The **Oracle Database Appliance** by **Dell:** Deployment Models

By Nicolas Pujol

The Oracle Database Appliance can deliver unique features and benefits unavailable in general computing environments. A discussion of multi-tier architecture, storage, and management issues provides guidelines for optimal implementation.

Dell and Oracle developed the Oracle® Database Appliance to provide the benefits of Oracle database technology and ease of implementation. To date, the deployment of high-end Oracle database solutions has required several days' time by knowledgeable database administrators (DBAs) to determine the configuration, install the operating system and database, and tune the system. Information Technology (IT) personnel not familiar with Oracle can deploy the Oracle Database Appliance successfully in about 60 minutes. The software also features auto-tuning and auto-maintenance capabilities.

The Dell® PowerEdge® 6450, with up to four Intel® Xeon™ processors and 4 GB of synchronous dynamic random access memory (SDRAM), provides the server platform for the Oracle Database Appliance. SCSI or Fibre Channel solutions may be used for external storage, and an optional tape backup is available. The appliance software includes an embedded operating system that Oracle has optimized to run Oracle database software.

Assess system needs to choose best deployment

To identify the best solution for a given database implementation, system administrators should

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consider their requirements for storage, availability, and workload. In some cases, an Oracle Database Appliance solution is optimal. In others, a traditional deployment (database server, associated storage, and software) such as general-purpose Dell PowerEdge servers and PowerVault® storage is more appropriate.

Storage environment. The Oracle Database Appliance by Dell supports directly attached SCSI and Fibre Channel storage as well as local and remote tape backup (see "Storage deployment options" later in this article). Complex storage topologies, such as Storage Area Networks (SANs), require a general-purpose deployment on PowerEdge servers.

High-availability requirements. The Oracle Database Appliance is an integrated and reliable solution. A stand-by feature in the appliance allows a passive database appliance to take over the workload in case of hardware failure. For higher end clustering deployments such as Oracle Fail Safe, PowerEdge servers provide the necessary level of high availability.

Anticipated workload. The Oracle Database Appliance supports up to 450 concurrent users. In general, only a small percentage of network users actually hit or access the database simultaneously. For example, if 20 percent of a user base accesses the
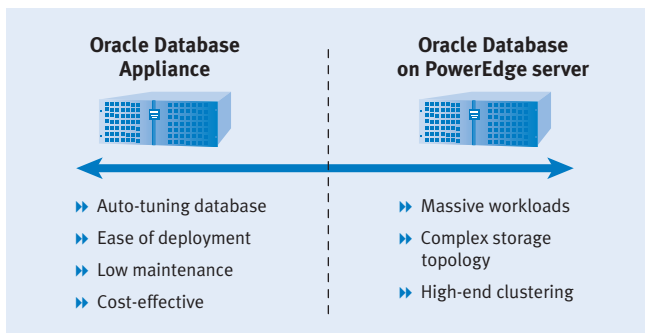
Figure 1. Capabilities of the Oracle Database Appliance and Dell
PowerEdge server

	Database Appliance	PowerEdge
Oracle Fail Safe clustering		✔
Stand-by mode	✔	
SCSI, Fibre Channel, tape backup	✔	✔
SAN		✔
Workload	Up to 450 concurrent users	Above 450 concurrent users
Auto-tuning	✔	
Auto-maintenance	✔	
Operating system	Embedded operating system	Windows NT/2000 Dell's Red Hat® Linux®
Dell OpenManage™		✔
Oracle Enterprise Manager	✔	✔
Successful deployment without Oracle expertise	✔	
Set of certified configurations designed by Dell and Oracle	✔	
Optimally preconfigured and pre-installed	✔	

Figure 2. Comparison between Oracle Database Appliance and Dell
PowerEdge server

database simultaneously, the total number of users is around 2,250 (that is, 450 ÷ 0.2). High-end PowerEdge servers, such as the PowerEdge 8450, meet the needs of massive workloads beyond 450 concurrent users and provide more flexibility in the deployment.

Figure 1 highlights the capabilities of the Oracle Database Appliance and PowerEdge server, and the matrix in Figure 2 details their features.

High-level view of Oracle Database Appliance deployment

The Oracle Database Appliance, like other Oracle database solutions, processes queries from client computers. However, the Oracle Database Appliance has been certified and optimized for specific deployment scenarios so that it can deliver unique features and benefits unavailable in general computing environments.

Two mirrored disks reserve the database appliance's internal storage for the Oracle software, and database storage is external. Dell pre-installs all the components, including the RAID setting. The Oracle Enterprise Manager, bundled in the appliance package, provides the remote management software for the appliance.

The following sections describe the multi-tier architecture, storage, and management components shown in Figure 3 and provide guidelines for optimal implementation. For more information on the Oracle Database Appliance itself, please see "The Oracle Database Appliance by Dell: Architecture and Features" in Dell *Power Solutions,* Issue 2, 2001.

Multi-tiered architecture: deployment considerations

The intended usage, storage requirements, and potential legacy applications present an infinite number of ways to architect a database solution. Four major deployment models are particularly relevant to the Oracle Database Appliance by Dell.

