

Oracle Maximum Availability Architecture

Active Data Guard and EMC CLARiiON

Oracle Maximum Availability Architecture (MAA) is Oracle's best practices blueprint based on proven Oracle high availability technologies and recommendations. The goal of MAA is to minimize the complexity in designing the optimal high availability system.

Oracle has partnered with EMC to demonstrate the superior performance that Active Data Guard can provide Oracle customers by using an active standby database to offload a read-only workload from a production database. The combined performance of Active Data Guard and the award-winning EMC[®] CLARiiON[®] storage platform is highlighted in the chart below. This collaborative effort between Oracle and EMC is a just one example of how our companies are dedicated to the success of our customers.

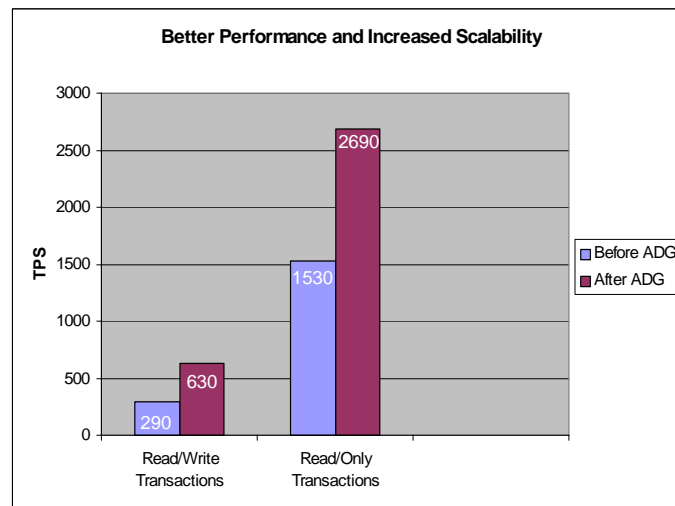


Figure 1 – Active Data Guard, Utilize Your Standby Database and Boost Performance up to 82%

The blue bars in Figure 1 (first bar in each sequence) show the transaction rate for a TPC-C style workload where both read-write transactions and read-only transactions all execute on a single database. The maroon bars in the chart (second bar in each sequence) show the increased transaction rates for both types of workload when read-only transactions are moved off the primary database and executed on an Active Data Guard standby database. Alleviating bottlenecks by offloading workload to the standby database increased aggregate transaction rates by 82%, with read-write transactions rates increasing over 100%. Active Data Guard improved primary performance and increased scalability while also providing high availability and data protection.

Oracle Active Data Guard

Information Technology (IT) organizations have long sought a simple solution to improve the performance of mission-critical applications by offloading the overhead of ad hoc queries, reporting, and backups to a synchronized replica of the production database. The unpredictable nature of these long-running operations and the system resources they consume make it difficult to guarantee consistently high levels of service for business transactions. Oracle Data Guard provides a simple, high performance synchronization between a primary database and one or more Oracle physical standby databases for data availability and protection in the event the primary database should fail. A physical standby database is typically operated in real-time apply mode, continuously validating and applying changes received from the primary database to ensure that a failover can complete within seconds of an outage at the primary site. Prior to Oracle Database 11g, however, it was necessary to stop apply to enable read access to a Data Guard physical standby database; making it impossible for the standby to stay current with the primary database.

The Active Data Guard Option available with Oracle Database 11g Enterprise Edition enables you to open a physical standby database for read-only access for reporting, for simple or complex queries, sorting, or Web-based access while changes from the production database are being applied to the standby database. All queries reading from the physical standby database execute in real time, and return current results. With Active Data Guard, you can offload any operation that requires up-to-date, read-only access to the standby database, enhancing and protecting the performance of the production database.

These new capabilities make it possible for Active Data Guard to be deployed for a wide variety of business applications. Examples include:

- Telecommunications: Technician access to service schedules, customer inquiries to check status of service requests.
- Healthcare: Fast access to up-to-date medical records.
- Finance and Administration: Ad hoc queries and reports.
- Transportation: Package tracking queries, schedule status.
- Web businesses: Catalog browsing, order status, scale out using reader farms.

