A correlated queue by different arrival distributions

한양대학교 산업공학과
허 선

ABSTRACT

It is obvious that most queueing related models in real-life system contain various types of dependencies. Analytical difficulties, however, arise when one try to solve the effect of the dependent arrival and/or service process to the performance measures of queues. This makes the most research on queueing theory starts independence assumptions, e.q., the arrival and servive processes are i.i.d. sequences.

In this research, we investigate the effect of dependencies caused by the different type of arriving customers on the queueing performances. A special structure of the arrival process is considered to extract the pure effect, that is, we keep the marginal interarrival time distribution always the same. This effect may reflect the feasibility of grouping and reducing the number of different customer types to be considered in a real life model.

We showed that a larger number of arrival types make the correlation coefficient in the arrival process larger under some assumptions. A numerical study shows, under heavy traffic and low jump intensity, this parameter has a remarkable influence on the queueing behavior. This effect, however, does not look significant when the traffic intensity is low and jump intensity is high.