Bonnier Corporation

Data Migration with Zero Downtime using Oracle Streams

"We've been using Oracle Streams since early January 2008, and it has worked out to be a good solution for us… We were able to perform the migration with no downtime for any of our websites."

Scott Baker
Database Administration Manager, Bonnier Corporation

BONNIER CORPORATION

Corporate Profile

- US-based branch of international media company
- Headquartered in Winter Park, Florida
- Annual revenue $350 million
- More than 1,000 employees
- http://bonniercorp.com/

Oracle Technology Used

- Oracle Database 10*g* Release 2 (10.2.0.3)
- Oracle Streams bi-directional replication
- Oracle Enterprise Linux
- Oracle Grid Control

OVERVIEW

Bonnier Corp. is the U.S.-based division of the Bonnier Group, an international media company based in Sweden with operations in more than 20 countries. In 2007, Bonnier Corp. grew through acquisition from a 350-person company with US$80 million in annual revenue to a company with more than 1,000 employees and approximately US$350 million in revenue.

The company publishes more than 40 magazines (including Field & Stream, Islands, Parenting, Saveur, and Skiing) and related websites aimed at helping people connect with their personal interests. However, managing that kind of fast growth and supporting more than 100 websites for magazines, events, and marketing presented some major challenges.

This case study describes how Oracle Streams enabled Bonnier Corporation to support their rapid growth by allowing them to migrate their hosted websites to a larger data center with no downtime. Bonnier was able to fully achieve this goal by using Oracle Streams [1] to provide bi-directional replication between their existing location and the new data center.

BONNIER REQUREMENTS

Rapid growth through acquisition drove Bonnier to move their related websites to a larger data center. During this migration they needed to insure that the following requirements were met:

- Ability to perform a phased migration. Bonnier wanted to be able to easily address any issues that might arise during such a large migration, and thus preferred to migrate only a limited number of websites at a time.
- End-users would have continuous access to these websites. Bonnier wanted to ensure that their customer base would have continuous access to these websites, including the ability to post content, throughout the migration.
- Ability to work over low bandwidths. Although the two data centers were only five miles apart, the connection between the two locations was slow.

ORACLE STREAMS REPLICATION

Oracle Streams captures DML and DDL changes made to database objects and replicates those changes to one or more destination databases. The destination databases allow DML and DDL changes to the same database objects, and these changes can also be propagated to other databases in the environment should the user desire. Streams can be configured to propagate changes between one or more databases bi-directionally. The tables for which data is shared do not need to be identical copies at all databases; both the structure and the contents of these tables can differ at different databases.

There are three steps to the Streams replication process – Capture, Propagation, and Apply. While the basics of replication are summarized below, please note that the Streams documentation includes many ways to customize how and where these processes are executed in order to address a wide range of replication requirements. Please refer to Oracle Streams Concepts and Administration [2] for a complete discussion of capabilities.

- **Capture:** A Streams capture process mines the redo log to create one or more logical change records (LCRs) and queues them to a Capture Queue. An LCR is a message with a specific format that describes a database change.
- **Propagation:** Streams propagation propagates the staged LCR to another queue residing in the destination database where apply will occur.
- **Apply:** Once the LCR has reached the destination database, a Streams apply process consumes the change by applying the LCR to the shared database object.

Bonnier Streams Configuration

As a result of Bonnier's rapid growth, their existing data center was no longer adequately sized to host the websites associated with their magazines. This data needed to be migrated to a larger, offsite data center. Bonnier preferred to perform an incremental migration using Oracle Streams bi-directional replication.

Bonnier needed for these websites to remain available for update throughout the migration. It was not feasible to simply turn off the databases in one data center and then turn them back on at the new data center. They needed to develop a solution where the database servers would replicate between the two data centers and the sites could be moved over a few at a time. This gradual transition would allow them to address any needs that might arise.