Given the widespread use of physical standby databases, all that is needed to unlock the value of the systems, software, storage, and networks already deployed is to upgrade to Oracle Database 11g, enable the Active Data Guard Option, and redirect read-only queries to your standby database.



Additional information on Oracle Active Data Guard can be found at:

http://www.oracle.com/technology/deploy/availability/pdf/maa_wp_11gr1_activedataguard.pdf

EMC CLARiiON Storage

With all the different hardware and software components involved, performance and manageability are crucial to ensure that any Oracle MAA deployment is performing as expected. The award-winning EMC CLARiiON storage platform provides the high-end performance, as well as integrated tools to assist in simplifying the tuning and management of these environments. Oracle and EMC have made great strides in developing tools that provide an integrated infrastructure, and when brought together with the Oracle MAA Active Data Guard Solution, enables businesses to provide a performant, highly available, and easy-to-manage deployment.

Test Configuration

EMC CLARiiON® Storage Systems

- FLARE® Release 26
- 4 GB RAM per SP
 - Write Cache = 2 GB
 - Read Cache = 1GB per SP
- 60 146GB FC drives @ 15k rpm
- All LUNs bound as 1+1 RAID 10
 - Non Vault DATA LUNs 133 GB
 - Vault DATA LUNs 99 GB
 - LUN Prefetch set to Variable with default settings

Dell 6950s

- 4 way Dual-Core AMD Opteron Processor 8212
- 8 GB RAM
- OEL 4.5 x86_64 (2.6.9-55.0.0.0.2.ELsmp)

Figure 2 – Test System Configuration

Oracle Enterprise Manager and Grid Control Plug-in:

This plug-in feature has been developed by Oracle working closely with EMC to provide analysis at the CLARiiON storage level, and reported in the OEM monitor. The tool is a value-add option available with CLARiiON that delivers a comprehensive solution for storage and database administrators providing a consolidated picture of the enterprise systems including databases, hosts, and storage systems. The plug-in offers a view of a large variety of storage level performance details that help to better understand what is occurring inside the array with ongoing I/O load. Graphing of performance statistics can be done on a real-time basis, or the raw data captured and imported into standard spreadsheets for subsequent post analysis, and correlation with other performance information throughout the enterprise.

Additional information on the Oracle Enterprise Manager 10g System Monitoring Plug-in for EMC CLARiiON storage systems can be found at:

http://www.oracle.com/technology/products/oem/pdf/ds_emclariion.pdf

EMC CLARiiON Navisphere Quality of Service Management (NQM) Facility:

Another feature for ensuring optimal performance tuning of the CLARiiON storage system, and satisfying the most effective I/O balance to support the rest of the MAA stack, is the CLARiiON Navisphere® Quality of Service Management facility, or NQM. NQM is an optionally enabled feature of the CLARiiON system software. It provides a comprehensive set of management policies and options to let customers decide which applications or which functions within an application get more of the available system resources, providing the ability to meet service levels on an application-by-application or on a function-by-function within an application basis. As an example, for the Active Data Guard MAA project, LUNs are configured that form the DATA ASM group, other LUNs form the FLASH_RECOVERY_AREA, and a third set related to the Real Applications Cluster storage such as OCR and QUORUM. With this facility, it would be possible, at a certain time of day, or for a particular operational window, to bias the I/O service level differently for the various LUNs. For example, during backup windows, it may be more effective to raise the I/O service attention for the LUNs in the FRA relative to the data LUNs, or for heavy query periods, it may be beneficial to bias I/O service to favor reads over writes, or even reads of certain types and I/O sizes over others (such as data scans versus single page reads).

Additional information on EMC CLARiiON NQM can be found at:

<http://www.emc.com/products/detail/software/navisphere-quality-service-manager.htm>

Oracle and EMC provide a combination of performant and highly available technologies designed for customers deploying the Oracle Maximum Availability Architecture.

For additional information on Oracle MAA Best Practices reference:

<http://otn.oracle.com/goto/maa>