1

Mo Tu We Th Fr Sa Su

No. ES. SISTEMI INF.

Date 20 · 11 · 19

OVERLOAD

λ = frequenza media di arrivo richieste

C = Carico medio richiesta

$\rho = \lambda \cdot C$ carico

$V_i(f_i)$ Valore del processo

Fattore di load negli istanti t di attivazione dei processi nel sistema

$$\rho_k(t) = \max_{k \text{ attivo}} \left\{ \frac{\sum_{i \mid d_i \le d_k} C_i(t)}{d_k - t} \right\}$$

$\leftarrow$ i processi attivi

$\rho(t) > 1 \Rightarrow$ OVERLOAD

per processi aperiodici

Se ho n processi periodici indipendenti e preemptabile:

$$\rho = U = \sum_{i=1}^{n} \frac{C_i}{T_i}$$

2

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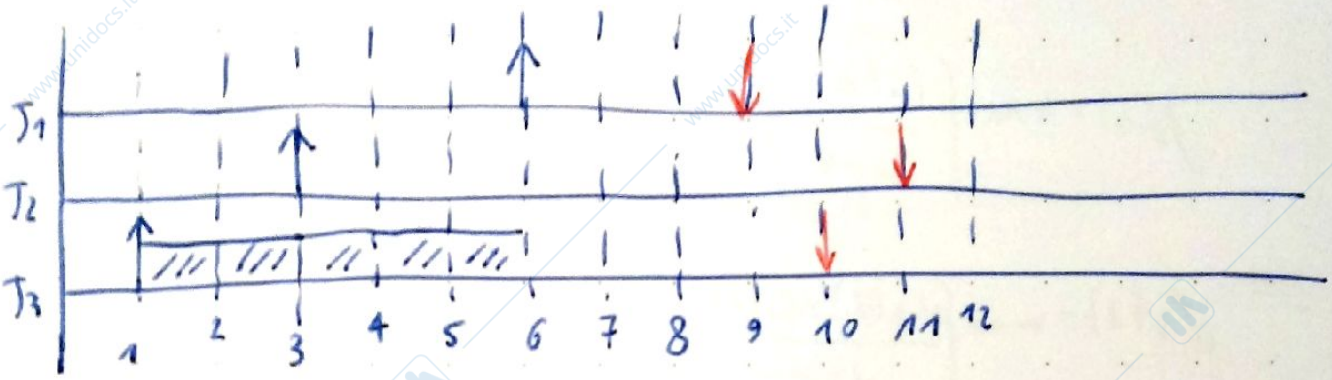
Date 20 · 11 · 19

(1) (ES. 4.1)

	J_1	J_2	J_3
a_i	6	3	1
C_i	2	3	6
d_i	9	11	10

Utilizziamo EDF



$$\rho_3(1) = \max\left\{\frac{C_3(1)}{d_3 - 1}\right\} = \frac{6}{9} < 1 \rightarrow \text{NON OVERLOAD}$$

$$\rho_2(3) = \max\left\{\frac{C_3(3) + C_2(3)}{d_2 - 3}, \frac{C_3(3)}{d_3 - 3}\right\} = \max\left\{\frac{7}{8}, \frac{4}{7}\right\} = \frac{7}{8} < 1$$

↓ NON OVERLOAD

$$\rho_1(6) = \max\left\{\frac{C_1(6)}{d_1 - 6}, \frac{C_1(6) + C_2(6) + C_3(6)}{d_2 - 6}, \frac{C_1(6) + C_3(6)}{d_3 - 6}\right\} =$$

$$\max\left\{\frac{2}{3}, \frac{2+3+1}{5}, \frac{2+1}{4}\right\} = \frac{6}{5} > 1 \rightarrow \text{OVERLOAD}$$

↓ FINE ES.

