



Configuring Databases Using Soft Links

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Configuring Databases Using Soft Links

When you specify the location for the storage objects of any relational database management system (RDBMS), there are two options; soft or absolute paths. A soft path, also referred to as a symbolic path, is a file name that links to the physical file through symbolic links (ln -s). An absolute path represents the physical file itself. Physical files can be file system files, raw devices, or VERITAS Volume Manager, Solstice DiskSuite™ software, or Solaris™ Volume Manager volumes.

This Sun BluePrints™ OnLine article explains the advantages of using soft links when configuring databases and provides techniques and examples for using them. It contains the following sections:

- “Benefits of Using Soft Links” on page 1
- “Using Symbolic Links to Set Up a Database” on page 2
- “Using Soft Links With VERITAS QIO” on page 4

Benefits of Using Soft Links

Using an absolute file path to specify the location of database storage objects permanently ties the database object to its physical location. There are a number of situations, in a benchmark or production environment, where it’s desirable to have the flexibility to quickly and safely alter the location of database objects.

The following sample situations demonstrate instances where the use of symbolic links are beneficial:

- Relocating a complete database to a different input/output (I/O) subsystem.

To relocate a database, simply copy the database files to their new storage location and reestablish the links between the database files and that new storage location.

- When the underlying I/O layout for ORACLE® storage objects (dbf files) become a bottleneck, you can relocate the objects as described in the preceding bullet.
- Validating a database with a cold backup.

Once a backup copy of a database is in place, you can simply change the current database links to point to the backed up database area and then bring up the backup database to quickly confirm that the backup is valid.

- Ease of database management when VERITAS file system (VxFS) is deployed with VERITAS QuickIO (VERITAS QIO). For more information, read “Using Soft Links With VERITAS QIO” on page 4.
- Symbolic links provide meaningful naming for raw devices used in database configurations; for example, when `$ORACLE_BASE/oradta/PROD/system.dbf` is used instead of the actual raw partition `/dev/rdsk/c1t1d0s3`. This can simplify database management and configuration tasks.

These benefits come with some added complexity. You must have foresight when adding a new database file. There is no tolerance for errors between the database reference and the symbolic-link name. An error could result in the symbolic-link file system being inadvertently filled.

Using Symbolic Links to Set Up a Database

Normally, using symbolic links is a three-step procedure. However, when VERITAS QIO is involved, there is an additional, fourth step to complete.

Caution – For the procedure described in this article to work safely and accurately, we strongly recommended that Step 2 on page 3 and the second step on page 4 be scripted to include all database files.

▼ To Use Symbolic Links

1. Identify database file names and their corresponding real (physical) locations.
2. Create symbolic links as shown in the following file system and raw device examples:

File system example:

```
#!/bin/ksh
ORACLE_BASE=/home/oracle; export $ORACLE_BASE
rm -f $ORACLE_BASE/oradata/PROD/*.{dbf,ctl,log}
ln -s /fs01/control.ctl $ORACLE_BASE/oradata/control.ctl
ln -s /fs02/system.dbf $ORACLE_BASE/oradata/system.dbf
ln -s /fs03/undotbs01.dbf $ORACLE_BASE/oradata/undotbs01.dbf
ln -s /fs03/redo.log $ORACLE_BASE/oradata/redo.log
```

Raw devices example:

```
#!/bin/ksh
ORACLE_BASE=/home/oracle; export $ORACLE_BASE
rm -f $ORACLE_BASE/oradata/PROD/*.{dbf,ctl,log}
ln -s /dev/rdisk/c1t1d0s3 $ORACLE_BASE/oradata/control.ctl
ln -s /dev/rdisk/c2t2d0s3 $ORACLE_BASE/oradata/system.dbf
ln -s /dev/rdisk/c3t3d0s3 $ORACLE_BASE/oradata/undotbs01.dbf
ln -s /dev/rdisk/c4t4d0s3 $ORACLE_BASE/oradata/redo.log
```

3. Create the database, specifying soft link file names to map to the location where a storage object is needed, for example:

```
CREATE DATABASE PROD
DATAFILES '$ORACLE_HOME/oradata/system.dbf'
        SIZE 500M REUSE AUTOEXTEND OFF
LOGFILE
        GROUP 1 ('$ORACLE_BASE/oradata/PROD/redo01.log') SIZE 1500M reuse,
        GROUP 2 ('$ORACLE_BASE/oradata/PROD/redo02.log') SIZE 1500M reuse,
```

Note – Even though these examples use an ORACLE database, the same techniques and principles should work with any database.

Using Soft Links With VERITAS QIO

When you use VERITAS QIO, soft links show the simplicity and flexibility of managing database objects.

VERITAS QIO allows access to a regular VxFS file as a raw character device through a pseudo device by using the `::cdev:vsf:` name extension. VERITAS suggests the following three-step procedure to accomplish this task: (1) change the directory to where the regular file is located, (2) moving (`mv`) the file to a dot file, and (3) establishing a symbolic link to that file:

```
# cd /fs01
# mv tablespace_1.dbf .tablespace_1.dbf
# ln -s .tablespace_1.dbf::cdev:vxfs: tablespace_1.dbf
```

These three steps are replaced by the following script:

```
#!/bin/ksh
ORACLE_BASE=/home/oracle; export $ORACLE_BASE
rm -f $ORACLE_BASE/oradata/PROD/*.{dbf,ctl,log}
ln -s /fs01/system.dbf::cdev:vxfs $ORACLE_BASE/oradata/system.dbf
```

Another advantage of using symbolic links is that they allow you to take database files out of QIO (for example, if you need to use Oracle's auto-extend feature to grow a tablespace). Normally, this requires you to use the following commands:

```
# cd /fs01
# rm tablespace_1.dbf
# mv .tablespace_1.dbf tablespace_1.dbf
```

This confusing, risky, and error prone step is replaced by running the following script:

```
#!/bin/ksh
ORACLE_BASE=/home/oracle; export $ORACLE_BASE
rm -f $ORACLE_BASE/oradata/PROD/*.{dbf,ctl,log}
ln -s /fs01/tablespace_1.dbf $ORACLE_BASE/oradata/tablespace_1.dbf
```

Moving Database Tablespace Example

In this example, a tablespace is found to be I/O bottlenecked and needs to be relocated to ease I/O contention.

▼ To Relocate a Tablespace

1. Shut down the database.
2. Copy the data files that made up the tablespace to a new location:

```
# cp /fs03/datafile1.dbf /NEW-fs03/datafile1.dbf
# cp /fs04/datafile2.dbf /NEW-fs04/datafile2.dbf
```

3. Remove the old database links:

```
# rm /oradata/datafile1.dbf
# rm /oradata/datafile2.dbf
```

4. Re-establish the database links to the new locations:

```
# ln -s /NEW-fs03/datafile1.dbf /oradata/datafile1.dbf
# ln -s /NEW-fs04/datafile2.dbf /oradata/datafile2.dbf
```

5. Restart the database and confirm the results.

About the Author

Carlos Godinez has worked as senior benchmark engineer for the almost four years in the Customer Benchmark Center in Newark, California. His job requires him to set up large databases efficiently and quickly. Carlos has used the technique described in this article extensively during the last four years.

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