

ESERCIZIO

```

for { i = 0, i < N, i++ }
{
  A[i] = B[i] * A[i] + c1 + c2
  B[i] = A[i] + c1
  c1 = c1 + c2
  c2 = c2 + 1
}
    
```

$$T = (N * T_{instr}) + T_{fault}$$

$$T_{fault} = f(\text{Numero fault}, T_{transf})$$

$$T_{fault} = -N_x * T_{transf}$$

$c_1, c_2 \rightarrow$ allocate in reg.

\Rightarrow 4 fault (i.e. to N)

$A, B \rightarrow N/\sigma \quad \sigma = \text{dim. pag.}$

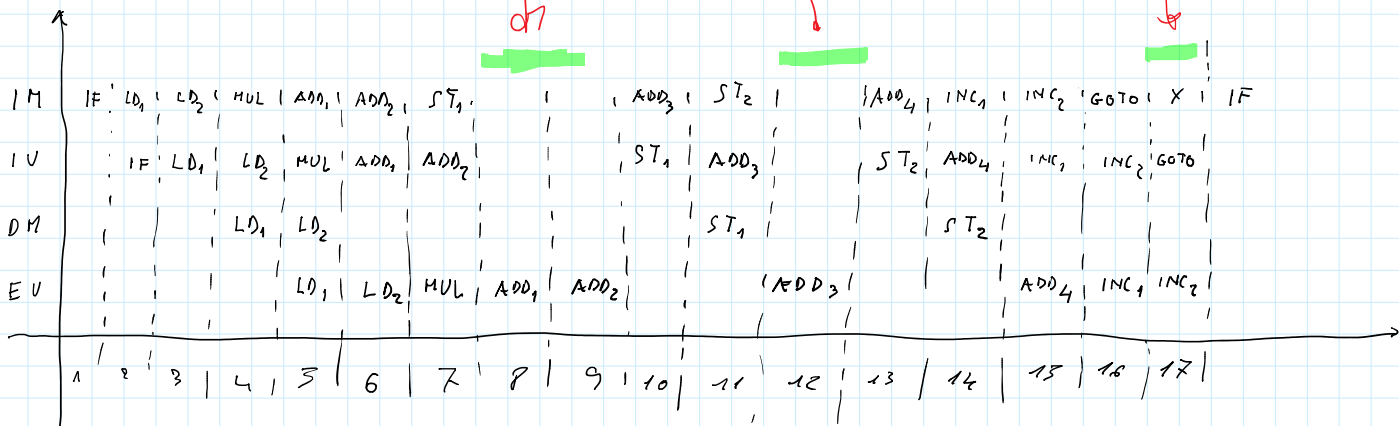
Dati: 2 pag. nel cal.

$\sigma = 16$ almeno 2 fault per str.

$$N^{\circ} \text{ fault} = \left(\begin{matrix} 3 & + & 4 & + & 2N \\ \text{I-str.} & & c_1/c_2 & & \frac{\sigma}{A, B} \end{matrix} \right) = N_x$$

```

SUB Rf, Rf, Rf
SUB Ri, Ri, Ri
LD Rr1, Rf, Rc1
LD Rr2, Rf, Rc2
LOOP: IF >= Ri, Ri, FINE
LD1 RB, Ri, Rb
LD2 RA, Ri, Ra
MUL Ra, Rb, Rc
ADD1 Rc1, Rt, Rb
ADD2 Rc2, Rt, Ra
ST1 RA, Ri, Rt
ADD3 Rt, Rc1, Rb
ST2 RB, Ri, Rb
ADD4 Rc1, Rc2, Rc1
INC1 Rc2
INC2 Ri
GOTO LOOP
FINE: ST Rc1, Rf, Rc1
      ST Rc2, Rf, Rc2
    
```



