

The White Papers

Strategies for Building a World Class Technical Architecture

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Strategies for Building a World Class Technical Architecture

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Introduction

This paper is based on the experience of several large Oracle Application implementations and attempts to define some technical guidelines for architecting a world class global solution. The ability to design an available, scalable and reliable global solution is a critical success factor to any implementation but takes on an even higher importance in a global implementation. The ability to scale a UNIX server to hundreds or thousands of concurrent users, support numerous interfaces and maintain a high level of availability are key components to a successful global deployment.

Giving the database administration group alternatives for hardware failures, human errors and cold database backups without bringing the production system down is also an important factor in the overall solution. The combination of EMC, Oracle and Quest is a field proven overall solution that can give corporations these major advantages.

For sizing considerations this paper will also discuss some data collected at current production sites, along with the approximate data volumes that can be used as a reference point.

Executive Summary

One of the key challenges to a successful implementation after ‘go live’ is the ability to keep the system available and performance at agreed upon levels. Another important factor is to have the ability to test development and application code against a recent copy of the production database. The ability to take a cold backup on a production system without interruption is important for several reasons including offsite tape storage, recovery, and the ability to ‘clone’ production to a host of other instances. The combination of standard Oracle Backup/Recovery and replication technology, EMC’s software (TimeFinder-BCV, PowerPath and Symmetrix Remote Data Facility) and Quest Software’s SharePlex[®] and LiveReorg[®] products are all tools that work together to add value.

Since global implementations are extremely complex, the technical architect's goal should be to keep the technical solution as simple as possible and to architect out as much of the manual intervention as possible. The less human intervention and the more scripted the solution, the easier it will be to implement and more likely it will succeed.

A complete technical architecture would include many other components such as database, UNIX, and network monitoring. The overall design of a help desk and service level agreements. Overall network architecture for both the WAN and LAN, backup strategies for all servers via a tape backup system, load balancing and job scheduling. From the hardware point of view, this includes flexible, hot swappable and redundant hardware. Additionally, the architect must account for an output management solution and interface architecture. As complete papers could be written on each of these areas this paper will focus mainly on the backend database server.

Most of these other areas have many software packages or hardware available, are fairly well known and are normally already defined in the existing infrastructure. While all these areas are all important to the overall solution, most are not as critical or can be expanded relatively easily by adding CPU, RAM, bandwidth or redundancy. In a large or global implementation the database server and network latency will become the areas of greatest concern, especially where a single database instance is demanded by the application software.

Addressing the Common Problems and Requirements

The goal of the technical architecture is to have an available, scalable, reliable solution that performs at accepted levels of service. To accomplish this the appropriate hardware and software components must be put in place. In any implementation each group or sub project team will have a limited area of focus. The data base administrators want to have as many options as possible for backups, recovery and 'cloning'. The development group must be able to easily and securely migrate code to different environments, and have the ability to test against a production like environment. The functional team needs a sandbox environment to test application patches, new business processes, and configurations. The performance testing group needs a production like system to perform regression testing and performance assurance testing.

To accomplish all these requirements several pieces of hardware and software must all work together as a single overall solution. The overall architecture should be as simple as possible and require minimal manual intervention. The ability to recover from most if not all situations, must be pre-tested and scripted. The ability for a vendor to fix a potential problem with "phone home" capability before a component fails is also critical over the long haul.

The following is a list of common problems or requirements in any production environment:

- Down or failed primary server
- Lost primary disk
- Cold database backup
- Hot database backup
- Database object dropped by mistake
- Database export
- Database reorganization
- Soft Disk Failure
- Database block corruption
- Consistent performance

The ability to address these common requirements with very limited or no downtime is the key to a world class solution.

Giving Information Technology Options and Alternatives

Ask any data base administrator supporting a production environment “what is the most critical factor if you need to recover?”, and the answer will most likely be “as many options as possible”. This could mean a cold backup, hot backup, export, standby database, extra mirror, a replicated environment or even a delayed replicated environment. The combination of EMC with TimeFinder or SRDF, Oracle with cold backup, hot backup, standby, database exports and Quest with a replicated environment via SharePlex Overdrive and LiveReorg give the database administrator many options.

- Down primary server
Use the Reporting server as the primary server, use dual ported disk solution and mount primary EMC frame to Reporting server.
- Lost primary disk
Mount the 3rd mirror via dual ported disk to the Production server and use as primary server disk.
- Cold Database Backup
Using the triple mirroring technique and splitting the third mirror, a cold backup can be done. The primary Database may need to be placed in Hot Backup mode for a consistent backup. This process can be done without manual intervention.
- Hot Database Backup
Use Oracle standard Hot Backup in combination with 3rd mirror. This allows for a very quick online backup of the production database and no performance impact while the 3rd mirror is copied to disk or tape.
- Lost Database Object (Table Drop)
SharePlex gives you the ability to export the lost table from the replicated environment, another potential solution would be to fail over to the

replicated environment depending on the severity of the problem and tables dropped.

