

Modeling Web Service Interaction Using Markovian Processes

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Nowadays E-Market forms a crucial part of our life; there are a lot of E-Commerce sites available worldwide. Customers of an E-Commerce site interact with requests in a session. A session identifies a navigation pattern through the sites. These customers use different navigation patterns, thus they make different workload for E-Commerce systems. Performance is one of the main challenges in designing an E-commerce or E-business application. To identify the performance for these systems, workload has to be determined. Our aim is to characterize typical user workload to reproduce user behavior before the site is developed, even during a modeling process. This article proposes mathematical models describing E-Commerce Systems along with a new method to estimate one important parameter of system workload, the average visit length. Several techniques can be applied to characterize system workload. One of these techniques is to analyze the Customer Behavior Model Graph while another approach is to use Markov Chains. A simple transformation has to be applied to transform CBMG graphs to stable Markov chains. Further methods include using mathematical models like Phase-type distributions or QBD (Quasi Birth Death Process) processes. In order to use these methods a transformation has to be applied to estimate the intensity matrix belonging to the CBMG graph. Finally typical E-Commerce systems are modeled using MAP / PH / 1 processes because service process can be modeled as Phase-type distribution and MAP is the one of the most general arrival processes. Average queue-length, waiting time and other characteristics of these E-Commerce systems can be calculated using these mathematical models. It is illustrated with measurement results that average visit length converges to the stationary distributions of the Markov chain representations.

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