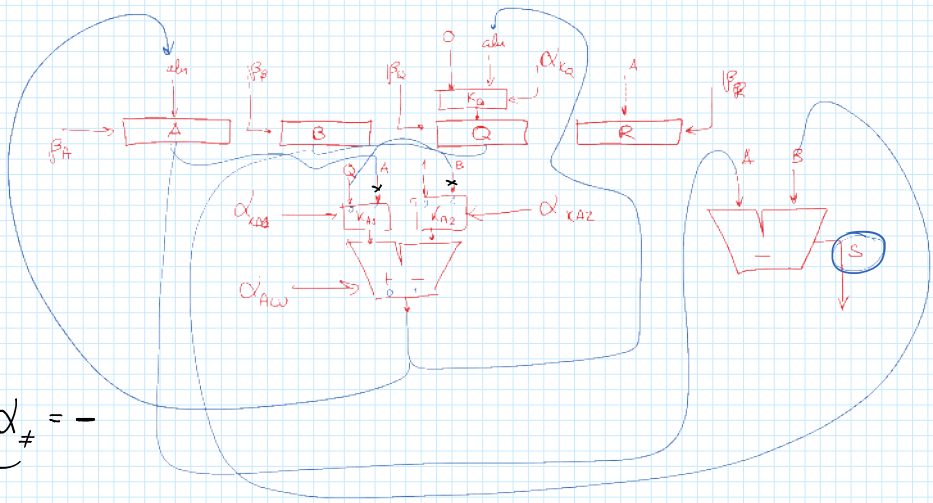
prossima istr è la 2

$\beta_Q = 1$ $\beta_{x \neq Q} = 0$

$\alpha_{K_Q} = 0$ $\alpha_{x \neq K_A} = -$

```
1  Q = 0
2  while (A >= B) {
3      Q = Q + 1;
4      A = A - B;
5  }
6  R = A
```

$\alpha_{ALU} = 1$
$\alpha_{KA1} = 1$
$\alpha_{KA2} = 1$
$\beta_A = 1$
$\alpha_{\neq} = -$
$\beta_{x \neq A} = 0$



while (A >= B) { T → 3 ; F → 6

S = A B

$R_{pc} = \begin{cases} 3 & \text{se } S == 0 \\ 6 & \text{se } S == 1 \end{cases}$

μ- linguaggio

op - esterne (.txt) → voi

prog. → μ-linguaggio

proc formule → Pc, Po, Σ

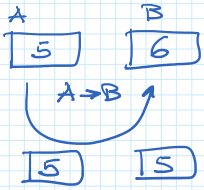
→ 2 tipi di istruzioni

a) n. $\mu op_1, \mu op_2, \dots \mu op_K, m$

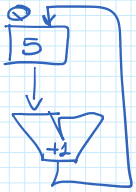
quando hai finito vai a eseguire l'istruzione n° m

op di trasferimento fra registri

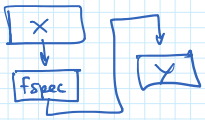
$A \to B$



$Q+1 \to Q$



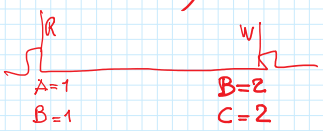
$fspec(X) \to Y$



$\mu op_x, \mu op_y$

fatte contemporaneamente

$A+1 \to B$, $B+1 \to C$



b) n. (cond) (True) μop .... μop, m'

(cond = false) μop .... μop, m''

↑ in termini delle variabili di condizionamento

S=0?
S=1?