- Database Export

While most large shops can no longer do a full database export due to file size and time limitations, exporting some tables or setting up an export rotation against the 3rd mirror or reporting environment is an option which does not effect the performance of the OLTP database.

- Database reorganization

A new product from Quest Software called LiveReorg is currently in Beta, this product will allow the database administrator to reorganize tables on a live production system.

- Soft Disk Failure

EMC has a built in monitoring or 'call home' functionality to check for soft disk errors or other hardware problems. Before a disk failure occurs a CE from EMC will be on site to replace the component while the system is live.

- Database block corruption

From time to time a hardware or software problem will occur that may cause data block corruption, EMC's 3rd mirror and the replicated environment give potential options to this problem.

- Consistent performance

With ad hoc reporting done mainly on the replicated environment, OLTP performance stays more consistent.

Other options with this solution

- Ability to perform a cold database backup during an upgrade process

Using the triple mirroring technique and splitting the mirror, a cold backup can be done while the upgrade process continues. This can be a great time saver during any upgrade process.

- Ability to create a cold backup of the Production database at any point in time

The ability to get your production database at any point in time and copy it for development, training, stress and performance testing, etc. This adds a great deal of value to the overall maintenance and quality.

- Human errors

Since Quests SharePlex does not replicate DDL, a major catastrophe like dropping a production table by mistake may be recovered without significant downtime. A DBA faced with this situation would have the option of failing over or exporting a table from the replicated environment.

- Ability to re-synchronize the reporting instance

If the replicated environment gets out of sync, EMC's BCV process provides the ability to quickly re-synchronize the reporting environment without manual intervention.

- Test DBMS upgrades in Production
Once adequate system testing has been done, it would be possible under certain conditions to upgrade the DBMS on the replicated side and validate in production without impacting the real production database.
- Data Center Move
If a corporation is physically relocating the data center, SRDF could be used to keep the production databases at a new data center “near up to date”. This could dramatically reduce downtime when the real cut over is done.
- Support Project in different locations
On occasion a project may want or need to have the development and functional teams in different physical locations, since development should be done over a LAN as opposed to a WAN, you could use the concept of the Oracle ‘Standby’ database at the development site and use this Database for ‘cloning’ purposes. Another side benefit of this would be a built in Disaster Recovery site.

Technical Architecture Tool Kit

Oracle

- | | |
|---|--|
| Cold Database Backup
creating new | - Needed for disaster recovery, and
instances (cloning) |
| Hot Database Backup | - Needed for point in time recovery |
| Oracle Replication
type reporting | - Good for small number of tables, day old |
| Oracle ‘Standby’
Can also be used if
physically separated | - Less expense D/R or failover solution,
development group and hardware are |

EMC

- | | |
|---|--|
| TimeFinder
single EMC
backups, reporting starting | - Ability to create a 3 rd mirror on
frame, 3 rd mirror critical for cold
point, fail over |
| SRDF
separate EMC | - Ability to create a 3 rd mirror on a |

by limited distance for

frame, can separate EMC frames

long term situation. Has limited use for disaster situations.

PowerPath
disk I/O from hardware

- EMC's disk redirector, improves to EMC frame.

Quest

LiveReorg
database while live

- Ability to reorganize a production

SharePlex Overdrive
production

- Ability to maintain a copy of the

database that is near real time.