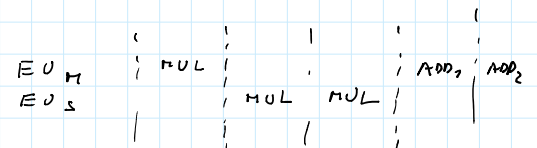
Eff. 13/17

$$17 * N * t$$

$$13 * N * t$$

$$4 * N * t$$

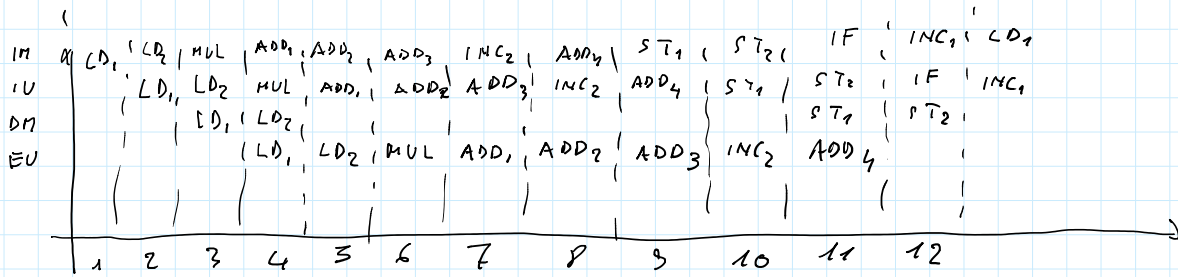
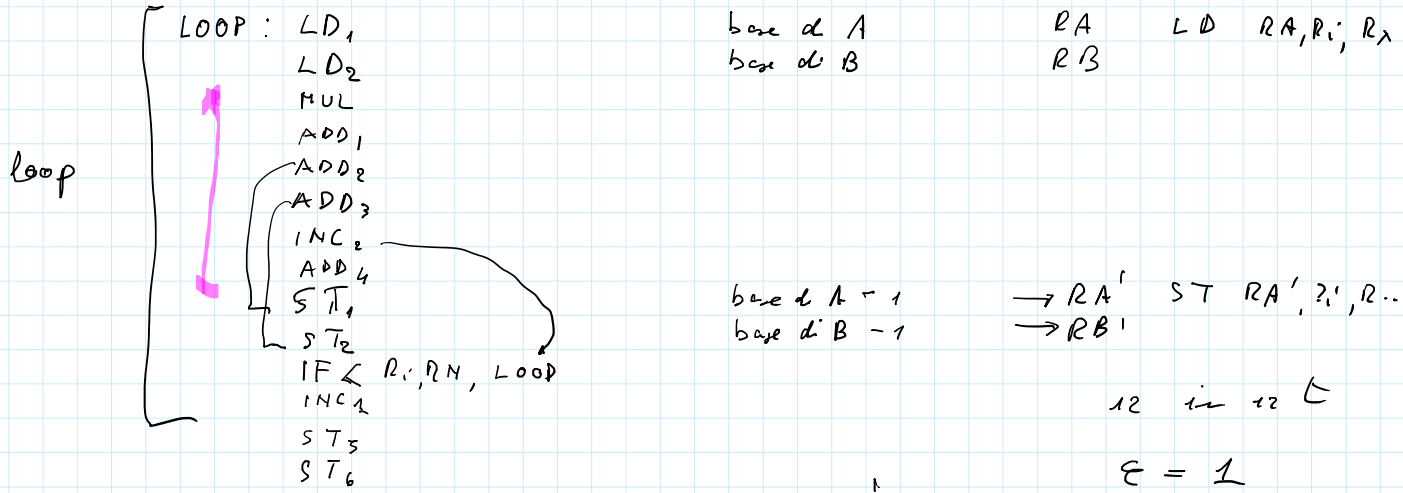
EU pipeline
marker + slave 2 stadi