2. (S=0) ..... ,3

(S=1) ..... ,6

Cond { (S=0) (Io=0)

(S, Io = 00) ——

(= 11) ——

(= --) ——

↓ in sequenza

(segno (A-B) = 0) ——

(= 1) ——

variabili booleane

espressioni

venerdì 7 ottobre 2016 11:04

pseudo codice → micro codice / programma

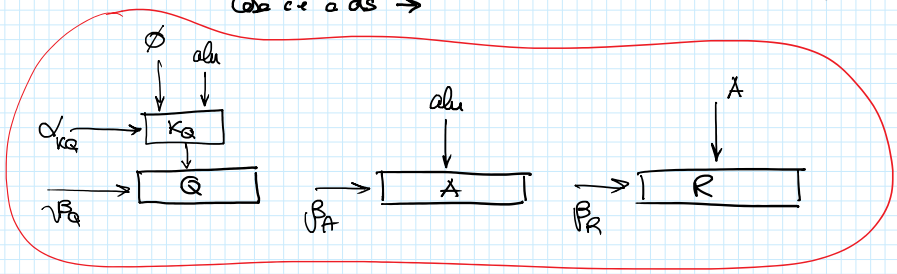
```
0  Q = 0
1  while (A ≥ B) {
2     Q = Q + 1
3     A = A - B
4  }
5  R = A
```

0. $\emptyset \to Q, 1$
1. (segno $(A-B) = \emptyset$) mop, 2
   $(=1)$ mop, 5
2. $Q+1 \to Q, 3$
3. $A-B \to A, 1$
5. $A \to R, \emptyset$

1) vedere le risorse x lo stato (cosa scriviamo e che cosa ci andiamo a scrivere)

