Programming distributed and adaptable autonomous components: the GCM/ProActive framework


Abstract

Component-oriented software has become a useful tool to build larger and more complex systems by describing the application in terms of encapsulated, loosely coupled entities called components. At the same time, asynchronous programming patterns allow for the development of efficient distributed applications. While several component models and frameworks have been proposed, most of them tightly integrate the component model with the middleware they run upon. This intertwining is generally implicit and not discussed, leading to entangled, hard to maintain code. This article describes our efforts in the development of the GCM/ProActive framework for providing distributed and adaptable autonomous components. GCM/ProActive integrates a component model designed for execution on large-scale environments, with a programming model based on active objects allowing a high degree of distribution and concurrency. This new integrated model provides a more powerful development, composition, and execution environment than other distributed component frameworks. We illustrate that GCM/ProActive is particularly adapted to the programming of autonomic component systems, and to the integration into a service-oriented environment.