Chapter 7

Integrating Web 2.0 and RESTful Web Services in Enterprise Grids: An Architectural Approach

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ABSTRACT

The integration of service-oriented architecture (SOA) and grid computing has been gaining momentum since the early 2000s. Most of the SOA-based grid implementations have been created using the lingua franca of the web services, namely SOAP, XML-formatted, message-based services. Although this technology provides advanced features such as security, transactions, reliability and workflow, these features are not always used in grid implementations. Adding these sophisticated features to the technology stack when they are not needed or used makes the implementations difficult and tedious for implementers. Web 2.0 and REST offer a set of techniques and tools that results in a paradigm shift in the web and enterprise applications. This chapter discusses the integration of Web 2.0 and RESTful web services into grid implementations. The suggested techniques and technologies alongside the proposed architecture will be discussed. Moreover, this chapter will explain how this model is useful and greener.

INTRODUCTION

The idea of networking a set of scattered computers that appear together like a virtual supercomputer has been mentioned before (Grimshaw & Wulf, 1997). Grid computing refers to the ability to combine and coordinate heterogeneous computing resources, usually from geographically dispersed locations, to obtain powerful computing capabilities (Foster & Kesselman, 2003). These abilities can solve computationally-intensive problems in a fast and cost-effective manner.

Grid computing is a form of distributed computing that allows parallel processing for computational tasks and large datasets. In this model, the original task is broken into a number of smaller and simpler
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Tasks (i.e., subtasks). These subtasks can be concurrently processed on a group of computing nodes (e.g., desktops, servers, and clusters). Virtual organization (VO) is a common term in grid computing, which refers to a set of institutions (or individuals) that work together to achieve a common goal. VOs usually share their computing resources, enabling them to solve complex computation problems quickly and efficiently (Foster et al., 2001).

Many implementations have offered the grid resources and functionalities in forms of abstracted, coherent, loosely-coupled and easy-to-use services. However, most of the recent implementations are message-based that have been created using the so-called “big” web services or WS-* as officially known. As will be discussed later in this chapter, WS-* (pronounced as WS-star) stack includes the original web services standards as well as a number of new and advanced standards.

Although the WS-* stack offers a set of advanced features (such as security, transactions, reliability and workflow) these features are not always used in grid implementations. Adding these sophisticated features to the technology stack when they are not required may cause complications to the implementation of SOA (Pautasso et al., 2008). Furthermore, the SOAP messages are usually bloated with an excessive amount of (XML) tags and metadata, which causes hindrance in the transmission and processing of the request/response messages. File size and performance issues usually cause debates between implementers when considering SOAP web services over the traditional Remote Procedure Call (RPC) invocations (Riad et al., 2009).

On the other hand, Representational State Transfer (REST) comes with a set of architectural principles for building simple, yet sophisticated, lightweight web services. With RESTful web services, developers can abstract the resources offered by their applications and websites in the form of accessible APIs. RESTful web services have gained a widespread acceptance due to the simplicity of the REST model. HTTP protocol and methods (e.g., GET, POST, PUT and DELETE) manage the interaction between the service builders and consumers. The simplicity and neatness of REST model frees developers from the complexities and slowness of the SOAP-based web services.

Web 2.0 provides a set of standards, protocols and advanced technologies that enable developers to create sophisticated and robust web applications and dynamic pages. These technologies include RESTful web services, AJAX and JavaScript libraries such as JQuery.

This chapter focuses on the utilization of Web 2.0 technologies and REST model to produce and consume grid services in a Web 2.0 fashion. This includes the concepts and high-level architecture. In addition, the chapter illustrates the presented ideas through an integration scenario using an enterprise level application.

The remainder of this chapter is organized as follows: Section Background gives an introduction to grid computing, SOA, Web 2.0, and SOAP and RESTful web services. The next section delves into the technical details of the proposed model. Then, a tutorial with a step-by-step guide on integrating Web 2.0 and REST model into grid environments is exampled. Following that, the chapter discusses how grid computing can make IT solutions greener. Last but not least, the chapter provides a guide on potential future research directions. Finally, the chapter concludes.

BACKGROUND

This section provides broad definitions and discussions on technical terms relative to this chapter.
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