Easy to Use Replication API's

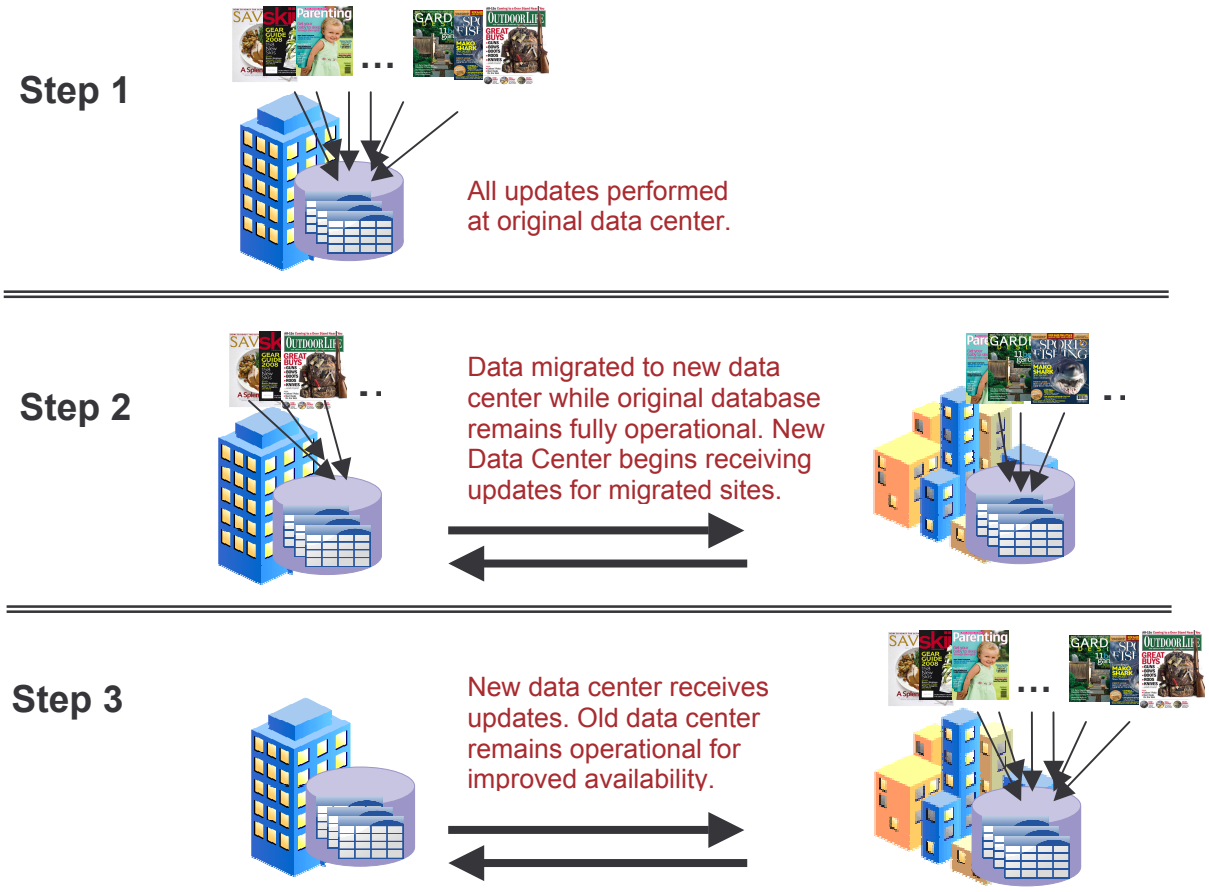
Although the team at Bonnier had no previous experience with Oracle Streams, after completing the Oracle Streams training course, they had their bi-directional Streams replication environment up and running less than a month later.

In addition to Oracle Enterprise Manager wizards, Oracle provides a number of high-level API's that allow users to quickly replicate all of the data in an individual schema, tablespace or even an entire database.

Bonnier took advantage of the `DBMS_STREAMS_ADM.MAINTAIN_SCHEMAS` procedure to configure their environment. This procedure provides the fastest and simplest method to configure an Oracle Streams environment that replicates one or more schemas. In addition, this procedure follows the established best practices for Oracle Streams replication environments.

Because the database objects did not exist at the destination database, the `MAINTAIN_SCHEMAS` procedure used a Data Pump export/import to automatically instantiate them at the destination database. Other arguments to the `MAINTAIN_SCHEMAS` procedure allowed Bonnier to indicate the location of the remote site and to establish that replication would be bi-directional, as opposed to one-way.

With a very small number of commands, the team at Bonnier was able to replicate all of the tables for a given schema between the two locations. For more information about the Streams API's, consult the Oracle Streams Replication Administrators Guide [3].



Rule-based Replication

Negative Rule Sets

Replicas in an Oracle Streams environment need not be identical. Although users frequently wish to replicate all of the tables associated with a particular application, they may find that there is a smaller subset of tables, for example, audit tables, that they prefer not to replicate. This goal is easily accomplished by using negative rule sets.

Oracle Streams uses rule-based replication. A rule is a database object that enables a client to perform an action when an event occurs and a condition is satisfied. Each rule is specified as a condition that is similar to the condition in the `WHERE` clause of a SQL query. Users can group related rules together into rule sets. Rule sets are evaluated by a rules engine, which is a built-in part of Oracle.

Rules determine what Oracle Streams clients replicate. Users can configure rules for each Oracle Streams client independently, and the rules for different Oracle Streams clients do not need to match.

Oracle Streams supports both positive as well as negative rule sets. The team at Bonnier Corp. took advantage of negative rules to indicate the tables in the schema that they did *not* want to replicate. Although Bonnier was performing a database migration, there were certain tables that did not need to be replicated, such as the NEXT_ID table used to generate sequence values used as primary keys. Additionally, certain text indexes are individually maintained at each location.

The successful migration to the larger data center allows Bonnier to support their rapid growth. After completing the migration, Bonnier has elected to continue to maintain their bi-directional replication environment. Although the majority of updates are performed at the new location, the original location is maintained in near real-time, and is available for updates as a safegaurd against disaster.

CONCLUSION

Bonnier Corporation needed a method of keeping up with their rapid expansion. They needed a way of incrementally migrating their data to a larger data center without affecting their customer's access to their websites. By using Oracle Streams bi-directional replication, they were able to perform a phased migration between the two data centers with zero downtime.

REFERENCES

1. Oracle Streams
   http://www.oracle.com/technology/products/dataint/index.html
2. Oracle Streams Concepts and Administration
   http://download-west.oracle.com/docs/cd/B19306_01/server.102/b14229/strms_over.htm
3. Oracle Streams Replication Administrators Guide
   http://download-west.oracle.com/docs/cd/B19306_01/server.102/b14228/toc.htm

Bonnier Corporation and Oracle Streams
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