Kendall's notation

Describing a queueing system

Now we give Kendall's notation in order to describe a queueing system.

Kendall's notation for a queue

- The basic queue is the **M/M/1**, it is generalized into the notation A/B/C/K/Z where:
  - A: inter-arrival time distribution
  - B: service time distribution
  - C: the number of servers
  - K: system capacity
  - Z: service discipline

The basic queue is the M/M/1, it is generalized into Kendall's notation A/B/C/K/Z where: A is the inter-arrival time distribution, B: the service time distribution, C: the number of servers, K: the system capacity, and Z: the service discipline.

Kendall's notation for a queue

A/B/C/K/Z

- where A and B can be:
  - M: Markovian(Exponential) or Memoryless
  - D: Deterministic (Constant)
  - G: General distribution
- Z is:
  - FIFO
  - LIFO
  - RS
  - PS
  - Priority
- Default values: for K is ∞, and for Z is FIFO.

For the inter-arrival and service time distributions A and B, they can take the following values: M: Markovian which mean Exponential or Memoryless distribution , D: Deterministic or Constant distribution , G: General distribution.
The service discipline Z can be: FIFO, LIFO, RS, PS, Priority. The default values: for K is infinite, and for Z it is FIFO.

Kendall's notation: examples

One server

- **M/M/1/∞/FIFO** is equivalent to **M/M/1**: exponential inter-arrival and service times, 1 server, infinite capacity, FIFO service discipline
- **M/M/1/10**: exponential inter-arrival and service times, 1 server, capacity of 10 customers, FIFO service discipline
- **D/D/1**: deterministic (constant) inter-arrival and service times, 1 server, infinite capacity, FIFO service discipline.

Multiple servers

- **M/M/5**: exponential inter-arrival and service times, 5 servers, infinite capacity, FIFO service discipline
- **M/M/8/100**: exponential inter-arrival and service times, 8 servers, capacity of 100 customers, FIFO service discipline
- **G/G/10**: general inter-arrival and service times, 10 servers, FIFO service discipline.

Now we give some Kendall's notation examples. We begin with the case of one server. M/M/1/infinite/FIFO is equivalent to M/M/1: exponential inter-arrival and service times distribution , 1 server, infinite capacity, FIFO service discipline.
M/M/1/10: exponential inter-arrival and service times distribution, 1 server, capacity of 10 customers, FIFO service discipline. D/D/1: deterministic (constant) inter-arrival and service times distribution, 1 server, infinite capacity, FIFO service discipline.

Now, we give some examples with multiple servers.

M/M/5: exponential inter-arrival and service times distribution, 5 servers, infinite capacity, FIFO service discipline
M/M/8/100: exponential inter-arrival and service times distribution, 8 servers, capacity of 100 customers, FIFO service discipline
G/G/10: general inter-arrival and service times distribution, 10 servers, FIFO service discipline.

A finite capacity queue

Poisson arrivals, Exponential service times

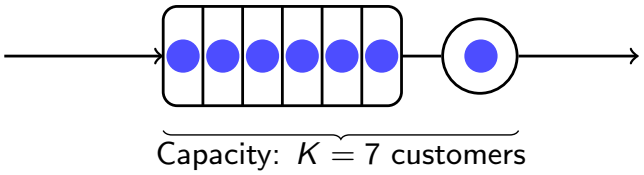

Figure: A=B=M, C=1, K=7, Z=FIFO: M/M/1/7 queue

The present figure represents the M/M/1/7: Exponential inter-arrival and service times distribution, one server, and a capacity of 7 customers.

A multiserver queue

Poisson arrivals, Exponential service times

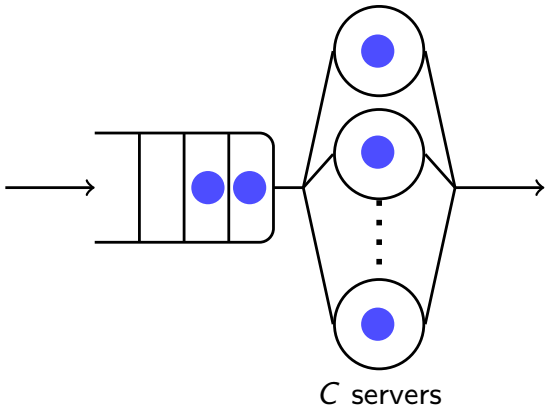

Figure: A=B=M, C servers, K=∞, Z=FIFO, M/M/C queue

And this figure represents a multi-server queue M/M/C, exponential inter-arrival and service times distribution, with C servers, and an infinite capacity.