

Sojourn time approximations in a two-node queueing network ^{*}

O.J. Boxma^{1,2}, R.D. van der Mei^{2,3}, J.A.C. Resing¹ and K.M.C. van Wingerden²

¹ Eindhoven University of Technology, Mathematics and Computer Science
P.O. Box 513, 5600 MB Eindhoven, The Netherlands

² CWI, Advanced Communication Networks
P.O. Box 94079, 1090 GB Amsterdam, The Netherlands

³ Vrije Universiteit, Faculty of Sciences
De Boelelaan 1081a, 1081 HV Amsterdam, The Netherlands

Abstract. We develop a method for approximating sojourn time distributions in open queueing networks. The work is motivated by the performance analysis of distributed information systems, where transactions are handled by iterative server and database actions. In this paper we restrict ourselves to a system with one server and a single database, modelled as an open two-node queueing network with a processor sharing node and a first-come first-served node. Extensive numerical results are presented for approximations of the mean sojourn time. The accuracy of the approximations is validated with simulations.

Keywords: two-node open queueing network, sojourn times, approximation.

1 Introduction

The dramatic growth of the Internet and the popularity of PCs have boosted the emergence of so-called Web services technology to compose new and advanced services on top of existing basic services. A typical example of such services that are built on top of existing services is holiday package reservation where the consumer can make a reservation for a hotel, a car and an airline ticket at once. Other examples are PC banking, and on-line services offered by a telephone company that enable the customers to check the status of telephone bills at their home PC with Internet access. A typical feature of this type of distributed applications is that a single transaction initiated by the end user may induce a sequence of server and database transactions. A key factor for the success of this type of services is that the response times observed by the end user are not overly long. This has motivated us to study response times in distributed systems in a queueing-theoretical framework, where the customers represent end-user initiated transactions, the network nodes represent the

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