Oracle OCFS2 with Dell Compellent Storage Center

Best Practices

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Oracle OCFS2 with Dell Compellent Storage Center
Document Revision

Table 1. Revision History

<table>
<thead>
<tr>
<th>Date</th>
<th>Revision</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4/30/2013</td>
<td>A</td>
<td>Initial release</td>
</tr>
</tbody>
</table>

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Document Conventions

Table 2. Conventions

<table>
<thead>
<tr>
<th>Item</th>
<th>Convention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Menu items, dialog box titles, field names, keys</td>
<td>Bold</td>
</tr>
<tr>
<td>Mouse click required</td>
<td>Click</td>
</tr>
<tr>
<td>User Input</td>
<td>Monospace Font</td>
</tr>
<tr>
<td>User typing required</td>
<td>Type:</td>
</tr>
<tr>
<td>System response to commands</td>
<td>Blue</td>
</tr>
<tr>
<td>Output omitted for brevity</td>
<td>&lt;...snipped...&gt;</td>
</tr>
<tr>
<td>Website addresses</td>
<td><a href="http://www.dell.com">http://www.dell.com</a></td>
</tr>
<tr>
<td>Email addresses</td>
<td><a href="mailto:name@dell.com">name@dell.com</a></td>
</tr>
</tbody>
</table>

Notes are used to convey special information or instructions.

Timesavers are tips specifically designed to save time or reduce the number of steps.

Caution indicates the potential for risk including system or data damage.

Warning indicates that failure to follow directions could result in bodily harm.
Audience

This paper is intended for Database Administrators, System Administrators, Storage Administrators, and Architects that design, maintain, and need to understand how to configure Oracle databases on Dell Compellent Storage Center. Readers should be familiar with Dell Compellent Storage Center and have prior experience in configuring and operating the following:

- Oracle Architecture
- Oracle 10g and 11g
- Real Application Clusters (RAC) or Single Instance
- Replication Technologies
- Oracle’s Automated Storage management (ASM)
- General understanding of SAN technologies

Scope

When designing the physical layer of a database, DBAs must consider many storage configuration options. The storage solution must facilitate high performance I/O. It must protect against failure of storage hardware, such as disks, host bus adapters (HBAs), and fabric switches. The strains of a growing and ever changing workload imposed upon the storage solution require the SAN configuration to be dynamic. These same strains also create additional work for the storage administrators and require them to be much more responsive to the needs of the business. Having storage related tasks automated reduces the risk of human error, and allows DBAs to concentrate on other business critical database administration functions and services.

This paper explains how to combine Oracle with Dell Compellent storage technology to meet these challenges. This paper will describe the features and terminology from Dell Compellent and Oracle. Migrating from OCFS to OCFS2 is out of scope of this document.
Introduction

In December 2002 Oracle released Oracle Cluster File System (OCFS), a free, open-source, POSIX-compliant, extent-based, shared-disk cluster file system for Linux 2.4, which was accepted into the 2.6.16 Linux kernel. OCFS provides high availability in cluster-aware applications, like Oracle Real Application Cluster (RAC), so they can failover in the event of node failure, and high performance by way of cache-coherent parallel IOs from multiple nodes for scalability. In addition to this, OCFS permits a RAC database to exist without RAW devices and provides the ability of all nodes to concurrently access a device by passing through the standard file system interface.

OCFS was architected and designed to support all database files including control files, redo logs, archive logs, and data files. It made great strides in making a RAC environment easier to manage in a Linux environment. However, even with OCFS capabilities, there still was a limitation with using it as a general-purpose file system. This limitation was overcome with the release of OCFS2, which included features of a general-purpose file system to manage almost all applications, including oracle binaries and configuration files that reside in ORACLE_HOME. Currently OCFSs is used in many different implementations including but not limited to: Oracle E-Business Suite, SAP’s Business Intelligence Accelerator, Oracle RAC, and in Oracle virtualization (Oracle VM) in the management domain which hosts the virtual machine images, and in the guest domain, which allows Linux guests to share a file system.

Even though OCFS2 can be used to host database files in a RAC environment, Oracle’s current recommendation is to avoid that configuration and use ASM to control the disks directly as raw devices, or via the ASMLib software. OCFS2 can still be used to share files in a RAC environment for UTL_FILE and external table operations.

