Value-chains and Mass-Customization

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Abstract

In an e-business world, configuration processes are becoming increasingly distributed. Collecting product information to process it in a centralized configuration system is only feasible in some domains. This short paper argues that in telecommunications, a distributed configuration transaction-oriented process is required. After the theorectical arguments, a particular service management system is discussed to illustrate the arguments.

Configuration Issues

A value-added product consists of many components from various suppliers, including internal divisions. Due to the resulting value-chains, mass customization requires information-chains. That means that the configuration information has to be assembled along the supply-chain of each product. This poses many questions, including:

- Are standard formats for product descriptions needed or can ontologies mediate between different domains?

- Should the information be collected by the value-added producer or should the configuration be carried out in a distributed fashion?

- How much information is exchanged between the various suppliers, some of which might also be in competition?

An Example

End-to-end telecommunication services between two locations a and z are composed out of an access service at location a, one or more backbone services, and another access service at location z. Each service provider is operating its own network, which is inter working with neighboring networks at peering points.

Such services are provisioned either by network protocols (like, IP and IP routing protocols) or network management systems (Galis et al. 1996). In both cases, a customer has a contract with its service provider that specifies the service provided in terms of a service level agreement. To provision and end-to-end service that satisfies the service level agreement, the service provider has to configure its resources and potentially obtain resources from other networks.

In (Galis et al. 1996; MISA), an end-to-end path is computed across all domains that satisfies the customer requirements. These requirements are entered by the customer himself, so that the MISA service management system is actually a distributed configuration system. The information exchange between operators and between consumers and operators is standardized in this system.

Computing an optimal end-to-end path requires that sufficient information is available from each network. This information may be commercially sensitive, so that the operators are not willing to disclose it fully. Therefore, end-to-end paths can be computed in two ways (Karali et al. 1998):

- An request for a connection between a and z is forwarded to all potential peer service providers by the access provider A at location a. Each of these providers forwards the request to its peers until z is reached. A selects the globally optimal path among all the computed paths.

- An abstraction of each network is made available to all service providers, such that an access provider (like A) can configure an end-to-end path (Karali et al. 1998). Optimal paths are only computed if the used abstraction is compose-able (Liver 1999).

The configuration process for mass-customized products is complicated considerably by the fact that products, like network services and network-based services, are composed out of components from different suppliers. Furthermore, such services cannot be produced independently, so that the network resource management system has to be involved in the configuration process. This leads to a distributed configuration process. The process is indeed a concurrent and distributed transaction with a role-back mechansism. This process requires some degree of cooperation between competing suppliers.

In addtion to the resource-bound, end-to-end properties (e.g., bandwidth, delay, and so on) discussed in this paper, telecommunication services have also other properties (e.g., protocols and interfaces), which do not demand a distributed configuration process. This suggests to combine different configuration approaches for self-provisioning and mass customization solutions.

In the telecommunications domain, the supply-chains are often already dynamic. Electronic markets have the potential to lead to more dynamic value-chains for telecommunication services and other goods as well. The issues brought up in this short paper are hence potentially relevant for configuration in general.

References

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