Abstract

In this work we investigate the guarantee of nonfunctional requirements of quality of service (or QoS), which are specified by QoS contracts in distributed applications. Such requirements can be associated to resources or services, such as processing and communication, that are required and shared by several applications.

In this context, mechanisms to verify the attendance of the applications' requirements and to monitor the usage level of the available resources are required. This approach allows situations in which inadequate services are being delivered to be identified, and as a response to perform adaptation activities, aiming to provide guarantees of quality at the application level.

The infrastructure required to ensure the required quality of service can be implemented either in an ad-hoc manner (application specific) or in a generic and reusable way by a suitable framework, such as that used in this work, named CR-RIO (Contractual Reflective - Reconfigurable Interconnectable Objects).

In particular, we investigate the inclusion of standard mechanisms for resource monitoring and location into the CR-RIO. In addition, we developed a set of applications with QoS requirements, using CR-RIO´s specification and contract management mechanisms. Based on the experiments performed using the framework, we identified increases in application performance as well as better utilization of the available resources. Moreover, we observed the advantages and disadvantages of its deployment when compared to an application specific (ad hoc) implementation.

Keywords:

Autonomic computing, CBabel, CR-RIO, monitoring, nonfunctional requirements, NWS, QoS contracts, resource selection, run-time adaptation, self-configuration.