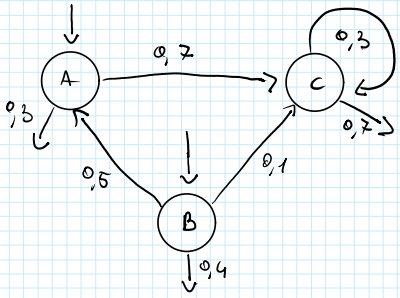
Esonero 18 novembre 2009

domenica 7 febbraio 2021 15:26

COMPITO A



$\lambda_A = 6$ p/h
$\lambda_B = 13$ p/h
$\mu_A = 10$ p/h
$\mu_B = 30$ p/h
$\frac{1}{\mu_C} = 0{,}067$ h $\rightarrow \mu_C = \frac{1}{0{,}067} = 15$ p/h

$S_B = S_C = 1$
$S_A = 4$

DOMANDE
$P(5, 3, 0)$
COSTO PEZZI NON ULTIMATI IN C
X_{R_B} ? X_{T_B} ?
$X_{R_B} \uparrow$

CALCOLO λ'

$\lambda'_A = \lambda_A + 0{,}5\,\lambda'_B \rightarrow \lambda'_A = 6 + 0{,}5\,(13) = 12{,}5$ p/h

$\lambda'_B = \lambda_B \rightarrow \lambda'_B = 13$

$\lambda'_C = 0{,}7\,\lambda'_A + 0{,}1\,\lambda'_B + 0{,}3\,\lambda'_C \rightarrow 0{,}7\,\lambda'_C = 0{,}7\,(12{,}5) + 0{,}1\,(13) = 10$ p/h

STAZIONARIO

$\lambda'_A < S_A \mu_A \Rightarrow 12{,}5 < 4 \cdot 6$
$\lambda'_B < S_B \mu_B \Rightarrow 13 < 30$
$\lambda'_C < S_C \mu_C \Rightarrow 10 < 15$

$X_R = \lambda_A + \lambda_B = 6 + 13 = 19$

CALCOLO VISIT COUNT

$V_A = \frac{\lambda'_A}{X_R} = \frac{12{,}5}{19} = 0{,}66$

$V_B = \frac{\lambda'_B}{X_R} = \frac{13}{19} = 0{,}68$

$V_C = \frac{\lambda'_C}{X_R} = \frac{10}{19} = 0{,}53$

CALCOLO X_T DELLA STAZIONE B

$$X_{T_B} = \frac{S_B \mu_B}{V_B} = \frac{1 \cdot 30}{0{,}68} = 44{,}12 \text{ p/h}$$

$X_{R_B} = \lambda_B = 13$ p/h

Per aumentare la produttività devo aumentare λ_B mantenendo la condizione di stazionarietà ($\lambda_B < 44{,}12$)

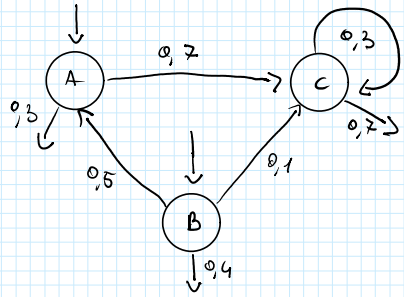
$X_{R_B} = X_{T_B} - \varepsilon$

CALCOLO $P(5, 3, 0)$

$$\beta_C(0) = \frac{\lambda'^0_C}{1! \cdot 1^{0-1}} \cdot P_0 = 1 \cdot \left(1 - \frac{10}{15}\right) = 1 - 0{,}7 = 0{,}3$$

$$\beta_B(3) = \left(\frac{\lambda'_B}{\mu_B}\right)^3 \cdot \left(1 - \frac{\lambda'_B}{\mu_B}\right) = \left(\frac{13}{30}\right)^3 \cdot \left(1 - \frac{13}{30}\right) = 0{,}08 \cdot 0{,}57 = 0{,}045$$

$$\beta_A(5) = \frac{1}{4!\,4^{5-4}} \left(\frac{\lambda'_A}{\mu_A}\right) \cdot P_0 = \frac{1}{24 \cdot 4} \cdot (1{,}25)^5 \cdot 0{,}285 = \frac{1}{96} \cdot 3{,}05 \cdot 0{,}285 = \underset{0{,}009}{9 \cdot 10^{-3}}$$



$$P_0 = \frac{1}{\sum_{i=0}^{s-1} \frac{1}{i!}\left(\frac{\lambda}{\mu}\right)^i + \frac{1}{s!}\left(\frac{\lambda}{\mu}\right)^s \frac{s\mu}{s\mu-\lambda}} = \sum_{i=0}^{3} \frac{1}{0!}\left(\frac{\lambda}{\mu}\right)^i + \frac{1}{4!}\left(\frac{12,5}{10}\right)^4 \frac{4\cdot 10}{4\cdot 10 - 12,5}$$

$$P_0 = \frac{1}{\frac{1}{0!}(1,25)^0 + \frac{1}{1!}(1,25)^1 + \frac{1}{2!}(1,25)^2 + \frac{1}{3!}(1,25)^3 + \frac{1}{4!}(1,25)^4 \frac{40}{22,5}} =$$

$$= \frac{1}{1 + 1,25 + 0,78 + 0,33 + 0,15} = 0,285$$

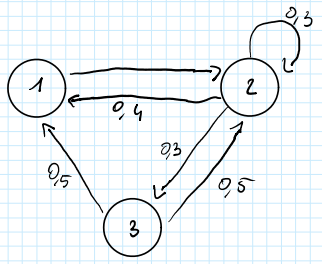
$$P(5,3,0) = 0,009 \cdot 0,045 \cdot 0,3 = 0,00012 = 1,2 \cdot 10^{-4}$$