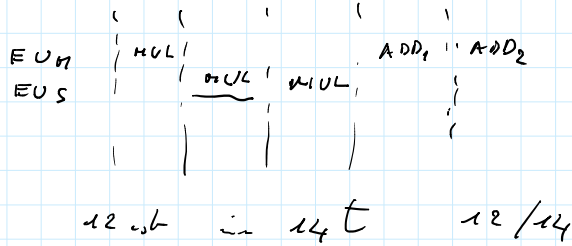
$$17 \rightarrow 13$$



Optimizzazione: Perm + Delayed Branch



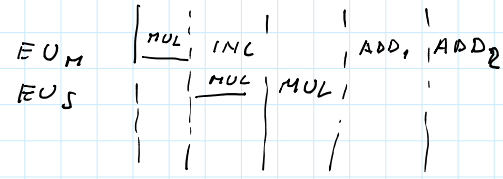
EU p. prima
 EU_n + 2 stadi. oltre



Ottimizzazione algoritmi

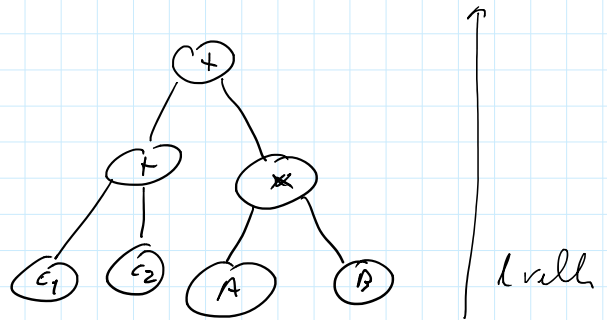
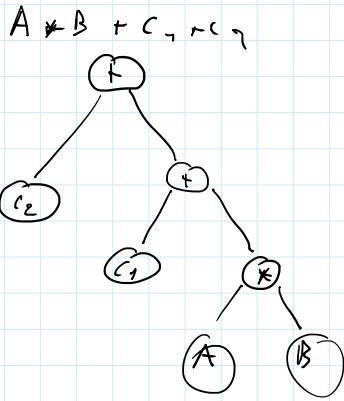
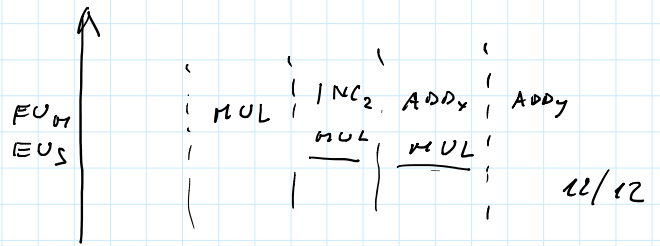
a) MUL utile solo
 INC₂ R_i nel caso di EU pipeline
 ADD₁
 ADD₂
 ADD₃

12 usb = 13 T



b) MUL ... R_t ⇒ MUL ... R_t
 ADD₁ R_{c1}, R_t, R_t ADD R_{c1}, R_{c2}, R_{t'}
 ADD₂ R_{c2}, R_t, R_t ADD R_{t'}, R_{t'}, R_t

c) MUL ... R_t
 INC₂ R_i
 ADD_x R_{c1}, R_{c2}, R_{t'}
 ADD_y R_{t'}, R_t, R_t



sbilanciato
 ⇒ problema

sbilanciato

$A * B \rightarrow *$
 $C_1 + C_2 \rightarrow +$
 $x + y \rightarrow +$

$$T_{ex} = \underbrace{T_{id} + T_{deg.}}_{\text{perm}} + T_{cache} \quad \text{locale/risc}$$

Super, wise, statica, VLW, e v.e

- SUB₁
- SUB₂
- LDC₁
- LDC₂
- IF₁
- LD₁
- LD₂
- MUL
- ADD₁
- ADD₂
- ST₁
- ADD₃
- ST₂
- ADD₄
- INC₁
- INC₂
- GOTO
- ST₃
- ST₆

1 st ist	SUB ₁ ; SUB ₂
2 ^o ist	LDC ₁ ; LDC ₂
3 ^o ist	IF ₁
4 ^o ist	LD ₁ ; LD ₂
5 ^o ist	MUL ; ADD ₁
6	ADD ₂
7	ST ₁ ; ADD ₃
8	ST ₂ ; ADD ₄
9	INC ₁ ; INC ₂
10	GOTO
11	ST ₃ ; ST ₆

occ. man 13 ist.
16 pos man

13 ist 11 t 92 ist
13/22

