Decentralized Architectures for Multi-Objective Autonomic Systems

Résumé du projet de recherche (Langue 1)

Autonomic Computing is a relatively new research initiative that aims at enabling computer systems to manage themselves. Autonomic systems should be able to self-optimise, self-configure, self-repair and self-protect, while minimising or completely eliminating the need for human intervention. This initiative mainly targets large-scale, distributed and dynamic computer systems, such as enterprise and pervasive systems, because of their inherent complexity and engendered management challenges. Nonetheless, successfully administrating complex software systems implies developing complex autonomic management solutions. This is a natural consequence of the very purpose that autonomic systems must serve, which is to absorb the complexity of currently manual tasks and leave simplified, intuitive and high-level interfaces for human administrators. Namely, autonomic systems must be capable of: -* Attaining their administrative goals while faced with a wide range of unexpected conditions -* Maintaining a good-balance among multiple, potentially conflicting administrative goals -* Cooperating with other autonomic managers for attaining common business objectives -* Adapting and evolving internal management strategies so as to respond to dynamic changes Designing, developing and maintaining autonomic solutions that meet these requirements is a challenging task, at best. Existing autonomic management projects focus whether on addressing specific management concerns (e.g. monitoring, pattern recognition, optimisation or learning), or on administering a specific system type, with respect to a specific business goal. The few autonomic management architectures available offer useful design guidelines and best practices, while remaining too general for being applied as such. Lack of reusable support requires complex autonomic solutions to be developed from scratch, at each time. This significantly hinders their success and consequently the overall development of the autonomic computing field. This thesis will address this shortcoming by investigating and producing a highly reusable, customisable and extensible solution for the creation of autonomic systems. The application domain considered will be pervasive computing, with a specific focus on ambient intelligence use-cases. Considered scenarii will include rich settings involving interconnected home equipments (e.g. gateway and sensors) and services relative to electricity distribution and consumption management. Obtained results will be evaluated and validated against such scenarii, which are to be provided by EDF.