Abstract

Ubiquitous, pervasive and self-adaptive distributed systems have specific requirements regarding the resources to be used by the infrastructure or by the components of the applications. Morover, auto-adaptive, ubiquitous and pervasive applications are aware of the context of these resources, regarding their availability or their quality. This work presents a proposal for two services that have to be ideally integrated into the infrastructure on the mentioned class of application: (i) a Context Service, which provides access to context information of the resources; and (ii) a Discovery service, which allows the dynamic discovery of resources, considering resources constraints to be satisfied. A standard high-level interface is proposed for both services, hiding the low-level implementation details.

The Context and Discovery Services were integrated to CR-RIO (Contractual Reflective-Reconfigurable Interconnectable Objects), a framework to manage adaptive applications, which adopts Software Architectures as its conceptual foundation. To this end we (i) extended CR-RIO's contract description language allowing the specification of dynamic requirements regarding the context of the resources and (ii) we mapped the extensions proposed in the language into actions to be performed in the existent support infra-structure, introducing the Context and Discovery Services in a modular fashion.

The relevance of the Context and Discovery Services to the development and management of context-aware applications, and the adequacy of the integration of these services to CR-RIO's infrastructure are shown using examples. These examples comprise "legacy", as well as pervasive, distributed applications, which have context constraints in its offered services. In that way, they also need to dynamically discover and monitor the resources. The achieved results allowed us validate our proposal.