

Trabalho de teoria de Filas

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① Dados

$$\lambda = 3/5 = 0,6 \text{ carros/min}$$

$$E\{t_s\} = \frac{1}{\mu} = 1 \text{ min}$$

$$\mu = 1 \text{ min}$$

$$a) E\{t_q\} = ?$$

$$b) E\{t_w\} = ?$$

→ M/M/1

$$\rho = \frac{\lambda}{\mu} = 0,6$$

$$E\{q\} = \frac{\rho}{1-\rho} = 1,5 \text{ min}$$

$$a) E\{t_q\} = \frac{E\{q\}}{\lambda} = 2,5 \text{ min}$$

$$E\{t_q\} = 2,5 \text{ min}$$

$$b) E\{t_w\} = \lambda \cdot E\{t_w\}$$

$$E\{t_w\} = E\{t_q\} - E\{t_s\} = 1,5 \text{ min}$$

$$E\{t_w\} = 0,9 \text{ carros}$$

② Dados

$$\lambda = 40 \text{ pac/sec}$$

$$n = 5000 \text{ bits}$$

$$R = 500 \text{ kbps}$$

$$a) E\{t_q\} = ?$$

$$b) E\{t_w\} = ?$$

$$\mu = \frac{R}{n} = 100 \text{ pac/sec}$$

$$E\{q\} = \frac{\rho}{1-\rho} = 0,6666 \text{ pac}$$

$$a) E\{t_q\} = \frac{E\{q\}}{\lambda} = 0,016667 \text{ seg}$$

$$E\{t_q\} = 0,016667 \text{ seg}$$

$$b) E\{t_w\} = E\{t_q\} - E\{t_s\}$$

$$E\{t_w\} = 0,00667 \text{ segundos}$$

③ Dados

$$\lambda = 200 \text{ pac/sec}$$

$$n = 128 \text{ bytes} \times 8 \text{ bits} = 1024 \text{ bits}$$

$$R = 256 \text{ kbps}$$

$$N = \{1, 5, 10 \text{ e } 15\}$$

$$\mu = \frac{R}{n} = 250 \text{ pac/sec}$$

$$\rho = \frac{\lambda}{\mu} = 0,8$$

$$P_B = \rho \cdot \frac{1-\rho}{1-\rho^{N+1}}$$

$$E\{q\} = \frac{\rho}{1-\rho} - \frac{(N+1)\rho^{N+1}}{1-\rho^{N+1}}$$

$$E\{t_q\} = \frac{E\{q\}}{(1-\rho) \cdot \lambda}$$

a) Para $N=2$, $P_B = 0,2623$; $E\{q\} = 0,85246 \text{ pac}$; $E\{t_q\} = 0,005778 \text{ segundos}$

b) Para $N=6$, $P_B = 0,0663$; $E\{q\} = 2,1424 \text{ pac}$; $E\{t_q\} = 0,0115 \text{ segundos}$

c) Para $N=11$, $P_B = 0,0184$; $E\{q\} = 3,1146 \text{ pac}$; $E\{t_q\} = 0,0157 \text{ segundos}$

d) Para $N=16$, $P_B = 0,005759$; $E\{q\} = 3,6082 \text{ pac}$; $E\{t_q\} = 0,018 \text{ segundos}$

④ Dados

$$\lambda = 1 \text{ msg/seg}$$

$$n = 2000 \text{ bits}$$

$$R = 10000 \text{ bps}$$

$$\mu = \frac{R}{n} = 5 \text{ msg/seg}$$

$$\rho = \frac{\lambda}{\mu} = 0,2$$

a) Constante

$$E\{T\} = \frac{\rho}{1-\rho} \left(1 + \frac{\rho}{2}\right)$$

$$E\{T\} = 0,225 \text{ ms}$$

$$E\{t_q\} = \frac{E\{T\}}{\lambda} = \boxed{0,225 \text{ seg}}$$

b) Distribuição Exponencial

$$E\{t_q\} = \frac{1}{\mu - \lambda}$$

$$E\{t_q\} = 0,25 \text{ seg}$$