Abstract

Mobile agents are a quite new and interesting paradigm for the implementation of distributed systems. As with most distributed systems, mobile agent applications are usually developed and installed without regarding performance aspects. Typically, methods and tools for capacity planning differ fundamentally from methods and tools for system development, thus system developers often avoid additional modelling and planning effort. This dissertation helps to solve this problem by presenting an approach to easy integrate performance modelling into the development process of mobile agent applications. Most mobile agent applications contain the same basic scenarios, which include stationary agents with the role of servers and mobile agents as clients. Based on these scenarios, this dissertation describes a new modelling approach and a methodology for capacity planning of mobile agent systems with an emphasis on intranet applications.

The core idea of the new modelling approach is to directly integrate byte code of real agents in a simulation environment. Thus, it is not necessary to describe agents' behaviour on a high abstraction level. Their behaviour results from their program code. To build performance models, a system developer mainly has to specify the infrastructure of the mobile agent system and parameters for time consumption. Moreover, this dissertation focuses on providing algorithms to increase the efficiency of simulation models of mobile agent systems. As existing approaches are not applicable to the presented modelling technique, new methods are developed which consider special features of mobile agent systems and which regard the objectives of this dissertation. A methodology for capacity planning of general heterogeneous IT systems is adjusted to mobile agent systems according to the developed modelling techniques.

The modelling concepts and the methodology for capacity planning are first presented and explained. They are implemented using the mobile agent platform *Tracy*[1] and the simulation package *JavaDEMOS*[2]. Finally, the applicability of these approaches are demonstrated by a realistic case study.

1. *Tracy* has been developed at the Friedrich-Schiller-University of Jena by the research group of Prof. Dr. Wilhelm Rossak.
2. *JavaDEMOS* has been developed at the University of Essen by the research group of Prof. Dr. Bruno Müller-Clostermann.

Abstract