CALCOLARE COSTO PEZZI NON ULTIMATI IN C

$$N_c = \frac{\lambda'_c}{\mu_c - \lambda'_c} = \frac{10}{15-10} = \frac{10}{5} = 2$$

costo = 2 · 7 = 14 euro pezzi non ultimati

COMPITO B



$\frac{1}{\mu_1} = 3h \rightarrow \mu_1 = 0,33 p/h$

$\frac{1}{\mu_2} = 2,2\ h \rightarrow \mu_2 = 0,45 p/h$

$\mu_3 = 0,27\ p/h$

$S_1 = 2$

$S_2 = S_3 = 1$

$N = 3$

DOMANDE

$P(5,3,0)$

$L_1 = ?$

$X_{R_3} \uparrow \; X_{T_B} \uparrow$

CALCOLO VISIT COUNT

$V_1 = 1$

$V_2 = V_1 + 0,5 V_3 + 0,3 V_2 \rightarrow 0,7 V_2 = 1 + 0,5(0,3 V_2) \rightarrow 0,55 V_2 = 1 \rightarrow V_2 = 1,8$

$V_3 = 0,3 V_2 \rightarrow V_3 = 0,3(1,8) = 0,55$

CALCOLO X_S

$$x_1 = \frac{V_1}{\mu_1} = \frac{1}{0,33} = 3,33\ p/h$$

$$x_2 = \frac{V_2}{\mu_2} = \frac{1,8}{0,45} = 4\ p/h$$

$$X_3 = \frac{\nu_3}{\mu_3} = \frac{0,55}{0,22} = 2,04 \simeq 2 \text{ p/h}$$

CALCOLO $f_3(n_3)$

$f_1(0) = 1 \quad f_1(1) = 3,33^1 = 3,33 \quad f_1(2) = \frac{3,33^2}{2!} = \frac{9,99}{2} = 5 \quad f_1(3) = \frac{3,33^3}{2!\,2^{3-2}} = \frac{36,92}{4} = 9,23$

$f_2(0) = 1 \quad f_2(1) = 4^1 = 4 \quad f_2(2) = 4^2 = 16 \quad f_2(3) = 4^3 = 64$

$f_3(0) = 1 \quad f_3(1) = 2^1 = 2 \quad f_3(2) = 2^2 = 4 \quad f_3(3) = 2^3 = 8$

CALCOLO $G(\mu, N)$

$G(\mu, N)$	1	1,3	1,3,2
0	1	1	1
1	3,33	5,33	9,33
2	5	15,66	53
3	9,23	40,55	252,47

$G(2,2) = 5 \cdot f_3(0) + 3,33 \cdot f_3(1) + f_3(2) = 5 + 6,66 + 4 = 15,66$

$G(2,3) = 9,23 \cdot f_3(0) + 5 \cdot f_3(1) + 3,33 \cdot f_3(2) + f_3(3) =$

$9,23 + 10 + 13,32 + 8 = 40,55$

$G(3,2) = 15,66 \cdot f_2(0) + 5,33 \cdot f_2(1) + f_2(2) =$

$15,66 + 21,32 + 16 = 52,32 \simeq 53$

$G(3,3) = 40,55 \cdot f_2(0) + 15,66 \cdot f_2(1) + 5,33 \cdot f_2(2) + f_2(3) =$

$= 40,55 + 62,64 + 85,28 + 64 = 252,42$

$$X_{R_2} = X_R = \frac{53}{252,47} = 0,21 \text{ p/h}$$

$$X_{T_2} = \frac{S_2 \mu_2}{\nu_2} = \frac{1 \cdot 0,45}{1,8} = 0,25 \text{ p/h}$$

Per aumentare X_{R_2} dovrei aumentare lo N dello stesso (come lo N del sistema) sempre rimanendo nella condizione di stazionarietà

CALCOLO $P(5,3,0)$

$$P(5,3,0) = \frac{f_1(5) \cdot f_2(3) \cdot f_3(0)}{G(\mu, N)} = \frac{25,59 \cdot 64 \cdot 1}{252,47} = 6,48$$

$$f_1(5) = \frac{3,33^5}{2!\,2^{5-2}} = \frac{409,45}{2^4} = \frac{409,45}{16} = 25,59$$

CALCOLO LA LUNGHEZZA