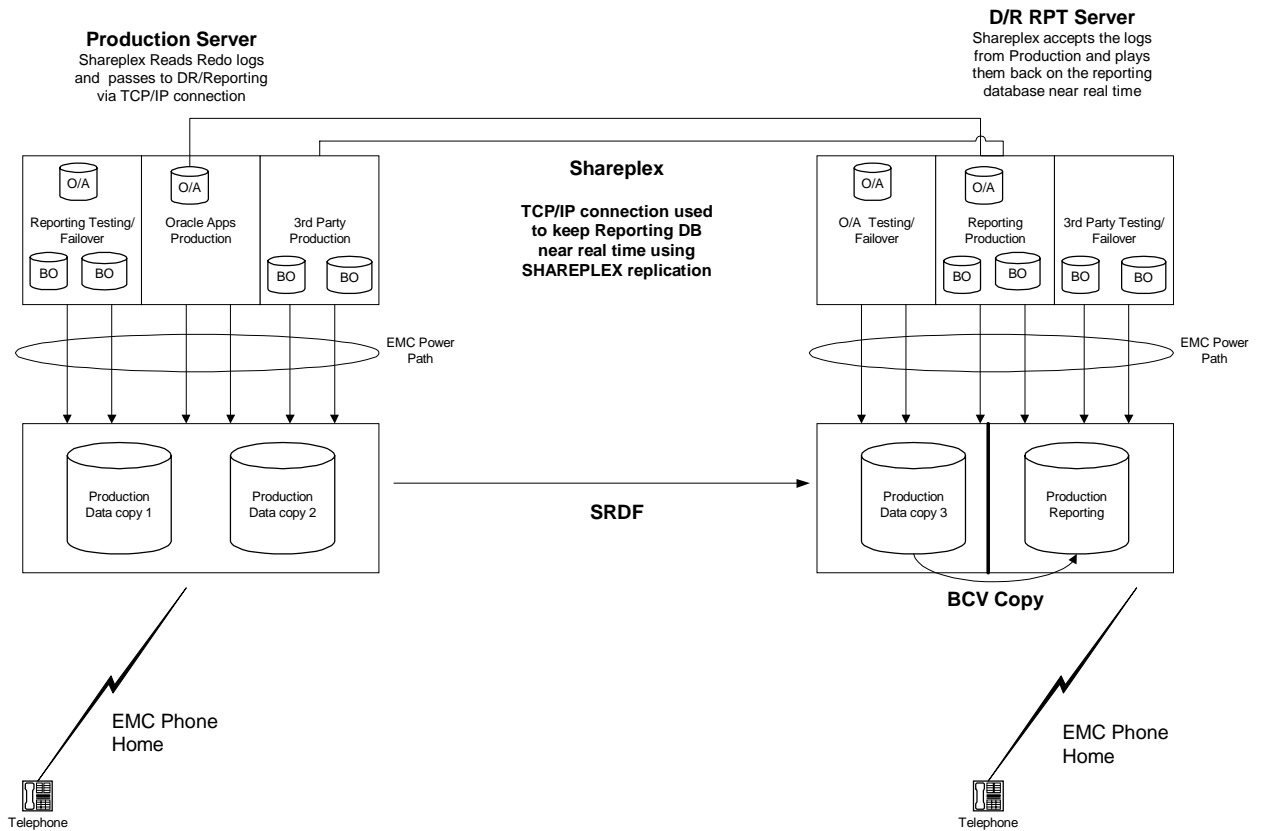
SharePlex

also gives other disaster recovery, fail over,

export and some human error insurance.

Following is a sample diagram which incorporates many of these features

Reporting-Failover Overview



** Could add Oracle Standby Database for D/R or other purposes

questemc.vsd

Application Patches and bug fixes

As corporations move toward a single global instance the ability to keep the system available as close to 7x24x365 becomes more important. Finding a time frame when application patches can be applied becomes difficult to negotiate, which is why having the ability to test the patches and bug fixes against a recent copy of production is critical. While this solution doesn't address how to totally eliminate downtime, it does help reduce the chances that bad code will be introduced to production causing further downtime.

Solution for ERP, CRM or E-Business

Whether its an ERP, CRM or a E-Business looking for a proven architecture, the fundamentals of availability, reliability, and scalability remain the same. The major differences will be what can the business afford for hardware and software costs. This will normally be based on the acceptable level of unplanned down time.

Each piece of the overall solution has its pros/cons and will need architectural design work for the particular situation. There are cost considerations that may drive some decisions, and tradeoffs made. There will also be new and exciting products that need to be explored and evaluated. The products and ideas presented in this paper are a solid and proven starting point.

Production Proven

The following is some data that was collected at one client site running a global single instance of the Oracle Applications.

1. Client is currently generating ~35 GB of Archive logs per day, SharePlex Overdrive keeps the reporting environment on average within minutes of production.
2. The database size is currently about 240GB and growing at a rate of 7GB per month
3. The production system maintainers between 500-700 concurrent users
4. While the exact I/O is difficult to determine, the client is doing ~1.8 million transactions transaction per day
5. Disk I/O per seconds are ~5K, gets to 10K during peak times

Conclusion

This paper should be used as a starting point for corporations to help create a global technical architecture. The combination of EMC, Oracle and Quest gives any corporation a solid starting point to some of the common implementation and maintenance problems. As more large corporations globalize their applications, this combination of products along with others will bring more options and stability to the information technology world.

About the Authors

Matt Holetz
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Matt has over twenty years experience in the software industry and seven years experience working with Oracle Applications with Oracle Services. He has also done 7 ERP implementations, three being global. He is assigned to the largest and most complex Oracle implementations.

Jeff Currier
Technical Manager
Oracle Services, Oracle Corporation

Jeff has over ten years experience in the software industry and seven years experience working with Oracle. He has been involved with two international implementations from the design phase through to production support. He continues to consult and provide guidance for the largest and most complex Oracle implementations.

Both Matt and Jeff currently work in the Industrial Sector Consulting group and specialize in application and technical architecture for multi-site, multi-national and multi-lingual implementations.



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