For additional information and documentation, please refer to Oracle’s OCFS2 project website (http://oss.oracle.com/projects/ocfs2/).

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Benefits of Oracle on Dell Compellent Storage Center

Some of the benefits of deploying Oracle in a Dell Compellent SAN solution are listed in the below table.

Table 3. Benefits of Oracle on Compellent Storage Center

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower total cost of ownership (TCO)</td>
<td>Reduces acquisition, administration, and maintenance costs</td>
</tr>
<tr>
<td>Greater manageability</td>
<td>Ease of use, implementation, provisioning, and management</td>
</tr>
<tr>
<td>Simplified RAC Implementation</td>
<td>Provides shared storage (raw or filesystems)</td>
</tr>
<tr>
<td>High availability and scalability</td>
<td>Clustering provides higher levels of data availability and combined processing power of multiple server for greater throughput and scalability</td>
</tr>
<tr>
<td>Dell Compellent Information Life Cycle (ILM) benefits</td>
<td>Provides tiered storage, dynamic capacity, data progression®, thin provisioning, instant replay (snapshot) and more</td>
</tr>
</tbody>
</table>

Features and Benefits of OCFS2

Some of the notable features of the file system are:

- Optimization of allocations
- Indexed directories
- Checksums on metadata
- Extended attributes (example: unlimited number of attributes per inode)
- Advanced security
- User/Group Quotas
- Journaling
- Endian and Architecture Neutral
- Self-contained clusterware stack and lock manager
- Clusterware Tools (mkfs, fsck, tunefs, etc.)
- Shorted patching downtimes
- Reduced maintenance overheads
Possible OCFS2 Configurations

This section shows two possible OCFS2 configurations. The first being a standalone Oracle database where OCFS2 hosts all the database files including the Oracle binaries, and the second being a RAC environment.
If oracle database files are placed on OCFS2, Oracle’s recommendation is to use either a single dedicated physical device, or multiple physical devices that are used solely by the database. This allows one to distribute physical I/O on different devices and allows one to utilize OFA guidelines. With Compellent’s Fluid Data Storage, the distribution of I/O across multiple devices is automatically implemented. If the database is created during the installation of Oracle, you must have at least 4 GB of free disk space on the devices.

Oracle also recommends that if a cluster file system is used for recovery files, that the recovery files be placed on different physical disks from that of the database files so that a disk failure does not make both the database and recovery files unavailable.
OCFS2 Software Distribution

OCFS2 is included in Oracle Enterprise Linux (OEL) and supported under Unbreakable Linux support. OCFS2 is distributed in two sets of Linux RPMs:

- **Kernel module RPM set**
- **Tool module RPM set**
  - ocfs2-tools (Command line tools)
  - ocfs2console (GUI front end for tools)

Migrating from OCFS or OCFS2 1.2 to a Newer Version

“For information regarding migrating data from OCFS to OCFS2, please refer to the OCFS to OCFS2 Migrate Guide. Please note that OCFS refers to the file system that worked on the 2.4 Linux Kernel. Users looking to upgrade from OCFS2 1.2 to OCFS2 1.4 or OCFS2 1.6 do not have to migrate the data.”

OCFS2 / Oracle / OS Certification

For the latest official certification matrix and supported versions of OCFS2, refer to Oracle’s OCFS2 project website (http://oss.oracle.com/projects/ocfs2/)

OCFS2 Support

Oracle offers full support for OCFS2 for customers with a subscription for Oracle Linux Basic or Oracle Linux Premier Support. See Oracle Doc ID 1129890, “Support and Software Update Policy for OCFS2 Running on Oracle Linux” for more information. Oracle also offers support for OCFS2 v1.2 and v1.4 to Red Hat Enterprise Linux (RHEL) users for use only with Oracle’s database product. OCFS2 versions above 1.4 are not available on RHEL. See Oracle Doc ID 1253272.1, “Oracle Cluster File System (OCFS2) Software Support and Update Policy for Red Had Enterprise Linux Supported by Red Hat.” OCFS2 is included in OEL and supported under ULK support

4 http://oss.oracle.com/projects/ocfs2/
References


