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Chapter XIII

Content Delivery Services in a Grid Environment

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Abstract

In this chapter, we propose a new approach for content delivery services by meshing together the best of grid computing and peer-to-peer (P2P) computing. The goal is to design a secure, reliable, and scalable system for efficient and fast delivery of content. The system consists of a combination of nondedicated servers and peers to provide the proposed service. We describe the challenges of designing such a system and discuss possible solutions and trade-offs. We detail the necessary interlacing of grid and P2P feature to achieve the goal. We present a prototype that is built based on the proposed approach.

Introduction

The concept of a computational grid was introduced in the mid 1990s to describe a distributed computing environment for science and engineering. Since then, a number of computational grids have been successfully developed and utilized to solve big science problems, and the concept of grid (Foster, 2002) has been extended to other domains. In this chapter, we present the use of a grid for distributed content delivery.

The increasing use of online rich-media content, such as audio and video, has created new stress points in the areas of content delivery. Similarly, the increasing size of software packages puts more stress on content delivery networks. New applications are emerging in such fields as bioinformatics and life sciences that have increasingly larger requirements for data.

In parallel to the increasing size of the data sets, the expectations of end users for shorter response times and better on-demand services are becoming more stringent. Moreover, content delivery requires strict security, integrity, and access control measures.

All those requirements create bottlenecks in content delivery networks and lead to the requirements for expensive delivery centers.

The technologies that have been developed to support data retrieval from networks are becoming obsolete. These technologies can be categorized into three groups. In the first category are file transfer mechanisms such as FTP, HTTP, and SMTP. The second category consists of distributed file systems such as DFS, NFS, and WINS. Finally, the third category includes streaming retrieval mechanism such as RTSP and SCTP. Each category provides specialized features for different applications.

In this chapter, we propose a new approach for content delivery services by meshing together the best of grid computing and peer-to-peer computing. The result is a secure, reliable, and scalable system for efficient and fast distribution and delivery of content.

This chapter concentrates on bulk file transfer mechanisms and is organized as follows. In the next section, we present some of the current solutions. We then present the concepts and requirements for using grids for content delivery followed by the description of a particular implementation of those concepts, the IBM Download Grid. Finally, we present our conclusions.