Oracle Disk Manager

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EXECUTIVE OVERVIEW

In today's complex, heterogeneous computing environment, Oracle database administrators face many challenges. For example, they need to manage database growth, ensure data availability, and improve performance -- all at the same time.

Oracle9*i* introduces many new features that address these challenges, one such feature is the new Oracle Disk Manager (ODM) interface. ODM is a disk management interface defined by Oracle to enhance file management and disk I/O performance. When implemented in a file system or a logical volume manager, ODM provides many benefits including simplified file administration, improved file integrity, and reduced system overhead.

INTRODUCTION

Oracle Disk Manager is highly optimized for Oracle. For example, the ODM interface allows Oracle kernel to allocate/release disk space, manage tablespaces, and read/write disk blocks directly.

ODM supports all I/O operations, including asynchronous I/O, on both file system files and raw partitions. It allows for all file I/O types on both system files and raw partitions with one system call, which is not possible with native operating system call. ODM includes an advanced file management infrastructure that enables the Oracle Server to create and initialize a file in an atomic operation, which reduces possible file creation errors. ODM eliminates file descriptors, which simplifies operating system kernel configuration and saves operating system resources.

Other ODM capabilities include special locking modes that prevent errors and ability to pass usage hints, such as Oracle file type information and I/O priorities, for third party application integration.

ODM is compatible with Oracle's new and existing features such as Oracle Managed Files (OMF), Recovery Manager (RMAN), and Oracle Mirror Resilvering. ODM is also compatible with the new Oracle Real Application Clusters.

Oracle9*i* automatically takes advantage of ODM interface when the underlying file system or logical volume manager becomes ODM enabled.

File Management

The ODM interface provides alternative means of creating, deleting, and accessing files. A file is considered an ODM file if it is in a file system that supports ODM interface. An ODM file may be created through this interface or it may be created by other applications through standard interfaces. Files that are not ODM files might be accessible through this interface for operations other than create/delete. An example is raw disk access.

ODM files can be backed up and recovered through the Oracle Recovery Manager (RMAN) interface, which allows Oracle to manage the backup and the restore. Backup and restore using RMAN proxy copy is supported. Third party tools may also be used to backup and restore ODM files.

In the ODM interface, a file is opened for access through an "identify" call. Oracle uses a key to ensure that only one Oracle database has the file identified for writing. An attempt by another instance to identify an already identified file will fail if a different key is supplied. This will prevent accidental database corruption by starting two instances that refer to the same file.

When Oracle is creating and loading ODM files, the file does not appear in the namespace, and thus cannot be identified or opened by any other process until the new file is committed. This atomic file creation feature makes adding data files to a database less error prone.

When Oracle creates ODM files, the name selected can be specified to be unique, in which case a "unique string" is inserted into the file name. The "unique string" represents a time sequence, and thus differs from all unique strings that have been used before, even on files that have deleted.

Disk I/O Performance

The standard file I/O interface is not optimal for the Oracle kernel. The Oracle kernel wants to be able to open many files, execute many asynchronous I/O operations concurrently, minimize the number of calls to the operating system, and execute some synchronous I/O operations. In the ODM interface, a single call is used to submit multiple new I/O requests, to get the completion status for multiple requests, and to perform multiple synchronous I/O operations. Rather than having every execution thread open every file, a file is "identified" by one execution thread for access by all threads in an Oracle instance. This eliminates thousands of file descriptors, thereby simplifying operating system kernel configuration and saving operating system resources.

Mirrored Disk Recovery Synchronization

When a system with host based mirroring fails, the disk mirrors must be resynchronized before normal processing continues. Oracle provides resilvering

support to recover mirrors efficiently. The ODM interface lets Oracle know when it is responsible for this resynchronization. The interface also has optional facilities to allow Oracle access to individual sides of a mirror for repairing some kinds of corruption.

CONCLUSION

By leveraging Oracle kernel knowledge, Oracle9*i* offers highly optimized I/O operations through Oracle Disk Manager interface that simplify file administration, improve file integrity, and reduce system overhead.

ODM helps Oracle database administrators to manage database growth, ensure data availability, and improve performance -- all at the same time.

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