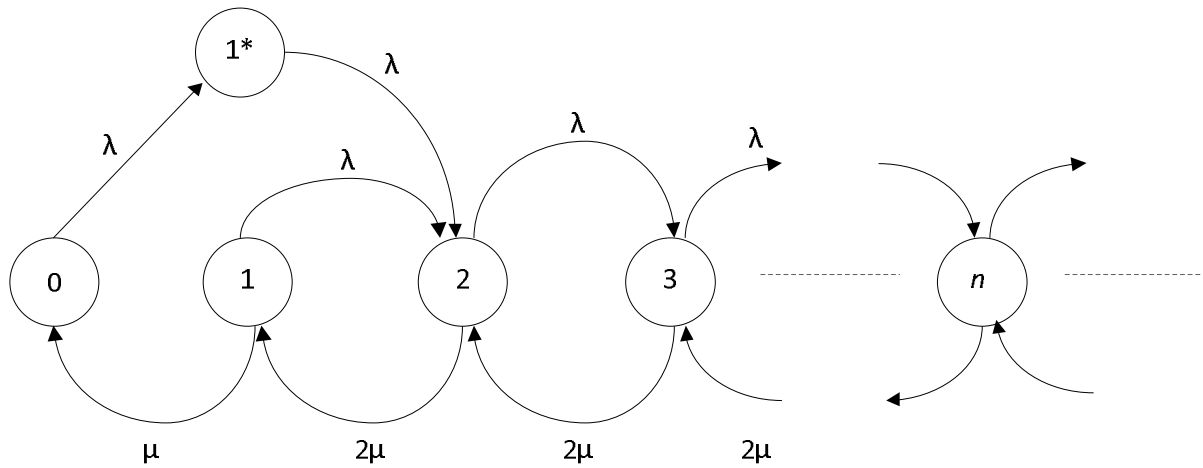


EE 633
Solutions to Quiz-I

1. The State Transition Diagram can be drawn as shown below



$$p_0\lambda = p_{1^*}\lambda \qquad p_{1^*} = p_0 \qquad \rho = \frac{\lambda}{\mu}$$

$$p_1\mu = p_0\lambda \qquad p_1 = \rho p_0$$

$$(p_1 + p_{1^*})\lambda = p_2(2\mu) \qquad p_2 = 0.5\rho(1 + \rho)p_0$$

and trivially, $p_n = (0.5\rho)^{n-2} p_2 \quad n \geq 2$

Applying the Normalization Condition

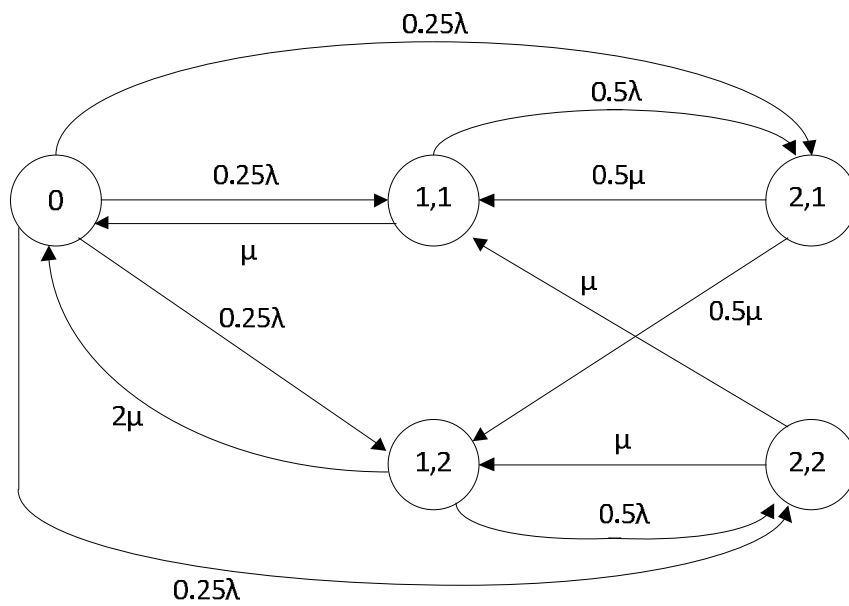
$$p_0[1 + 1 + \rho] + p_2 \frac{1}{1 - 0.5\rho} = 1 \qquad \text{for } \rho < 2$$

Therefore,
$$p_0 = \frac{1}{2 + \rho + \frac{0.5\rho(1 + \rho)}{1 - 0.5\rho}} = \frac{1 - 0.5\rho}{2 - 0.5\rho^2 + 0.5\rho + 0.5\rho^2} = \frac{1 - 0.5\rho}{2 + 0.5\rho} = \frac{2 - \rho}{4 + \rho}$$

and
$$P\{j \text{ jobs in system}\} = \begin{cases} p_0 & i = 0 \\ p_1 + p_{1^*} = (1 + \rho)p_0 & i = 1 \\ (0.5\rho)^{i-1} (1 + \rho)p_0 & i \geq 2 \end{cases}$$

2. The State Transition Diagrams will be as follows

WBAS



PBAS

