BOOK REVIEW

László Lakatos, László Szeidl and Miklós Telek:

Introduction to Queueing Systems with Telecommunication Applications. Second Edition

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The book is an extended and revised version of the first edition by the same authors which appeared in 2013 at Springer. It consists of two main parts: mathematical background and queueing systems with applications, and contains 11 chapters.

The development of queueing theory dates back to more than a century. Originally the concept was examined for the purpose of maximizing performance of telephone operation centers, but it was realized that issues in this field, that were solvable using mathematical models, might arise in other areas of everyday life as well. One can mention the planning of emergency medical services, computer operation, banking services, transportation systems, or other areas. The common feature is that demands and services occur and irrespective of their concrete meaning one is dealing only with moments and time intervals. It is interesting that beginning of queueing theory is closely connected to the appearance of telephone operation centers more than a century ago, it still plays an important role in the planning, modeling and analyzing of telecommunication networks supplemented by the up-to-date simulation methods and procedures.

The mathematical background presented in Chapters 1-5 is an introduction to probability theory and stochastic processes including classical Markov chains, renewal and regenerative processes, the actually often used Markov chains with special structures: phase-type distributions, Markov arrival process and quasi-birth-death process.

The second part, Chapters 6-11, is devoted to queueing models and their applications. Chapter 6 serves as introduction, Chapter 7 considers the classical Markovian (from M/M/1 to M/M/1//N), Chapter 8 the non-Markovian (M/G/1, G/M/1) queueing systems. Chapter 9 gives an overview of application of structured Markov chains from the PH/M/1 queue to the queues with underlying G/M/1 and M/G/1 type processes. Chapter 10 presents the classical queueing network models. Chapter 11 is devoted to applications. There are queueing models for bandwidth sharing, packet transmission, the ALOHA and IEEE 802.11 protocol, there are mentioned some special service disciplines like priority, retrial and cyclic-waiting systems, queues with negative arrivals. As appendix the book gives the Laplace and z transformation rules, Bessel function.

Differing from the first edition each chapter contains problems with detailed solutions, sometimes they are elementary, but in several cases they help to more profoundly understand the used tools.

The book gives an introduction to the classical queueing theory and its actual problems, beyond the well-known methods it collects some original results obtained by the authors and published in journals and conference papers. It can be used as a one- or two-semester course on queueing theory and may be useful for specialists dealing with problems in applied probability theory, in telecommunication and other fields requiring the application of queueing methods.