3

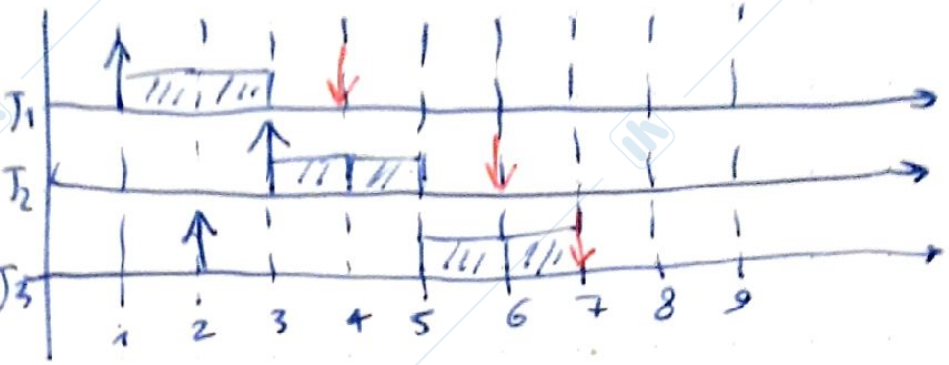
No. ES. SISTEMI INF.

Date 20 11 19

2 (ES. 4.2)

EDF

	T_1	T_2	T_3
a_i	1	3	2
C_i	2	2	2
d_i	4	6	7



$$f_1(1) = \max\left\{\frac{C_a(1)}{d_1 - 1}\right\} = \frac{2}{4-1} = \frac{2}{3} < 1 \rightarrow \text{NO OVERLOAD}$$

$$f_3(2) = \max\left\{\frac{C_3(2)+C_1(2)}{d_3-2}, \frac{C_1(2)}{d_1-2}\right\} = \max\left\{\frac{3}{5}, \frac{1}{2}\right\} = \frac{3}{5} < 1$$

↓

NO OVERLOAD

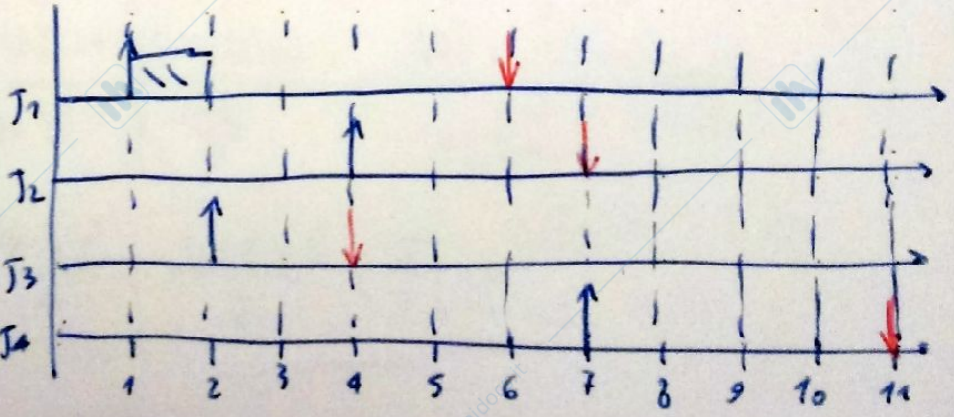
$$f_2(3) = \max\left\{\frac{C_2(3)}{d_2-3}, \frac{C_3(3)+C_2(3)}{d_3-3}\right\} = \max\left\{\frac{2}{3}, 1\right\} = 1$$

↓

no overload

3 (ES. 4.3)

	T_1	T_2	T_3	T_4
a_i	1	4	2	7
C_i	4	2	2	3
d_i	6	7	4	11



$$f_1(1) = \frac{c_1(1)}{d_1 - 1} = \frac{4}{5} < 1$$

$$f_3(2) = \max\left\{\frac{c_1(2) + c_3(2)}{d_1 - 2}, \frac{c_3(2)}{d_3 - 2}\right\} = \max\left\{\frac{5}{4}, 1\right\} = \frac{5}{4} > 1$$

