

Problem Statements of self-management in service deployment by autonomic systems (VELTI)

This document reports the identified issues and topics that require an extensive and targeted research around the domain of service deployment in autonomic / self-managing systems and the corresponding performance factor analysis. The later includes the analysis of an enhanced functionality performed by the self-management framework (at least) at the node level in order to guarantee specific purpose self-awareness of end user service / application active session during changing conditions (network or context). Service deployment in autonomic environments (primarily heterogeneous) requires efficient and increased management capability of specific system-dependent performance parameters that are of major importance for the implementation of service self-orchestration operations (e.g. self-composition, self-adaptation,) as part of the existing self-management framework.

From the service deployment perspective of autonomic systems the following identified issues require further targeted analysis and investigation and in general can be categorized into two prime domains:

- The network domain, and
- The context domain

The network domain includes all the already identified aspects and factors of the typical autonomic systems however under careful interpretation for the service session management and performance optimization purposes. Towards that direction the following issues have been identified:

- The need to define and specify common components in traditional management architecture still remains ultimately valid for self-management in autonomic service deployment however the framework should be enhanced with new/updated performance indicators or metrics to feedback the latest service generation quality requirements (e.g. metrics for combined Quality of Experience vs. Quality of Service or QoE/QoS evaluation). Indicatively, the service dependent QoE accepted levels significantly vary per network conditions in terms of traffic, connectivity, QoS, context and content representation, necessitating the re-consideration of the common self-management platform features and components. One could say that the underlying realms of Internet of Services and Internet of Things are now

interacting through a common network/context self-managed while on a service dependent way.

- Definition of QoE as part of existing QoS framework for autonomic heterogeneous environments requires the specification/implementation of autonomic end-to-end QoS and not only last mile or access technology-dependent QoS. The later requires also some form of centralized management (especially for monitoring) which at this stage autonomics may not support that capability.
- There is a need to define a semantic-based framework for the description, composition and orchestration of autonomic enabled services in Next Generation Network (NGN) systems (e.g. IMS) while enhance the existing Web Service Resource Framework (specify the WSDL/WSDM extensions for autonomic service management) as well. As a bottom line it seems that SOAP may not be enough to support services in integrated autonomic environments [1].

Context awareness in networks and services still remains a key prerequisite for the realization of autonomics communication vision. Its ultimate factor of success depends highly on the self-awareness capability that in the case of service awareness requires a re-consideration of existing framework in order to incorporate service /application relevant features and parameters as well.

Self-awareness in autonomic service deployment deals directly with self knowledge, continuous optimization, dynamic restructure and adaptation of service quality dependent parameters and the respective underlying networking system features in order to adapt to (un) predictable conditions and changes to access environments, prevent and recover form failures and guarantee service continuation even in the worst case scenarios.

In EFIPSANS context management is proposed to be performed by an independent decision element component that achieves context awareness in service autonomicity through its direct interaction with the corresponding mobility and QoS decision elements. The identified issues for further investigation can be summarized as:

- Context ontology & modeling for autonomic environments
- Context discovery, data gathering and processing
- Interfacing for dynamic context awareness in autonomic networking environments

References

- [1]. <http://www.ibm.com/developerworks/library/ac-wsrf.html>