Queuing Networks for Designing Shared Services

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INTRODUCTION

Shared services have been widely implemented in many government and business organizations (Janssen & Joha, 2006; Leavell, 2006; Rolia, Cherkasova, Arlitt, & Machiraju, 2006; Ulbrich, 2006; Wang & Wang, 2007; Williams, 2006). Government and large business organizations often have many operational units. Each operational unit provides and supports particular business functions to the organization. For shared services, common business functions are consolidated and shared by different operational units within the organization in order to reduce operational cost and to increase information and knowledge sharing. Shared services generally require significant transformation and optimization of business processes. Cost saving and knowledge sharing within the organization are the strategic opportunities of shared services (Davenport, Harris, & Cantrell, 2004; Davenport & Short, 1990).

One of the important aspects of successful shared service design is to maintain specified service levels for each operational unit that uses the shared service. Different operational units have different requirements about the completion time of the tasks (Wang, 2007). It is important and necessary to ensure all these requirements are fulfilled when designing shared services. Multi-class product-form queuing networks have been widely used as an analytic tool for predicting the completion time of tasks in a system (Bolch, Greiner, Meer, & Trivedi, 2006). They can facilitate the successful design of shared services by checking whether all requirements of different operational units are fulfilled (Wang, 2007). Checking whether all requirements of different operational units are fulfilled means to solve the corresponding multi-class product-form queuing network model of the shared service. However, as the complexity of shared services increases, the computational time for solving a multi-class product-form queuing network model becomes prohibitive large. Various approximate Mean Value Analysis algorithms have been proposed to solve multi-class product-form queuing network models with much reduced computational time and a reasonably accuracy (Wang & Sevcik, 2000; Wang, Sevcik, Serazzi, & Wang, 2008). In practice, these approximate algorithms can be used together with multi-class product-form queuing network models as an analytic tool for facilitating the successful design of shared services.

BACKGROUND

Large organizations often have many operational units. Each operational unit focuses on its core business functions, and also supports necessary non-core business functions. In order to reduce operational cost, common non-core business functions can be consolidated within the entire organization and implemented as shared services. Shared services provide common non-core business services to different operational units, and allow each unit to focus on its core business functions. Generally, information systems services, accounting and financial services, and human resource management are the designated lines of business processes for shared services.

Research has indicated that successful design of shared services requires new organizational structures (Gulati & Singh, 1998; Kakabadse & Kakabadse, 2000). Shared services drive all operational units of the organization to form a network with the nucleus of shared service centers. A shared service center provides one or more types of non-core services to operational units in a more economical and more effective way. During the design of shared service centers, business process reengineering (BPR) is often used to re-examine the business processes and the relationships between involved operational units (Ulbrich, 2006). Success of shared services has been reported in the many fields, including information systems services, accounting and financial services, and human resource management (Ulbrich, 1995).

Information technology creates fertile soil for shared services (Wang & Wang, 2007). It makes information and knowledge sharing more effective within shared service centers as well as throughout the entire organization, which would also dramatically improve the business performance.

The goals of shared services are:

1. Lower the operational costs of business processes.

2. Increase the quality of the services through business process reengineering and knowledge sharing.
3. Improve the business performance of the organization through a focus on core business functions.

MAIN FOCUS

As more organizations have engaged in shared services, there has been a growing realization of the importance of designing shared services. Many organizations have discovered that it requires considerable efforts to make shared services suitable for their specific situations (Baron & Bitran, 2005; Rison, 2005; Wang & Wang, 2007). One of the important aspects of successful design of shared services is to maintain specified service levels for each operational unit. As a shared service center provides services to different operational units that have different requirements about the completion time of the tasks, it is important and necessary to ensure all these requirements are fulfilled when designing shared services.

Multi-Class Product-Form Queuing Networks

Multi-class product-form queuing networks have been widely used for performance analysis of resource sharing systems, such as communication networks and computer systems (Bolch *et al.*, 2006). They are capable of providing accurate estimations of the completion time of different types of tasks in a resource sharing system. As a shared service center can be treated as a resource sharing system where employees and equipments in the shared service center are the resources for delivering services, multi-class product-form queuing networks are capable of predicting the completion time of different tasks performed by shared service centers (Wang, 2007).

A queuing network consists of a collection of service centers that represent the resources for

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