↓ OVERLOAD

MI FERMO QUI ← non calcolo $f_2(4)$ e $f_4(7)$

Dover

Φ_A = COMPETITIVE FACTOR DI ALGORITMO A

T_A = VALORE DELLA SCHEDULAZIONE DATA DA A

T^* = VALORE SCHED. OTTIMA

Se A HA competitive factor Φ_A

$$T_A \geq \Phi_A T^*$$

Dover ottimo rispetto al worst case

↳ $\Phi = 0{,}25$

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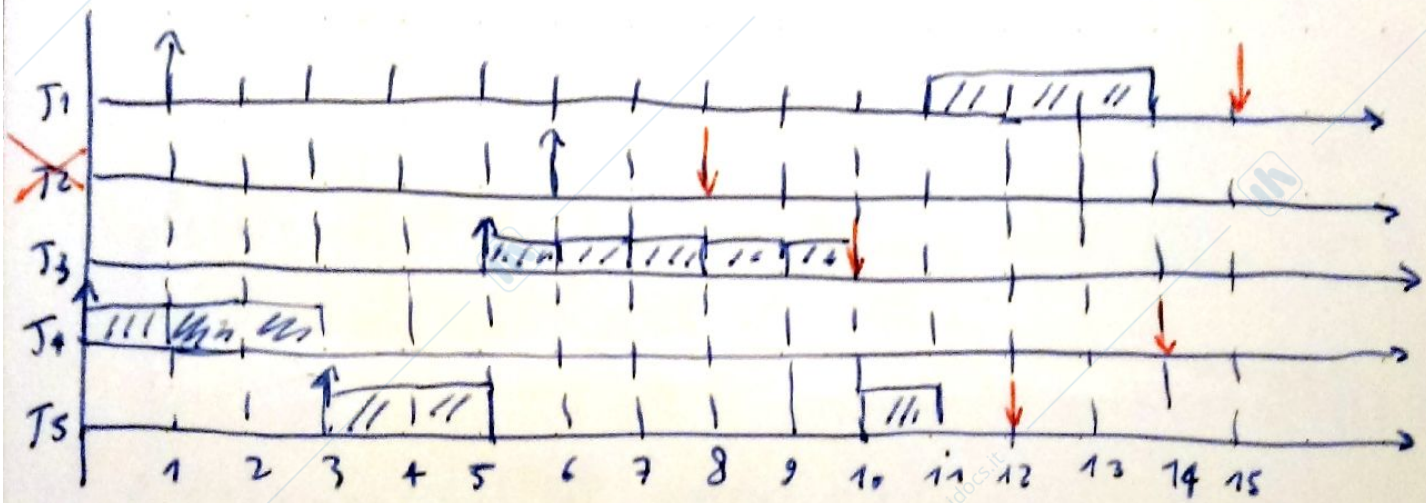
No. ESERCIZI NR

Date 20 · 11 · 19

(4) (Es. 4.9)

	T_1	T_2	T_3	T_4	T_5
a_i	1	6	5	0	3
c_i	3	2	5	3	3
d_i	15	8	10	14	12
v_i	1	1	1	1	1



$$\rho_4(0) = \frac{C_4(0)}{14} = \frac{3}{14} < 1$$

$$\rho_1(1) = \max\left\{\frac{C_4(1)}{14-1}, \frac{C_4(1)+C_1(1)}{15-1}\right\} = \max\left\{\frac{2}{13}, \frac{5}{14}\right\} = \frac{5}{14} < 1$$

$$\rho_5(3) = \max\left\{\frac{C_5(3)}{12-3}, \frac{C_1(3)+C_5(3)}{15-3}\right\} = \max\left\{\frac{1}{3}; \frac{1}{2}\right\} = \frac{1}{2} < 1$$

$$\rho_3(5) = \max\left\{\frac{C_3(5)}{10-5}; \frac{C_5(5)+C_3(5)}{12-5}; \frac{C_1(5)+C_5(5)+C_3(5)}{15-5}\right\} =$$

$$\max\left\{1; \frac{6}{7}; \frac{9}{10}\right\} = 1$$

6

No. ES. SISTEMI INF.