Cosa c'è a ds → Cosa c'è a sn → X

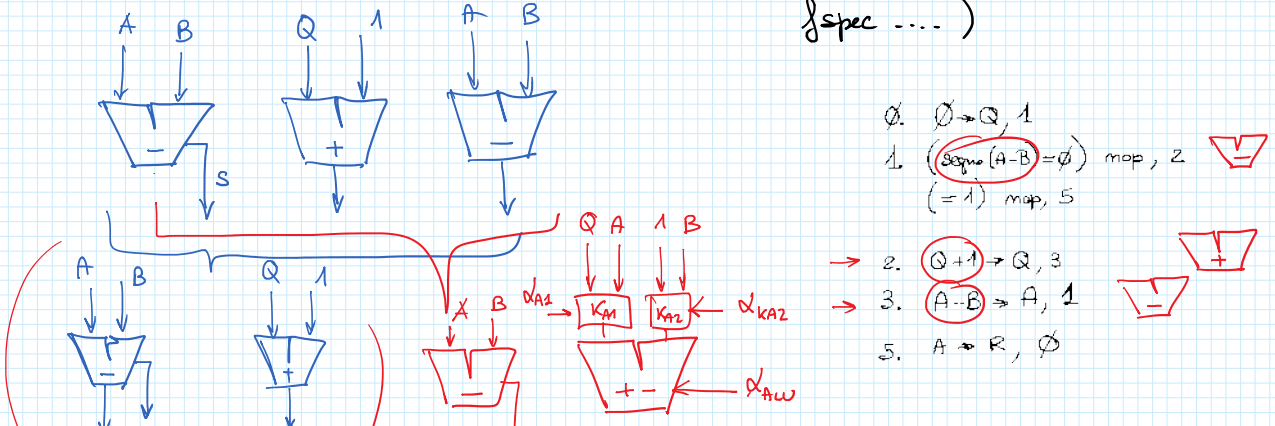
0. →Q
3. →A
5. →R



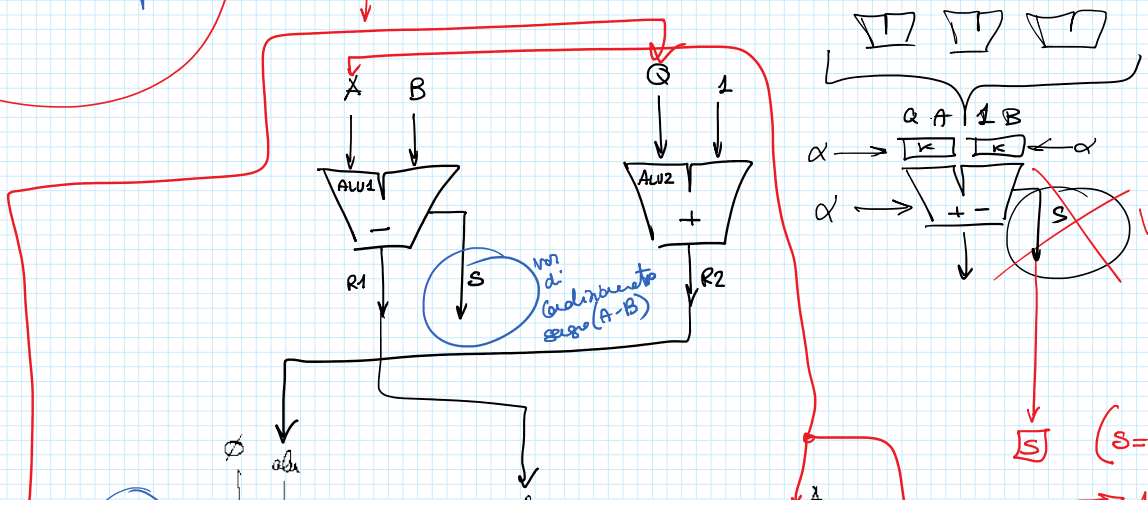
$\emptyset$ / Q+1 } →Q

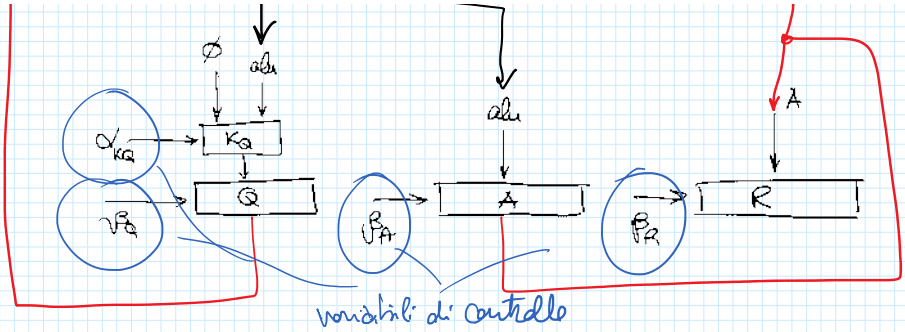
A−B } →A

2) trovare le risorse di "calcolo" (individuare tutte le espressioni che ottengono risultati tramite ALU, spec ....)



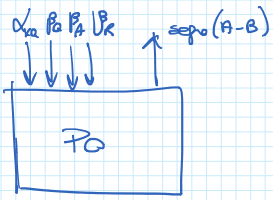
0. $\emptyset \to Q, 1$
1. (segno $(A-B) = \emptyset$) mop, 2
   $(=1)$ mop, 5
2. $Q+1 \to Q, 3$
3. $A-B \to A, 1$
5. $A \to R, \emptyset$





S (S=0)

⇒ μ-programma diverso



3) PC !

R — abbastanza bit × rappresentare una qualunque delle μ-istruzioni → 3
ω
σ

- { ∅. ∅ → Q, 1
- { 1. (segno(A-B) = ∅) nop, 2
  (= 1) nop, 5
- { 2. Q+1 → Q, 3
- { 3. A-B → A, 1
- { 5. A → R, ∅

μ-istruzione (5)

PC Mealy ω : Ingressi × Stato → Uscite

segno(A-B) — #μistr corrente (R) — α_{KA}, β_Q, β_A, β_R

σ

	segno	s_0	s_1	s_2	s_0'	s_1'	s_2'
∅.	–	0	0	0	0	0	1
1.	0	0	0	1	0	1	0
	1	0	0	1	1	0	0
2.	–	0	1	0	0	1	1
3.	–	0	1	1	0	0	1
5.	–	1	0	0	0	0	0

