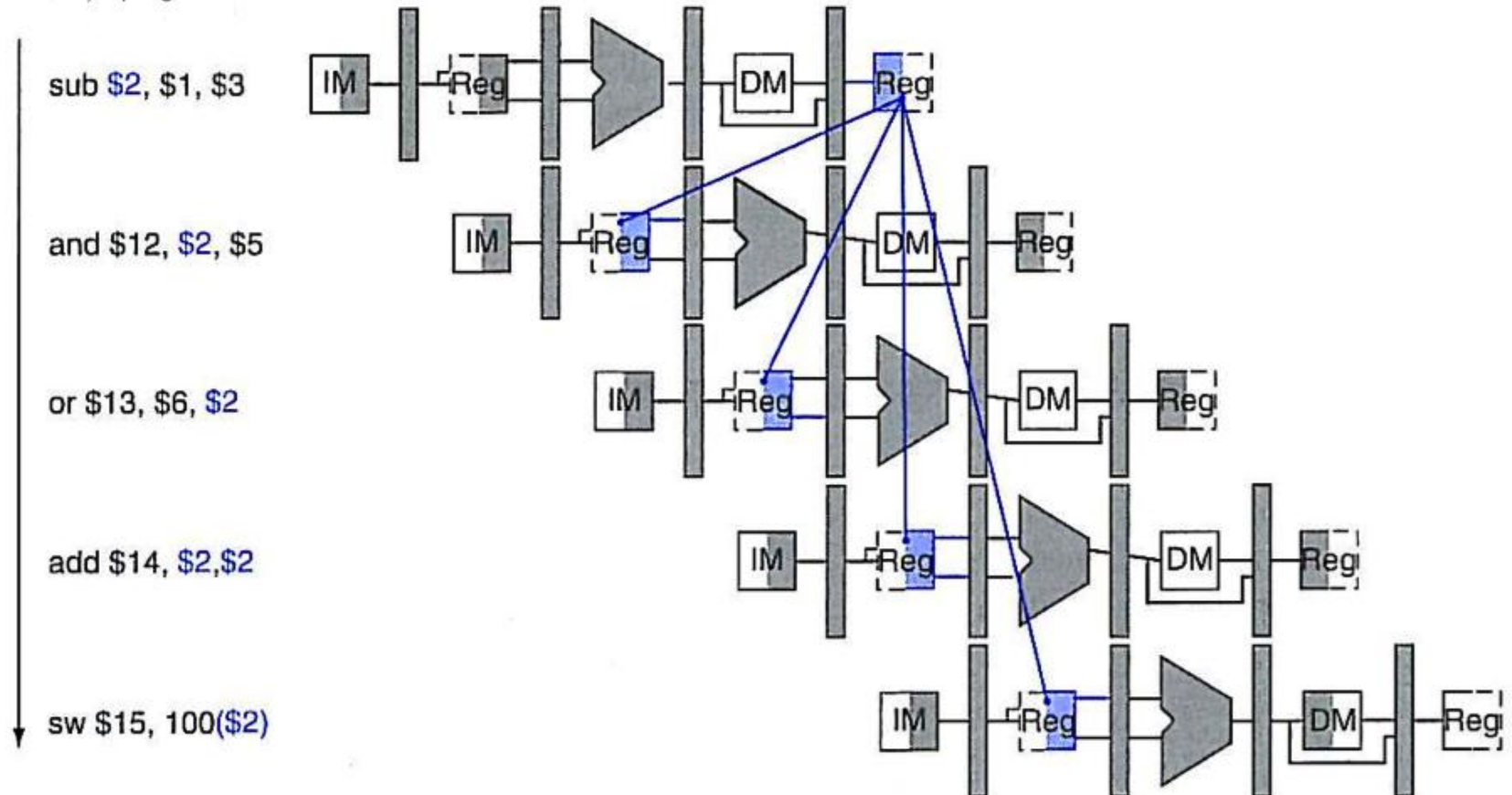
Hazardele de date

- sub \$2, \$1, \$3
- and \$12, \$2, \$5
- or \$13, \$6, \$2
- add \$14, \$2, \$2
- sw \$15, 100(\$2)