Date 20. 11. 19

$$\rho_2(6) = \max\left\{ \frac{c_2(6)}{8-6};\ \frac{c_3(6)+c_2(6)}{10-6};\ \frac{c_5(6)+c_3(6)+c_2(6)}{12-6};\ \frac{c_1(6)+c_5(6)+c_3(6)+c_2(6)}{15-6} \right\} =$$

$$= \max\left\{ 1;\ \frac{6}{4};\ \frac{7}{6};\ \frac{10}{9} \right\} = \frac{3}{2} > 1 \rightarrow \text{overload}$$

in $t=6$ $J_{CURR} = J_2$
↑
ossia per EDF

$J_3 \in LST$ (Least start time)

$V_3 > (1+\sqrt{k})(V_{CURR} + V_{PRIV})$? — processi attivi

$$k = \frac{\overline{V}_{max}}{\overline{V}_{min}} = \frac{\max(\sum \frac{V_i}{C_i})}{\min(\sum \frac{V_i}{C_i})} = \frac{\max\left(\frac{V_5}{3}, \frac{V_1}{3}, \frac{V_2}{2}, \frac{V_3}{5}\right)}{\min\left(\frac{V_5}{3}, \frac{V_1}{3}, \frac{V_2}{2}, \frac{V_3}{5}\right)} = \frac{\frac{17}{5}}{\frac{1}{3}}$$

(attivi)

$$k = \frac{51}{5}$$

solo quelle interrotte (V_1 hanno iniziato)

$$V_3 > \left(1+\sqrt{\frac{51}{5}}\right)(V_2 + V_5) = \left(\frac{56}{5}\right)(2) \ ?$$

in waiting non preemption

$17 > 8,4$ ✓ → faccio J_3
↓
~~J_2~~ eliminato

7

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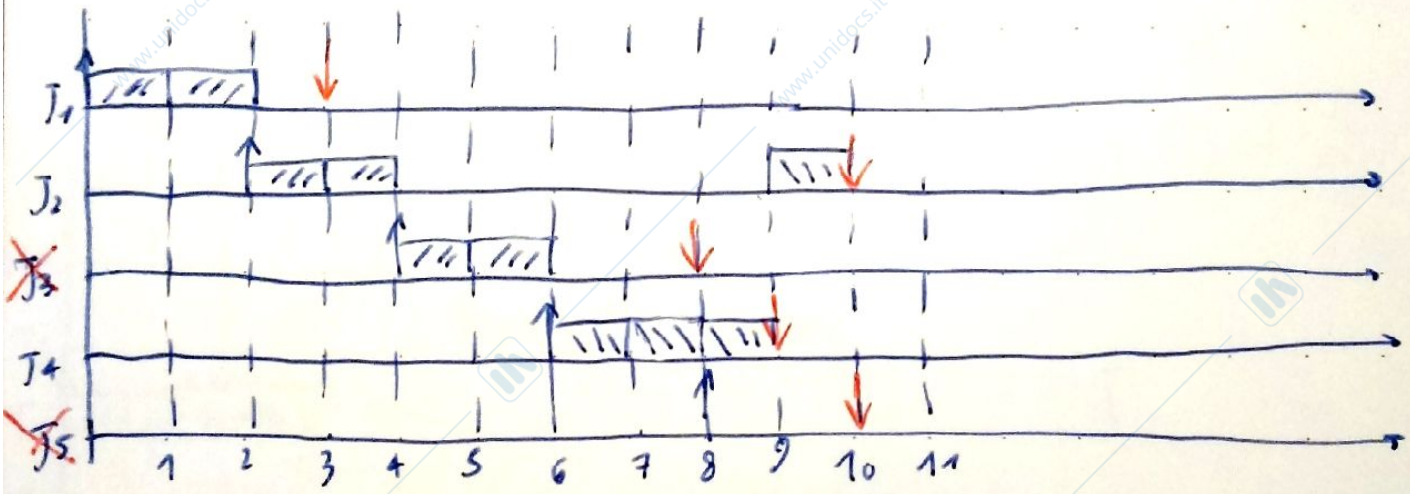
No. ES. SISTEMA INF.

