Business Service Scheduling

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ABSTRACT

The management and predictive planning of the processes to create business services is more difficult than the planning of production processes, because services cannot be produced in stock and customers are involved in their creation. In this paper, the author proposes a method for service scheduling and optimization based on an ontology to describe business services and related concepts. The author schedules operations required to create a service. With each service process and its operations, soft and hard constraints on the execution of operations and the required resources are posted. These constraints are derived from service level agreements. A legal plan must then satisfy all hard constraints. All soft constraints are matter of optimization. Using a tabu search, a near-optimal solution of the service scheduling problem is achieved.

Keywords: Business Service Scheduling, Business Services, Service Description, Service Management, Service Scheduling, Service Science

INTRODUCTION

In business management and especially in marketing a shift of interest from product to services can be observed. Since in the most economies the service sector has grown considerable the management of services becomes more and more important. A service focus can be also seen in information technology where service-oriented architectures are promoted to master the complexity of distributed applications and sometimes to enable new flexible business models that require ad-hoc communication and cooperation between business partners. In the following we consider services on a business layer but our elaboration has also impact on service-oriented architectures.

Often services are explained as an opposite of products. A person or a legal organization may own a product or may use a service. The lifetime of a service is rather short in contrast to most products. Since there is still a predominant management theory on products many business entities (e.g. banks) offer their services as products. This gives customer the impression to own something. We follow, however, a new approach, the so called service-dominant logic of Vargo and Lusch (2006) where services are seen as a concept embracing products or goods. In this approach products are seen as means for distributing services. If we buy an iPhone we use the product to consume services such as mobile communication, email, mobile listening to music and many more. Each customer has his/her individual expectations on the services s/he will obtain. Typically a bunch of services is offered and for this offer also different providers are responsible. Service system is a concept to describe the common offer of services by different providers (Spohrer et al., 2007).

DOI: 10.4018/jal.2010100104
Traditional management methods focus on products. One reason is that it is easier to manage products than services because products can be produced on stock and production management is much easier if lots of goods are produced together. Services, however, are individualized and are configured in a process between provider and customer. They are consumed in a process not in an instant point of time. Moreover, services cannot be stored. The resources required to provide a service may be available during the consumption. This makes it more difficult for a provider to offer resources efficiently. To be on the safe side, more resources are typically reserved as required during normal operation. Service level agreements may result in a differentiated models of reservation of resources (Dorn & Werthner, 2008).

In principle, a provider tries to find a trade-off between a customer’s expectations and the efficient usage of resources. There may be hard constraints given by service level agreements between customer and provider and soft constraints derived from preferences of an individual user. These soft constraints are matter of optimization in order to improve the customer’s satisfaction.

By service scheduling we understand now the process of planning the services for many customers with different expectations in an optimized manner. In scheduling and production management theory some approaches exist to schedule such individualized “production” processes, but an optimal solution cannot be guaranteed for such complex problems. We applied iterative improvement methods (e.g. tabu search, simulated annealing, genetic algorithms) for finding near optimal solutions in former research (Dorn, 1995; Dorn et al., 1996). Tabu search was the best solution in performance and development (Dorn, 1995). Iterative improvement methods cannot only be used to optimize a schedule/plan but also to react if something changes in the environment. For example, if an order is cancelled or a new order is introduced, such a search method is able to repair a plan locally. To guide the search for a near optimal solution, an evaluation function is required. In our case, the evaluation function is derived from service level agreements.

In the following we first describe different approaches and ideas in service management that motivate our representation of business services. We then describe the representation and afterwards we sketch the search procedure as well as the evaluation function. Finally we conclude.

BACKGROUND

Service Science, Management, and Engineering (SSME) describes an interdisciplinary approach to analyze, design and implement services systems – complex systems in which specific arrangements of people or organizations act to provide value for others. SSME applies science, management, and engineering disciplines to tasks that one organization beneficially performs with others. SSME calls academia, industry and government to focus on becoming more systematic about innovation in the service sector, which is the largest sector of the economy in most industrialized nations, and is fast becoming the largest sector in developing nations as well. SSME is also a proposed research area that integrates – rather than replaces – the other disciplines contributing knowledge about service in order to improve innovation (Maglio et al., 2006).

In economic science, the service sector is often called tertiary sector besides agriculture and manufacturing. Intuitively, services are activities that a person or an organization does for the benefit of another – such as selling or transporting goods, repairing a machine or running a business’s IT infrastructure and applications. Vargo and Lusch (2006) propose the so-called service-dominant (S-D) logic for marketing which is in many aspects in accordance with other insights into services. A service is defined as some intangible entity that is exchanged between a provider and a client. With a service some subjective customer-estimated value is assigned. The provider typically applies certain competencies (knowledge, social skills and
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