Chapter IV

Simultaneous Database Backup Using TCP/IP and a Specialized Network Interface Card

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ABSTRACT

Data play an essential role in business today. Most, if not all, e-business applications are database driven, and data backup is a necessary element of managing data. Backup and recovery techniques have always been critical to any database and as real-time databases are used more often, real-time online backup strategies become critical to optimize performance. In this chapter, current backup methods are discussed and evaluated for response time and cost. A prototype device driver, RORIB (Real-time Online Remote Information Backup) is presented and discussed. An experiment is conducted comparing the performance, in terms of response time, of the prototype and several current backup strategies. RORIB provides an economic and efficient solution for real-time online remote backup. Significant improvement in response time is demonstrated using this prototype device driver when compared to other types of software driven backup.

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protocols. Another advantage of RORIB is that the cost is negligible when compared to other hardware solutions for backup, such as Storage Area Networks (SAN) and Private Backup Networks (PBN). Additionally, this multilayered device driver uses TCP/IP, (Telecommunications Protocol/Internet Protocol) which allows the driver to be a “drop in” filter between existing hardware layers and thus reduces the implementation overhead and improves portability. Linux is used as the operating system in this experiment because of its open source nature and its similarity to UNIX. This also increases the portability of this approach. The driver is transparent to both the user and the database management system. Other potential applications and future research directions for this technology are presented.

The goal of this work is to show a multifaceted approach that uses software and hardware to provide a cost effective and efficient real-time backup system for databases. This chapter explores the use of a specialized network card and corresponding software to provide service that is demonstrably better than current methods, due to cost containment, ease of operation, real-time backup capabilities, or combinations of all of these. Prior to this research, the only option that approached this level of service was the use of an extremely expensive Private Backup Network (PBN) that does not adequately address the issue of obtaining real-time capabilities. Therefore, this research shows a true real-time system that is hardware and software independent and that can be used by any type of system to achieve the desired features.

INTRODUCTION

Importance of Backup

A company’s information assets are critical to the operation of the business (Preston, 1998). Continuous availability of these assets is a necessary yet vulnerable element of any business. This data is essential to the efficient operation of the business and must be protected. Backups are necessary to safely manage data. Recovering lost data is a difficult and time intensive procedure (Panda & Giordano, 1998). The cost in personnel and equipment for recreating lost data can run into hundreds of thousands of dollars (Bufahiraja, Marzullo, Schneider & Toueg, 1992). According to an estimation of the International Computer Security Association (ICSA), the average cost to restore 20 megabytes of sales and marketing data is 19 people’s days of labor and $17,000. To restore 20 megabytes of engineering data, it costs 42 people’s days of labor and $98,000. Businesses in North America pay more than a billion dollars a year to attempt to recover their data through recovery agencies, but unfortunately these agencies succeed only 40% of the time (Memory.com, 2001). There is
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