Warmup: Doubling the server speed

(a) Open System

(b) Closed Batch System

$$S \sim \text{Exp}(\mu) \text{ where } \mu = 2 \qquad \lambda = 1.8 \qquad N = 10$$

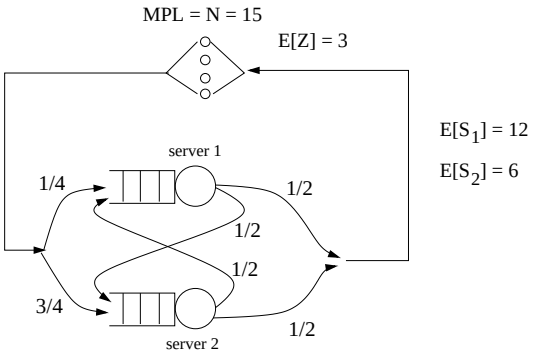
T^{orig} = response time in original system.
T^{fast} = response time in system with 2x faster server.

Question: Derive $\mathbf{E}[T^{orig}]$ and $\mathbf{E}\left[T^{fast}\right]$ for the open and closed systems above.

Question: Which system had the greater improvement, open or closed?

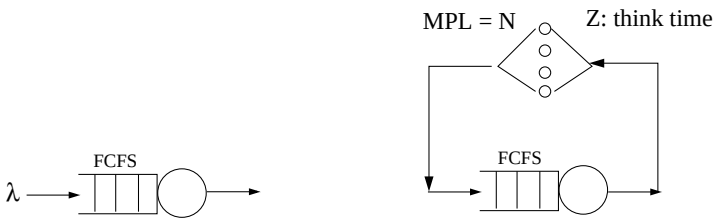
Question: Does this system have the greater improvement $\forall\lambda$?

More practice with closed systems



Question: What is $\mathbf{E}[R]$?

How to adjust load in closed interactive systems?



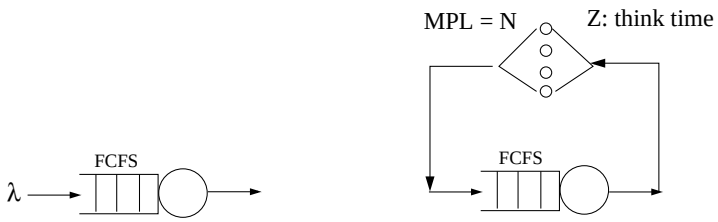
(a) Open System (b) Closed System

In both systems, $\mathbf{E}[S] = 1$.

Question: How do we adjust ρ in the open system?

Question: How do we adjust ρ in the closed system?

Mean residence time in open versus closed

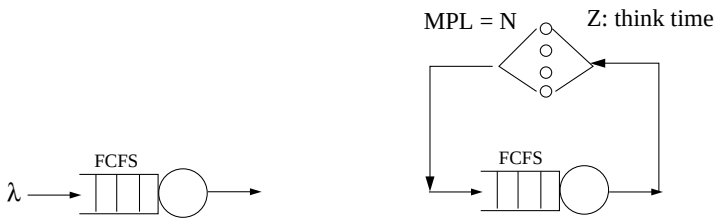


(a) Open System (b) Closed System

Question: Suppose that the open system and the closed system are run with the same load ρ. Which will have higher $\mathbf{E}[T]$?

Hint: Think about what happens when $\rho \to 1$ in open versus closed?

Effect of job size variability in open versus closed



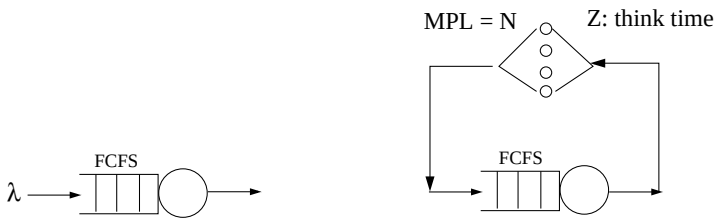
(a) Open System (b) Closed System

Fix load, say $\rho = 0.8$.

Question: How does $\mathbf{E}[T]$ scale with increasing C_S^2 in an open system?

Question: How does $\mathbf{E}[T]$ scale with increasing C_S^2 in a closed system?

Effect of scheduling in open versus closed



(a) Open System (b) Closed System

Assume that job size S is highly variable.

Question: In an open system, what does $\mathbf{E}[T]$ look like as a function of ρ for the case of FCFS scheduling versus SRPT scheduling?

Question: What about in a closed system? (Pay attention to $\rho \to 1$)