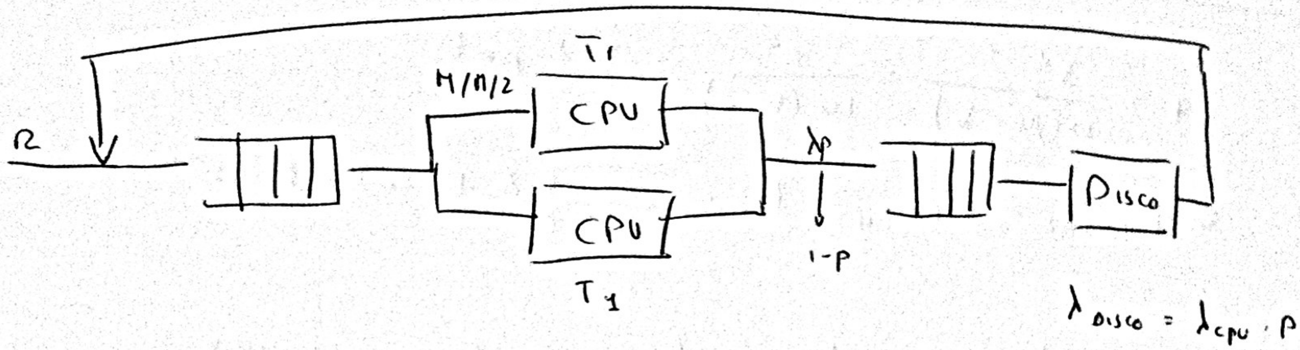
17.



$T_1 = 20$ ms

$T_2 = 100$ ms

$p = 0,8$

$R = 2$ pet/s

$\lambda_{cpu} = R + p \cdot \lambda_{cpu} \rightarrow \lambda_{cpu} - p\, \lambda_{cpu} = R$

$$\lambda_{cpu} = \frac{R}{1-p} = \frac{2 \text{ pet/s}}{1-0,8} = 10 \text{ pet/s}$$

$$\mu_{cpu} = \frac{1}{T_1} = \frac{1}{20 \cdot 10^{-3}} = 50 \text{ pet/s}$$

$$\mu_{disco} = \frac{1}{T_2} = \frac{1}{100 \cdot 10^{-3}} = 10 \text{ pet/s}$$

$\lambda_{disco} = 0,8 \cdot \lambda_{cpu} = 8$ pet/s

$L_q = L_{q\,cpu} + L_{q\,disco}$.

<u>CPU</u> (M/M/2)

$$L_q = \frac{P_q \cdot \rho}{1-\rho} = \frac{P_2 \cdot 0,1}{1-0,1} = 1,78 \cdot 10^{-3} \text{ pet}$$

$$\rho = \frac{\lambda}{c\mu} = \frac{10 \text{ pet/s}}{2 \cdot 50 \text{ pet/s}} = 0,1 \qquad P_q = \frac{P_2}{0,9} = \frac{0,016}{0,9} = 0,017$$

$$P_0 = \left[1 + \frac{0,2^2}{2 \cdot 0,9} + 0,2 + \frac{0,2^2}{2 \cdot 0,9}\right]^{-1} = 0,80$$

$$P_2 = P_0 \frac{2^2}{2} 0,1^2 = 0,016$$

Disco (M/M/1)

$$L_q = \frac{\lambda^2}{\mu(\mu-\lambda)} = \frac{8^2}{10(10-8)} = 3,2 \text{ pet}$$

$$L_{q\,TOTAL} = L_{q\,cpu} + L_{q\,disco} = 3,2 + 0,188 \cdot 10^{-2}$$

$$W_{TOTAL} : \frac{L_{TOTAL}}{R} = \frac{L_{DISCO} + L_{CPU}}{R} = \frac{4 + 0,20188}{2 \text{ pet/s}} = 2,10 \text{ sg}$$

$$L_{DISCO} = \frac{\rho}{1-\rho} = \frac{0,8}{0,2} = 4 \text{ pet}$$

$$\rho = \frac{\lambda}{\mu} = \frac{8}{10} = 0,8$$

$$L_{CPU} = L_{q\,cpu} + c\rho = 1,88 \cdot 10^{-3} + 0,2 = 0,20188 \text{ pet}$$

$$\rho = 0,1$$

Disco > factor utilizacion CPU puede ∃ cuello botella.

Solucion posibles
- ++ μ de disco
- ~~Recursos~~ Aumento recursos por colocacion en paralelo (+ costoso)