This video was dedicated to **birth-death processes**. These are important particular cases of continuous time Markov chains.

In particular, any queuing system with Poisson arrival and exponential service durations can be modeled as a birth-death process.

Let us summarize the main results that we have learnt:

- a **birth-death process** is a CTMC where **the only transitions possible are from i to (i+1) and from i to (i-1)**
- in birth-death processes **global balance equations** are equivalent to **local balance equations**
- if λ(i) is the transition rate from i to i+1 and if μ(i) is the transition rate from i to i-1 then the **steady state distribution** has the following form:

$$\pi_i = \frac{\prod_{j=0}^{i-1} \lambda_j}{\prod_{j=1}^{i} \mu_j} \pi_0$$

  where π_0 can be obtained from the normalizing condition

$$\sum_i \pi_i = 1$$

Question 1

1 point possible (graded)

In the general case of a continuous time Markov chain the local balance equations are equivalent to the global balance equations:

- ○ true
- ○ false