

Shire Pharmaceuticals Trans-Atlantic Disaster Recovery with Oracle Data Guard

“Our Trans-Atlantic deployment of Data Guard delivers a level of reliability and data protection required by the many regulatory agencies we are accountable to as a specialty pharmaceutical and biologics company operating in 27 different countries across several continents”

*Kevin Bradley, Associate Director
Global R&D Business Systems, Support & Delivery*



Corporate Profile

- Multinational specialty pharmaceutical company
- Founded in 1986
- FY2005 revenue of \$1.6 billion
- <http://www.shire.com/>

Disaster Recovery & Data Protection

- Oracle Database 10g Release 2
- Windows OS
- Oracle Data Guard
- Trans-Atlantic deployment >3,000 miles between primary and standby databases
- Automatic Storage Management
- RMAN, Flash Recovery Area & Flashback Database
- Oracle Enterprise Manager Grid Control
- Enables regulatory compliance for data protection and availability - [FDA CFR Title 21 Part II](#)

OVERVIEW

Founded in 1986, Shire plc is a global specialty pharmaceutical and biologics company with revenues for the full year 2005 of \$1.6 billion. Shire’s strategic goal is to become the leading specialty pharmaceutical company that focuses on meeting the needs of the specialist physician. Shire focuses its business on attention deficit and hyperactivity disorder (ADHD), human genetic therapies (HGT), gastrointestinal (GI) and renal diseases.



Shire has utilized [Oracle Maximum Availability Architecture](#) [1] best practices to deploy Data Guard configurations across primary and standby data centers located in Europe and the United States – over 3,000 miles apart. The data protection and availability provided by Data Guard [2] enables Shire to comply with strict requirements of US and European regulatory authorities.

Data Guard protects Oracle databases supporting Shire’s regulatory document repository and publishing system from [Documentum](#) [3], a drug safety and reporting system from [Relsys Inc - Argus Safety](#) [4] and the Oracle repositories used by [Shire’s Citrix Presentation Servers](#) [5].

Shire’s databases are modest in size, ranging up to 15 GB. User population is similarly modest, 500 users on the Documentum application, and 50 users on Argus Safety, however the importance of guaranteeing data protection and availability far outweighs the database size and level of activity. Both must be accomplished at the lowest possible cost and management complexity.

SHIRE – DEPLOYING ORACLE MAA

HA/DR Architecture

Figure 1 illustrates Shire’s high availability and disaster recovery (HA/DR) architecture. The primary data center is located in Basingstoke, UK and the standby data center is located in Chesterbrook, PA USA. All production databases are hosted on the “Live Oracle Server” in Basingstoke. The standby databases are

System Configuration

- Primary & Standby servers are HP DL580 G3, 4 CPUs each, 3.3ghz, 16GB memory, Windows 2003 Enterprise
- Documentum and Citrix Presentation Servers on Oracle Database 10.2.0.2
- Argus Safety on Oracle 9.2.0.7
- Middle Tier – (4) Citrix DL380's in each location
- HP EVA 8000 SAN

Network Configuration

- Primary data center located in UK
- Standby data center located in US
- 34mb/sec network bandwidth available to synchronize primary and standby databases
- 94ms RTT - round trip network latency

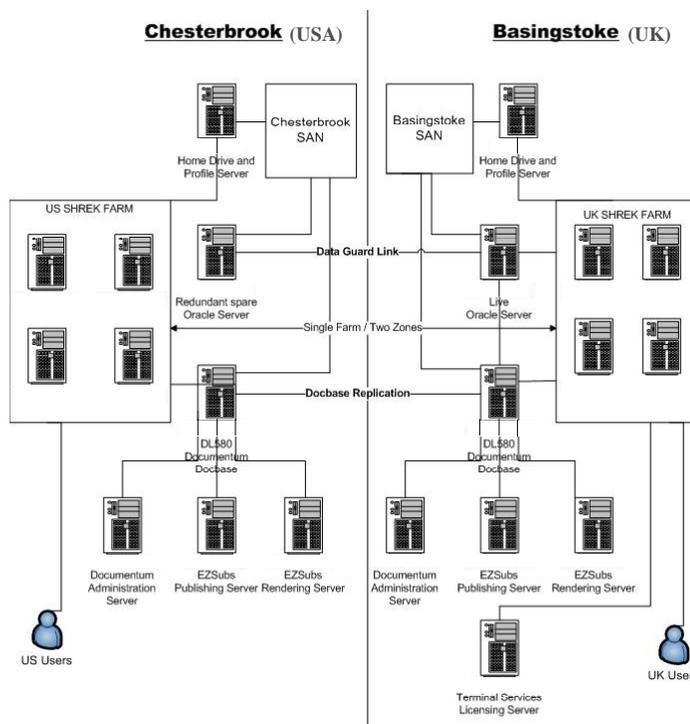


Figure 1 – HA/DR Architecture

hosted on the “Redundant spare Oracle server” in Chesterbrook. The two sites are connected by a network link for Data Guard communication that has 34mb/sec bandwidth at 94ms RTT network latency. Users have local access to applications via Citrix presentation servers located in each data center (the “Shrek farm” in Figure 1). The Citrix presentation servers route client connections to the

production location, and will redirect clients to the new production database following a Data Guard failover.

While Shire has currently deployed Argus Safety on Oracle9i, the Documentum and Citrix Presentation Server repositories are deployed on Oracle Database 10g Release 2. Shire has utilized many high availability (HA) components of Oracle's Maximum Availability Architecture, these include: Automatic Storage Management, Data Guard, RMAN, Flash Recovery Area, Flashback Database and Enterprise Manager.

