

3. domaća zadaća – izvještaj

U ovoj domaćoj zadaći trebalo je analitički i programski odrediti vrijednost funkcije zadržavanja zahtjeva u raspodijeljenom sustavu u ovisnosti o učestalosti dolazaka zahtjeva λ . U ovom izvještaju nalazi se tekst zadatka s pripadajućom shemom sustava, analitički postupak rješavanja, ispis programskog rješenja u konzoli (za neke vrijednosti λ) i grafički prikaz vremena zadržavanja zahtjeva.

2 Zadatak

Zadan je raspodijeljeni sustav koji se sastoji od 7 komponenti modeliranih mrežom repova. Studenti trebaju analitički i programski odrediti rješenje funkcije zadržavanja zahtjeva u raspodijeljenom sustavu $T = f(\lambda)$ zadanog prema zadnjoj znamenki JMBAG-a (npr. student s JMBAG-om 0036471234 rješava zadatak 2) ako su zadane vjerojatnosti prosljeđivanja paketa u sustavu i srednja vremena obrade paketa.

Napomena: prilikom programskog rješavanja zadatka u alatu PDQ potrebno je odrediti vrijednosti funkcije zadržavanja zahtjeva $T = f(\lambda)$ u nekoliko točaka.

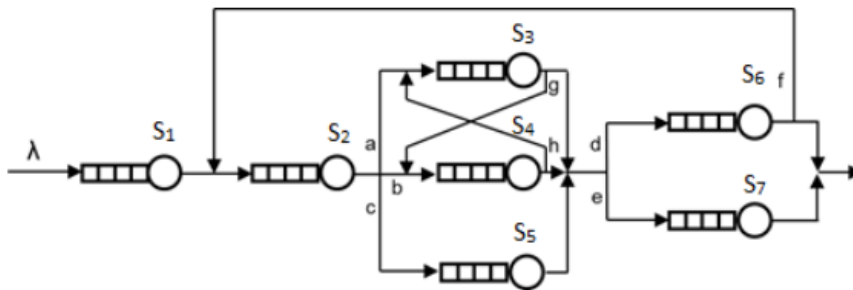
2.2 Zadnja znamenka JMBAG-a 2, 3, 4

Vjerojatnosti prosljeđivanja paketa u sustavu:

$a = 0.2$, $b = 0.3$, $c = 0.5$, $d = 0.3$, $e = 0.7$, $f = 0.6$, $g = 0.2$ i $h = 0.3$

Srednja vremena obrade paketa:

$S_1 = 0.003$ s/p, $S_2 = 0.001$ s/p, $S_3 = 0.01$ s/p, $S_4 = 0.04$ s/p, $S_5 = 0.1$ s/p, $S_6 = 0.13$ s/p i $S_7 = 0.15$ s/p



$$\lambda_1 = \boxed{2}$$

$$\lambda_2 = \lambda + 0.6\lambda_6$$

$$\lambda_3 = 0.2\lambda_2 + 0.3\lambda_4 = 0.2\lambda_2 + 0.09\lambda_2 + 0.06\lambda_3 \Rightarrow \lambda_3 = \frac{29}{94}\lambda_2$$

$$\lambda_4 = 0.3\lambda_2 + 0.2\lambda_3 = \frac{14}{47}\lambda_2$$

$$\lambda_5 = 0.5\lambda_2$$

$$\lambda_6 = 0.3(0.8\lambda_3 + 0.7\lambda_4 + \lambda_5) = 0.3\left(0.8 \cdot \frac{29}{94}\lambda_2 + 0.7 \cdot \frac{14}{47}\lambda_2 + 0.5\lambda_2\right) = \frac{3}{10}\lambda_2$$

$$\lambda_7 = 0.7(0.8\lambda_3 + 0.7\lambda_4 + \lambda_6) = \frac{7}{10}\lambda_2$$

$$\lambda = 0.4\lambda_6 + \lambda_7$$

$$\lambda_2 = \lambda + 0.6 \cdot \frac{3}{10}\lambda_2 \Rightarrow \lambda_2 = \frac{50}{41}\lambda = \boxed{1.2195\lambda}$$

