

EMC SRDF/A and SRDF/S with Sybase ASE

Applied Technology

Abstract

EMC and Sybase jointly collaborated on a project that validates Sybase ASE in SRDF® (synchronous and asynchronous) environments. The purpose of this exercise was to ensure that under all tested circumstances, SRDF yielded valid data, for both the instance and database, on the target side of the replication. This white paper serves as a statement of product compatibility between EMC® SRDF and Sybase ASE.

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Executive summary

In EMC labs, testing was conducted in order to validate Sybase ASE in an SRDF[®] (synchronous and asynchronous) environment. The purpose of this exercise was to ensure that under all testing scenarios, SRDF yielded a valid copy of the database on the target side of the replication. Various methods were used to introduce failures and simulate software or hardware disasters during replication. In every case, the target system was checked for data consistency and integrity. In all tests, ASE was found to be restartable, consistent, and error-free.

This white paper is an excerpt from the paper titled *EMC SRDF/A and SRDF/S with Sybase ASE – Best Practices Planning*. Refer to that document for full testing descriptions, details, and syntax.

Introduction

This white paper demonstrates the integration testing that was completed using SRDF with the latest ASE technology to optimally address replication needs for either a single database, or an entire Sybase instance.

EMC[®] SRDF is used for business continuity and disaster recovery. SRDF is a business continuity solution that provides a host-independent, mirrored data storage solution for duplicating production site data to one or more physically separated target Symmetrix[®] systems. In basic terms, SRDF is a configuration of two or more Symmetrix units whose purpose is to maintain multiple copies of logical volume data in more than one location. SRDF replicates data transparently to users, applications, databases, and host processors. SRDF operates in various modes and currently supports synchronous, asynchronous, and adaptive copy. For the purposes of this exercise, both SRDF/S and SRDF/A were included in the test bed.

Sybase ASE meets the demands of large databases and high transaction volumes, while providing a database management system. Its key features include on-disk encryption, smart partitions, and new query processing technology that has demonstrated a significant increase in performance, as well as enhanced support for unstructured data management.

A testing environment was created using EMC hardware and software in order to test ASE and document the procedures and best practices for several use cases. The desired outcome was to prove that the target system maintained data consistency and integrity. The goal was to ensure that ASE is restartable, consistent, and error-free at the conclusion of each test.

Audience

This paper is intended for customers, IT planners, storage architects and administrators, and EMC staff and partners to use for guidance and proposal development.

SRDF and ASE testing and qualification

Source and target host configuration

Source host	Target host
SunOS 5.10	SunOS 5.10
EMC PowerPath [®] version 5.0.0	EMC PowerPath version 5.0.0
Symmetrix Command Line Interface (SYMCLI) version 6.4.2.1	Symmetrix Command Line Interface (SYMCLI) version 6.4.1.0
Sybase ASE 15.0.2	Sybase ASE 15.0.2

Symmetrix configuration

Source Symmetrix	Target Symmetrix
Symmetrix DMX-3	Symmetrix DMX-4
5772 Microcode	5772 Microcode

Testing validation procedures

A test plan was created to provide recommendations and guidelines for several test scenarios. Each scenario was tested multiple times to ensure validity.

Note: All testing scenarios included the same exact procedures for both SRDF/S and SRDF/A.

Test Scenario 1: Materialization

Database materialization (or instantiation) is the process of populating a target database with identical data from the primary. This process can be done using SRDF (/S or /A) and is very efficient, especially for very large databases.

This process is simply a matter of synchronizing (or establishing) the SRDF devices. By synchronizing the R2 devices on the Symmetrix, we materialize (or instantiate) the target database. The target devices remain in a “SyncInProg” state until all tracks have been completely copied to the target. During synchronization, we are populating the Sybase database devices with the exact same data as the primary. At the completion of this test, we bring the target instance online. The target database(s) contain the same database and table objects, row counts, and so on as the primary.