MAA Configuration

- **4 primary/standby database pairs providing HA/DR for Documentum, Argus Safety, Citrix, and EM repositories**
- **Redo Apply – physical standby**
- **Data Guard Maximum Performance Mode using LGWR ASYNC**
- **RMAN backups taken at both primary and standby locations**
- **Oracle Enterprise Manager**

Additional details for Shire's Oracle 10g Databases:

- **Standby databases use Data Guard 10g Real-time Apply**
- **Flashback Database used to reinstate failed primary after Data Guard failover**
- **48 hour retention period for Flashback logs**
- **Flash recovery area used to automate archive log management**
- **Automatic Storage Management**

Configuration Details

Data Guard is configured in Maximum Performance Mode using LGWR ASYNC redo transport services and Real-time Apply to provide optimum data protection and availability for all Oracle data. Documentum's file based replication (Docbase) is used to maintain a remote copy of data that resides outside of Oracle.

All Oracle 10g Databases (both primary and standby databases) are configured according to MAA best practices for use of Flash Recovery Area and Flashback Database. The Flash Recovery Area automates the management of archive logs and is used for on-disk backups that are subsequently archived to tape. Flashback Database is used to provide very fast point-in-time recovery to protect against user error or logical corruptions. Flashback Database is also utilized to very quickly reinstate a failed production database after a Data Guard failover – avoiding the need to restore from backup. Shire uses a 48-hour retention period for their flashback logs.

RMAN is used to take backups at both primary and standby locations. If an event should destroy the original production database files such that Flashback Database cannot be used, the database is restored from a local backup. Given the modest size of Shire's databases, the initial remote database instantiation was done by copying a backup of production over the network.

Shire uses Enterprise Manager to manage their Data Guard configurations and to execute Data Guard role transitions (“switchover” in response to planned events, or “failover” in response to unplanned outages).

Shire enables client failover by configuring its TNSNAMES.ORA file using a unique entry for the production instance. For example, the TNS entry for the production instance of Documentum is SHREKP. The TNS entry for the corresponding standby instance is SHREKDR. At switchover/failover time, the TNS entries are reversed, enabling clients to recognize that the production instance is now running at what had previously been the standby site. While Shire has chosen to change its TNS names manually, the process can be automated by utilizing the Data Guard 10.2 DB_ROLE_CHANGE event. This event can be used to fire a trigger upon any role change to automatically change the TNS entries as required.

Service Levels Achieved

Recovery Time Objective: In the most extreme case of a catastrophic failure of its primary production site, failover to the standby Oracle database can be completed in minutes. Additional time, up to one hour, is required to complete the redirection of all client processes to the new production database.

Recovery Point Objective: Data residing outside of the Oracle database is subject to 1 hour of data loss upon primary site failure. In contrast, Oracle data protected by Data Guard has less than one minute of potential data loss exposure (assuming there was no interruption in asynchronous network transmission that preceded the failure event). The more stringent recovery point objective for Oracle data is critical. For example, all metadata regarding Documentum's file-based document store is maintained in Oracle. Thus even if there is data loss of file-based content, the information protected by Oracle provides Shire the information it needs to recover and to maintain conformance with regulatory requirements.

Peace of mind . .

“Simply stated, Data Guard gives me peace of mind. I can provide data protection and availability required for regulatory compliance on both sides of the Atlantic. Data Guard is an integrated Oracle solution that can accommodate WAN latency and provide the performance and automated management that I require.”

***Kevin Bradley
Associate Director,
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Delivery
Shire Pharmaceuticals***

DATA GUARD BENEFITS

Shire's use of Data Guard in their MAA configuration yields the following benefits.

Optimum performance. Asynchronous redo transport services have no impact on the performance of the primary database. This is a very important characteristic given the very high latency of Shire's transatlantic network connection.

Protection against component or site failure. Database failover can be executed as quickly as the decision is made to failover to the standby site. Because Data Guard Real-time Apply updates the standby database as fast as data is received from the primary site, there is no delay in completing a failover when required.

Optimum data protection. Asynchronous redo transport service ships redo data from committed transactions to the standby database destination as fast as the network link allows, ensuring that data is kept safe and secure at a remote location.

Data Guard redo apply validates all data before it is applied to the standby database. This prevents physical corruptions from being propagated to the standby database from the primary site. It also protects against corruptions that can occur during network transport. Shire's use of Flashback Database with a 48 hour retention period provides very fast point-in-time recovery should user error or logical corruption occur that can not be detected by physical validation.

Automated Management. Data Guard automatically isolates primary database performance from the impact of network failures between primary and standby locations, or the failure of the standby database. If network outages or standby database failure occurs, the primary database will continue processing transactions. Data Guard continually monitors the status of the standby database and automatically resynchronizes the configuration once connection is re-established.

CONCLUSION

Shire has implemented a Data Guard configuration with primary and standby databases on each side of the Atlantic. Their Oracle Database 10g configurations have made extensive use of Oracle HA features and Oracle [Maximum Availability Architecture](#) [1] best practices. MAA provide in-depth recommendations, an example especially relevant to Shire's Data Guard WAN implementation is the MAA best practice paper - [Oracle Databaes 10g Release 2, Data Guard Redo Transport and Network Best Practices](#) [6]. The integrated HA capabilities of the Oracle Database provide Shire "peace of mind" in the demanding international regulatory environment in which it operates.

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