$s_0' = \overline{segno}\,\overline{s_0}\,\overline{s_1}\,s_2$

$s_1' = \overline{segno}\,\overline{s_0}\,\overline{s_1}\,s_2 + \overline{s_0}\,s_1\,\overline{s_2}$

$s_2' = \ldots + \ldots + \ldots$

$t_{\sigma_{PC}} = 2t_p$

	segno(A-B)	$s_0 s_1 s_2$	α	β_Q	β_A	β_R
∅.	–	000	0	1	0	0
1.	0	001	–	0	0	0
	1	001	–	0	0	0
2.	–	010	1	1	0	0
3.	–	011	–	0	1	0
5.	–	100	–	0	0	1

$\alpha = \overline{s_0}\,s_1\,\overline{s_2}$

$\beta_Q = \overline{s_0}\,\overline{s_1}\,\overline{s_2} + \overline{s_0}\,s_1\,\overline{s_2}$

$\beta_A = \overline{s_0}\,s_1\,s_2$

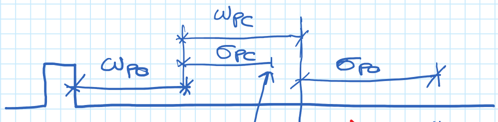
$\beta_R = s_0\,\overline{s_1}\,\overline{s_2}$

$t_{\omega_{PC}} = 2t_p$

considerando solo PC $\tau = 3t_p = \max\{t_{\sigma_{PC}}, t_{\omega_{PC}}\} + \delta$

Consideriamo PO — t_K

- ∅. (∅ → Q) 1 — t_K
- 1. (segno(A-B) = ∅) (nop), 2
  (= 1) (nop) 5
- 2. (Q+1 → Q), 3 — $t_{ALU} + t_K$
- 3. (A-B → A), 1 — t_{ALU}
- 5. (A → R), ∅ — ∅



segno(A-B)

sono pronti gli ingressi dello stato PC

pronto × gli ingressi × lo stato dello PO

"ESATTO"

	ω_{PO}	σ_{PO}	τ'
∅.	∅	t_K	$2t_p + t_K + t_p$
1. –	t_{ALU}	∅	$t_{ALU} + 2t_p + t_p$
–	t_{ALU}	∅	
2.	∅	$t_{ALU} + t_K$	$2t_p + t_p + t_{ALU} + t_K$
3.	∅	t_{ALU}	
5.	∅	∅	

MAX

$5t_p + t_{ALU} = 2t_p + t_p + t_{ALU} + t_K$

MASSIMIZZAZIONE

nel μ-programma

$\forall\, t_{\omega_{PO}}$ $t_{\omega_{PC}}$

$\forall\, t_{\sigma_{PO}}$ $t_{\sigma_{PC}}$

max di ogni valore × valutare

max $t_{\omega_{PO}} = t_{ALU}$

$\tau = t_{\omega_{PO}} + \max\{t_{\sigma_{PC}}, t_{\omega_{PC}} + t_{\sigma_{PO}}\} + \delta$

($t_{\omega_{PO}} = t_{ALU}$, $t_{\sigma_{PC}} = 2t_p$, $t_{\omega_{PC}} = 2t_p$, $t_{\sigma_{PO}} = t_{ALU} + t_K$, $\delta = t_p$)

$$\tau = t_{ALU} + \max\left\{ \begin{matrix} 2t_p \\ 2t_p + t_{ALU} + t_K \end{matrix} \right\} + t_p =$$

una maggiorazione del τ PO

$$= 2t_{ALU} + 3t_p + t_K = 2t_{ALU} + 5t_p$$

($t_K = 2t_p$)

$$\tau = \max\{\underset{PC}{3t_p}, \underset{PO}{2t_{ALU} + 5t_p}\} = 2t_{ALU} + 5t_p$$

5

venerdì 7 ottobre 2016 11:05