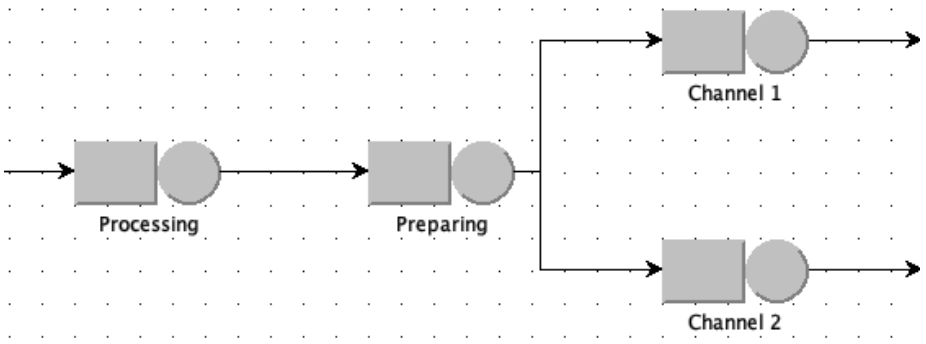
Performance indices of a warehouse

A warehouse receives order at rate λ. Each order is processed in First-Come-First-Served, and a maximum of $K = 5$ pending orders is allowed: in case further requests are received, they will be dropped. The average processing time is exponentially distributed, with an average service time of $S_1 = 2\ min$. Orders are then prepared in Last-Come-First-Served, with a buffer of $K = 10$ requests; should this capacity be reached, the processing node will be blocked in BAS mode. The average processing time is exponentially distributed, with an average service time of $S_2 = 3.5\ min$. The system has two distribution channels, characterized by an exponentially distributed service time with average $S_3 = 6\ min$ and $S_2 = 5.5\ min$, selected in a Round-Robin fashion. A possible model for the system is shown below:



Considering a variable input rate between $\lambda = 10\ req / h$ and $\lambda = 20\ req / h$, compute using JMT:

1. The system throughput
2. The drop rate of the Processing station
3. The system response time
4. The average response time of the four stations