Topics Covered in Lecture 10

20-August, 2002

- TMR System.

$$n = 3, k = 2$$

$$F_{Y_2}(t) = \begin{pmatrix} 3 \\ 2 \end{pmatrix} (1 - R(t))^2 R(t) + \begin{pmatrix} 3 \\ 3 \end{pmatrix} (1 - R(t))^3$$

$$\begin{aligned} (or)R_{TMR}(t) &= 1 - F_{Y_2}(t) \\ &= \begin{pmatrix} 3 \\ 0 \end{pmatrix} (R(t))^3 + \begin{pmatrix} 3 \\ 1 \end{pmatrix} (1 - R(t))R(t)^2 \\ &= R^3(t) + 3(1 - R(t))R^2(t) \\ &= R^3(t) + 3R^2(t) - 3R^3(t) \\ &= 3R^2(t) - 2R^3(t) \end{aligned}$$

$$\text{specialize} \quad R(t) = e^{-\lambda t}$$

$$R_{TMR}(t) = 3e^{-2\lambda t} - 2e^{-3\lambda t}$$

$$R_{simplex}(t) = e^{-\lambda t}$$

$$\begin{aligned} 3x^2 - 2x^3 &= x \\ 3x - 2x^2 - 1 &= 0 \\ 2x^2 - 3x + 1 &= 0 \\ x &= \tfrac{1}{2}, 1 \end{aligned}$$

$$R(t) = e^{-\lambda t} = \frac{1}{2} \text{ and } R(t) = e^{-\lambda t} = 1$$

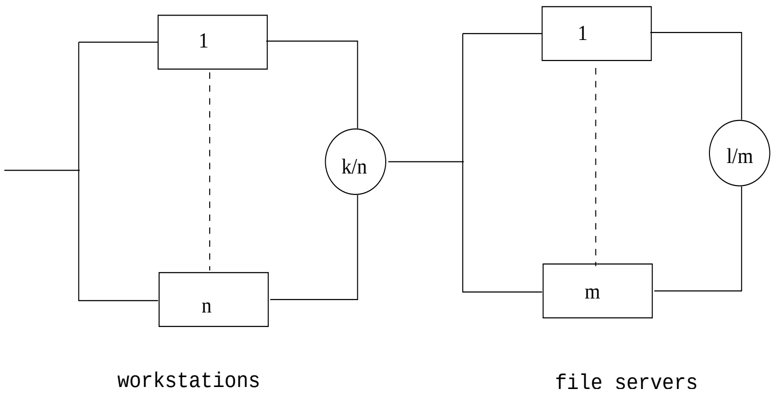
$$t = \frac{-ln\left(\frac{1}{2}\right)}{\lambda} \simeq \frac{0.7}{\lambda} \text{ or } t = 0$$

- n different Poisson sources so that
  N_i(t) = # of arrivals in interval(0, t) is Poisson distributed with parameter λ_it
  X_i, the time between two arrivals in stream i is EXP(λ_i)
  Assume $X_1, X_2, \ldots, X_n$ are independent(nonidentically distributed).

The time between arrivals in the output stream

$$Y_1 = min\{X_1, X_2, \ldots, X_n\}$$
$$Y_1 \sim EXP\left(\sum \lambda_i\right) \Leftrightarrow \sum_{i=1}^{n} N_i(t) \text{ is } POI\left(\sum_{i=1}^{n} \lambda_i t\right)$$

- WFS problem



$$R(t) = \left[\sum_{j=k}^{n} \binom{n}{j} [R_w(t)]^j [1 - R_w(t)]^{n-j}\right] \left[\sum_{j=l}^{m} \binom{m}{j} [R_f(t)]^j [1 - R_f(t)]^{m-j}\right]$$

- Task graphs with min, max and k of n connections.
- Multiprocessor Interconnection Network(MIN)
  - Shuffle Exchange Network(SEN)
  - Reliability of SEN can be increased with SEN+
  - 4×4 SEN+ systems decreases reliability whereas 8×8 SEN+ systems increases reliability.
- Standby redundancy
  - Cold Standby
- Z = X + Y.