Execuție

	Timpul →								
	CC 1	CC 2	CC 3	CC 4	CC 5	CC 6	CC 7	CC 8	CC 9
Valoarea lui \$2	10	10	10	10	10/-20	-20	-20	-20	-20

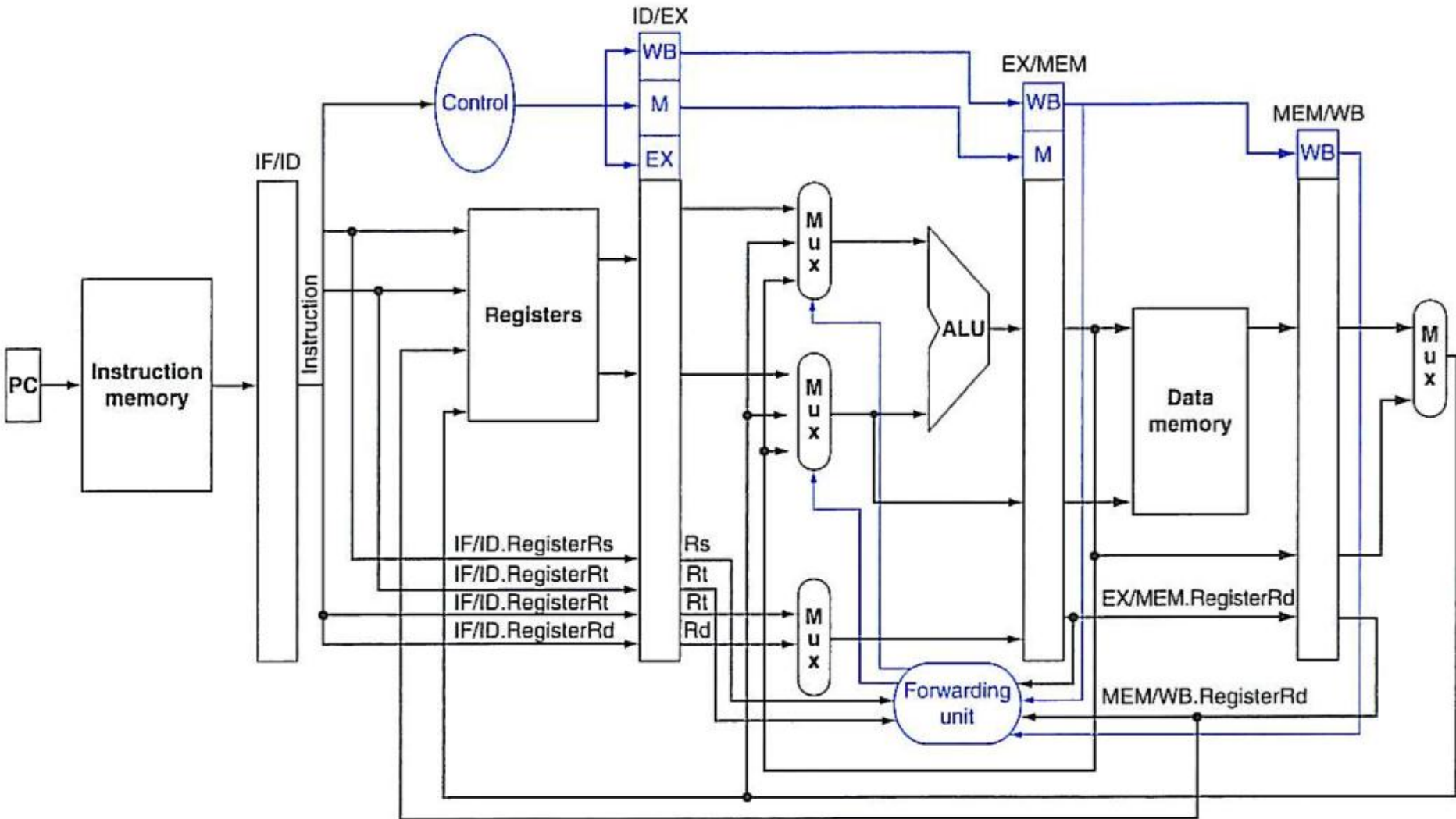
Execuția programului



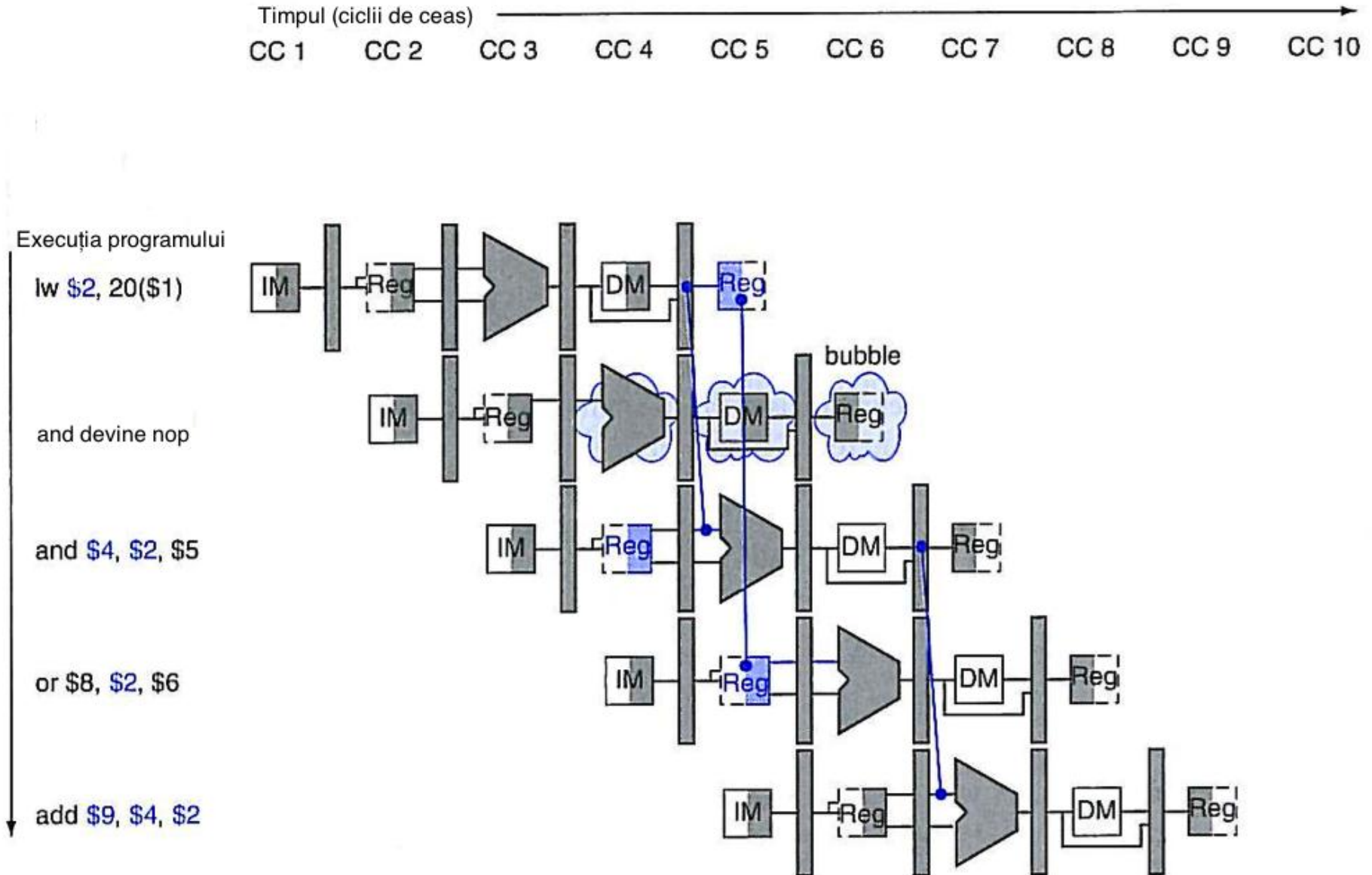
Condițiile de detecție

- 1a : EX/MEM.RegRD = ID/EX.RegRS
- 1b : EX/MEM.RegRD = ID/EX.RegRT
- 2a : MEM/WB.RegRD = ID/EX.RegRS
- 2b : MEM/WB.RegRD = ID/EX.RegRT

Varianta cu detecție de hazard



Introducerea de nop-uri



Varianta finală