$$\lambda_3 = \frac{725}{1927}\lambda = \boxed{0.3762\lambda}$$

$$\lambda_4 = \frac{850}{1927}\lambda = \boxed{0.4411\lambda}$$

$$\lambda_5 = \frac{25}{41}\lambda = \boxed{0.6098\lambda}$$

$$\lambda_6 = \frac{15}{41}\lambda = \boxed{0.3659\lambda}$$

$$\lambda_7 = \frac{35}{41}\lambda = \boxed{0.8536\lambda}$$

$$P_1 = \lambda_1 \cdot S_1 = 0.0032$$

$$P_2 = \lambda_2 \cdot S_2 = \frac{1}{820} \lambda = 0.00122$$

$$P_3 = \lambda_3 \cdot S_3 = \frac{29}{7708} \lambda = 0.00382$$

$$P_4 = \lambda_4 \cdot S_4 = \frac{34}{1927} \lambda = 0.01762$$

$$P_5 = \lambda_5 \cdot S_5 = \frac{5}{82} \lambda = 0.06102$$

$$P_6 = \lambda_6 \cdot S_6 = \frac{39}{820} \lambda = 0.04762$$

$$P_7 = \lambda_7 \cdot S_7 = \frac{21}{164} \lambda = 0.12802$$

$$N_1 = \frac{P_1}{1 - P_1} = \frac{0.0032}{1 - 0.0032}$$

$$N_2 = \frac{P_2}{1 - P_2} = \frac{0.00122}{1 - 0.00122}$$

$$N_3 = \frac{P_3}{1 - P_3} = \frac{0.00382}{1 - 0.00382}$$

$$N_4 = \frac{P_4}{1 - P_4} = \frac{0.01762}{1 - 0.01762}$$

$$N_5 = \frac{P_5}{1 - P_5} = \frac{0.0612}{1 - 0.0612}$$

$$N_6 = \frac{P_6}{1 - P_6} = \frac{0.04762}{1 - 0.04762}$$

$$N_7 = \frac{P_7}{1 - P_7} = \frac{0.1282}{1 - 0.1282}$$

$$T = \frac{N_1 + N_2 + N_3 + N_4 + N_5 + N_6 + N_7}{2}$$

$$T(1) = 0.28772 \Rightarrow \lambda = 1$$

$$T(2) = 0.32042 \Rightarrow \lambda = 2$$

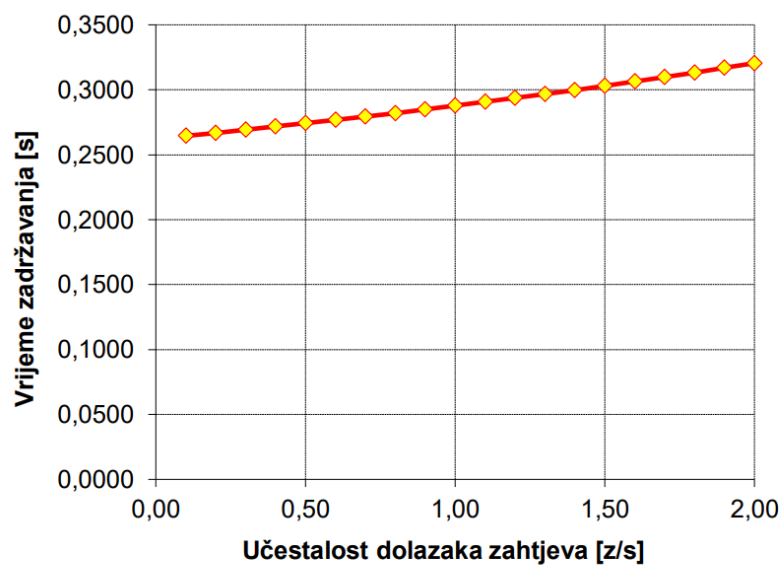
$$T(0.5) = 0.27422 \Rightarrow \lambda = 0.5$$

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lambda: 0.9
T1: 0.003008121955211544
T2: 0.0012208399364043233
T3: 0.003774780471796952
T4: 0.017928700234227265
T5: 0.06452104273721117
T6: 0.04969443304855845
T7: 0.14471656800815624
T: 0.2848644863915659

lambda: 1.0
T1: 0.0030090271074779324
T2: 0.0012209889996531314
T3: 0.0037762059069683124
T4: 0.017960901804343364
T5: 0.06494004276456541
T6: 0.04994262012694767
T7: 0.14684160989731881
T: 0.2876913966072746

lambda: 1.1
T1: 0.0030099328046339505
T2: 0.0012211380993073107
T3: 0.003777632419093953
T4: 0.01799321925646939
T5: 0.06536452034038774
T6: 0.0501932986715613
T7: 0.14902999079621929
T: 0.29058973238767294
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Ispis programskog rješenja u konzoli (za vrijednosti $\lambda = 0.9, 1.0$ i 1.1)



Zadatak 2.2	
L	T
0,10	0,2645
0,20	0,2669
0,30	0,2693
0,40	0,2717
0,50	0,2742
0,60	0,2768
0,70	0,2794
0,80	0,2821
0,90	0,2849
1,00	0,2877
1,10	0,2906
1,20	0,2936
1,30	0,2966
1,40	0,2997
1,50	0,3030
1,60	0,3063
1,70	0,3097
1,80	0,3132
1,90	0,3168
2,00	0,3205

Grafički prikaz vremena zadržavanja zahtjeva