Test Scenario 2: Creating restartable and consistent database images

This testing ensures that SRDF can provide a database image at the target, which is restartable and consistent. A successful result for this test means that Sybase ASE will complete its normal restart procedures and bring each database online successfully and error-free. At the conclusion of each test in this scenario, we verify that the target ASE database is consistent with the primary, such that:

1. Any/all in-flight transactions from the primary were rolled back.
2. Any/all committed transactions on the primary are consistent on the target.
Steps 1 and 2 can be verified by reviewing the Sybase log file.
3. As an optional check, we compare table row counts on the primary and target database to ensure they are identical.

Test Scenario 3: *failover/failback* using the inherent functionality of SRDF

When primary systems are down, SRDF enables fast *failover* to the target (R2) copy of the data so that Sybase ASE becomes available quickly in the event of disaster. Business operations and related applications may resume full functionality with minimal interruption. When it is safe to return to normal operations, *failback* switches data processing from the target (R2) side to the source (R1) side. The target side volumes will then become write-disabled.

During this testing, successful failover allowed us to invoke full production operations at the target site. The target ASE server and databases were modified, producing an environment that was out of sync with the downed primary. A failback was then initiated. The failback process resynchronizes the target devices with the R1s. Resynchronization can be performed while continuing to run the application and database on

the R2s. When the resync has completed, all users are switched back to the primary (R1) site, and the R2s are re-established.

Test Scenario 4: SRDF for log shipping and disaster recovery to provide roll-forward log capability

Log shipping methods are probably the most commonly used form of integration between SRDF and ASE today. Using the Sybase backup server in conjunction with SRDF enables a myriad of user options for backup and recovery. Log shipping is a strategy that some companies deploy for disaster recovery. The process works only for databases using archive logging. The basis of log shipping is that changes to the database at the source site are propagated to the target site. These logs are then applied to a standby database at the target to maintain a consistent image of the database that can be used for DR purposes.

Testing was performed using SRDF in conjunction with the Sybase backup server. Using the ASE `quiesce for external dump` feature, the database at the secondary site remained offline and subsequent transaction logs were applied to the target in order to keep the standby database current.

This roll-forward log recovery method, accomplished by using the Sybase `quiesce for external dump` and SRDF, allows the standby to be brought “online”. At that point, the standby becomes completely independent of the original primary database.

Test Scenario 5: SRDF for non-logged transactions

The goal of testing non-logged transaction scenarios is to ensure that SRDF captures all transactions entered into the primary, even under circumstances where the data is non-logged or minimally logged. In the case of a bulk-copy operation using `fast bcp`, transactions are not logged, whereas a `truncate table` statement is considered to be a minimally logged transaction where the primary is aware that a `truncate table` statement has been issued, but keeps no record of the actual deleted rows, therefore making recovery of the table impossible. SRDF natively replicates all data that resides on devices that are set up for remote replication.

All tests performed proved that SRDF is capable of maintaining consistency between primary and target regardless of logged or non-logged transaction scenarios.

Conclusion

EMC SRDF/S and SRDF/A combined with Sybase provide a consistent and reliable method of replication for an ASE instance or database. Using SRDF to create (or clone) consistent copies of databases is fast and efficient. Periodically updating the target database using this block replication software is an effective way to keep the data fresh without impacting the production application at the primary.

There are many methodologies associated with log shipping, and SRDF has been proven to meet the needs of mission-critical 7x24x365 business requirements. Recovery time objectives (RTO) and recovery point objectives (RPO) dictate data availability requirements, which in turn dictate the SRDF deployment. Whether customers require zero data loss or not, various SRDF modes of operation can satisfy their needs.

Last, non-logged database operations can wreak havoc for database administrators because, without SRDF, there is no way to recover this type of data. However, our testing has proved that when all database devices are replicated via SRDF, even non-logged transactions are recoverable.

A more in-depth and detailed white paper titled *EMC SRDF/A and SRDF/S with Sybase ASE – Best Practices Planning* documents all tests and results and can be found on EMC.com and Powerlink.