

# Optimal control of a queueing system

Mario Lefebvre and Roozbeh Yaghoubi \*

## Abstract

We consider the  $M/M/k$  queueing model modified as follows: we assume that one can decide how many servers are working at any time. Suppose that at a given time instant, there are  $k + l$  customers in the system and that they are all waiting for service. Our aim is to determine how many servers should be used in order to reduce the number of customers to  $k + r$ , where  $0 \leq r < l$ , as rapidly as possible, while taking the control costs into account. The dynamic programming equation satisfied by the value function is obtained in the general case, and particular problems are solved explicitly.

---

\*Polytechnique Montréal, mlefebvre@polymtl.ca, roozbeh.yaghoubi@polymtl.ca