

15.761 Introduction to Operations Management

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1 Little's Law

$$L = \lambda W \quad (1)$$

- L : number of jobs in the process
- λ : job arrival rate
- W : average time each job spend in the process

Caution: watch out for unit conversion, especially time-related units.

2 Queuing Analysis

2.1 Setup

- A : time between successive job arrivals (a.k.a “interarrival time”)
- TODO

2.2 Capacity utilization ρ

$$\rho = \frac{\lambda}{N\mu} \quad (2)$$

- λ : job arrival rate
- N : number of servers
- μ : a server's expected service rate, which is the inverse of the average service time \bar{S}

$$\mu = \frac{1}{\bar{S}} \quad (3)$$

2.3 Coefficient of variation of the interarrival time CV_S

$$CV_S = TODO \quad (4)$$

2.4 Coefficient of variation of the service time CV_A

$$CV_A = TODO \quad (5)$$

2.5 Expected number of jobs in the queue L_q

$$L_q = \frac{\rho\sqrt{2(N+1)}}{1-\rho} \frac{C_A^2 + C_S^2}{2} \quad (6)$$