Date 20 · 11 · 19

5 (ES. 4.5)

	J_1	J_2	J_3	J_4	J_5
a_i	0	2	4	6	8
c_i	2	3	3	3	2
d_i	3	10	8	9	10
V_i	3	1	2	15	7



$$f_1(0) = \frac{c_1(0)}{d_1 - 0} = \frac{2}{3} < 1 \qquad f_2(2) = \frac{c_2(2)}{d_2 - 2} = \frac{3}{8} < 1$$

$$f_3(4) = \max\left\{ \frac{c_2(4) + c_3(4)}{d_2 - 4} ; \frac{c_3(4)}{d_3 - 4} \right\} = \max\left\{ \frac{4}{6} ; \frac{3}{4} \right\} = \frac{3}{4} < 1$$

$$f_4(6) = \max\left\{ \frac{c_4(6) + c_3(6)}{d_4 - 6} ; \frac{c_3(6)}{d_3 - 6} ; \frac{c_2(6) + c_3(6) + c_4(6)}{d_2 - 6} \right\} =$$

$$\max\left\{ \frac{4}{3}) \dots \right\} \rightarrow \text{OVERLOAD}$$

$t = 6$ TURN J_3 $J_4 \in LST$

$V_4 > (1 + \lceil k \rceil)(V_3 + V_2)$? $k = \dfrac{\max\left(\frac{V_2}{C_2}, \frac{V_3}{C_3}, \frac{V_4}{C_4}\right)}{\min(\dots)} =$

$\frac{1}{3}$ $\frac{2}{3}$ 5

$= 15$

8

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Date 20. 11. 19

$15 > (1+\sqrt{15})(3)$ V faccio J_4

$t=7$

$J_{CURR} = J_4$ $J_3 \in LST$

$k = 15$

$V_3 > (1+\sqrt{k})(V_2+V_4)$ X → scarto J_3

$$f_3(8) = \max\left\{ \frac{C_4(8)}{d_4 - 8}, \frac{C_5(8)+C_4(8)+C_2(8)}{d_2 - 8}, \frac{C_5(8)+C_4(8)+C_2(8)}{d_5 - 8} \right\}$$

$\max\{3, 1, \dots\}$ → overload

$t=8$ $J_{CURR} = J_4$ $J_5 \in LST$

$$k = \frac{\max\left(\frac{V_2}{C_2}, \frac{V_4}{C_4}, \frac{V_5}{C_5}\right)}{\min(\dots)} = \frac{\max\left(\frac{1}{3}, 5, \frac{7}{2}\right)}{\min(\dots)} = 15$$

$k = 15$

+ istante corrente

$J_{CUR} = J(EDF)$

$J_2 \to LST$

$V_5 > (1+\sqrt{15})V_4$

↓ non consideriamo V_{PRIV}

$7 > (1+\sqrt{15})15$ X → scarto J_5

J_{PRIV} ! TASK IN PREEMPTION

$\to V_2 > (1+\sqrt{k})(V_{PART}+C_{CURR})$

→ FALSA → CONTINUO J_{CUR}

→ VERA → J_2

TUTTI GLI ALTRI TASK DIVENTANO WAITING $\Rightarrow V_{PRIV} = 0$ → se arriva $J_W \in LST$

$V_W > (1+\sqrt{k})V_2$ → FALSO → CONTINUO J_2

→ VERO → J_W

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es. 4.5 Ultima volta

t_{77} → condizione sbagliata

↓

Usare

$v_w > (1+\sqrt{k})\, v_z$

↓ ↓

$T_w = T_3$ $T_z = T_4$