The database deployment eventually chosen could be a hybrid of the options presented here. These deployment examples have been simplified to show the relevant pieces that

access the database appliance. The front end of the network might include components (such as firewalls, Web servers, and PowerApp.BIG-IP™ for load balancing) to optimally route incoming HTTP connections, shown in Figure 4.

Option A: Clients with browsers. In this scenario, the appliance directly hosts applications. The Oracle Portal software, bundled with the appliance, provides interfaces and the ability to create portals or Web-based applications that access the database.

Option B: Web browser. The Web browser scenario uses server-side scripting mechanisms such as servlets, JavaServer Pages™ (JSP™), Active Server™ Pages (ASP), and Common Gateway Interface (CGI) to access the database. This deployment scenario would benefit from Dell's Internet infrastructure components such as
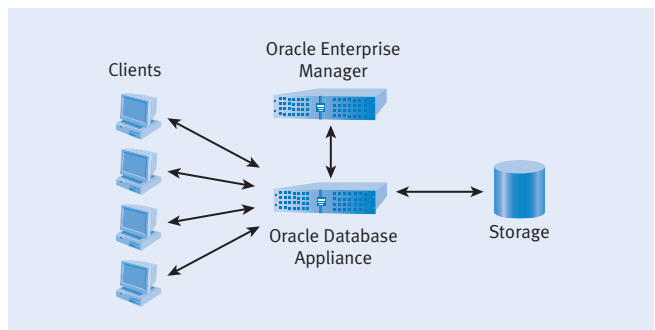

Figure 3. High-level view of the Oracle Database Appliance deployment

PowerApp.web (for simplified Web server deployment and management), PowerApp.cache (for advanced caching mechanisms) and PowerApp.BIG-IP (for advanced load-balancing mechanisms). Smaller deployment scenarios, which do not depend on the application server for reliability and scalability of the middle tier, benefit from this approach.

Option C: Application server model. The application server is the middle tier that hosts business logic and provides a framework for reliable and scalable service.

The application server infrastructure provides the runtime environment for programs such as JSPs and servlets, thereby enabling delivery of content over an HTTP link to Web clients. Application servers include Oracle9i™ Application Server, BEA WebLogic™, and IBM® WebSphere®.

If this scenario is part of a tiered infrastructure, it can be deployed with PowerApp.cache and PowerApp.BIG-IP to increase the reliability and scalability of the solution.

Option D: Client/server model. In this model, the application resides on a remote machine and accesses the database using standard application programming interfaces (APIs) such as open database connectivity (ODBC) and Java Database Connectivity (JDBC®). The application can be created using standard Java™ and C++ development tools and deployed on any operating system that supports it.

Storage deployment options

Dell and Oracle have tested and certified several storage options for the Oracle Database Appliance by Dell (see Figure 5). Current and anticipated database storage requirements should drive the solution decision. The appliance's database storage is external; SCSI and Fibre Channel solutions provide hot-swappable hard drives, redundant power supplies, cooling modules, and interface modules for greater availability and fault tolerance. As mentioned earlier, the internal storage on the appliance is reserved for the Oracle software on two mirrored disks.

SCSI storage

SCSI storage is recommended when the need for expansion capabilities is low. The Dell PowerVault 210S is a 3U SCSI solution that features 80 MB/sec throughput, up to 12 hot-plug drives, backplanes that can be split for flexibility, and up to 438 GB of effective storage capacity in a RAID-10 configuration.
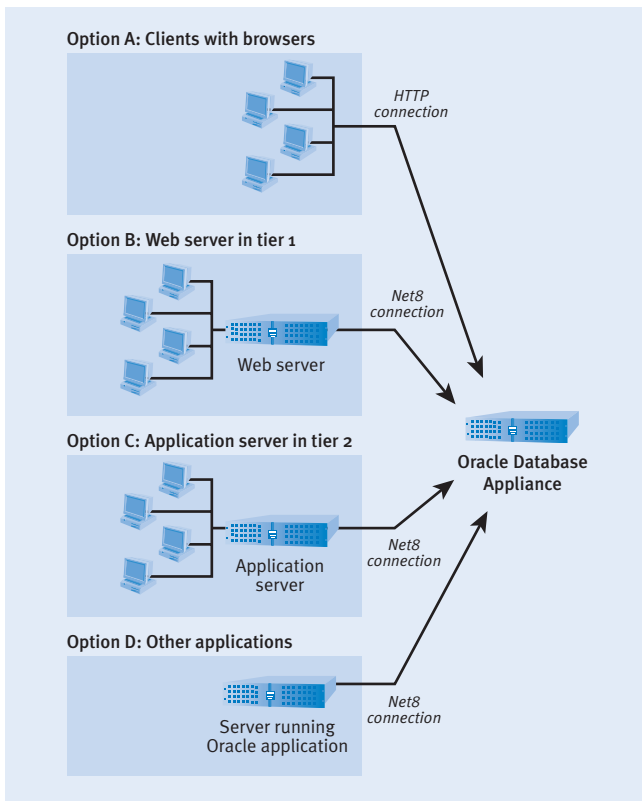

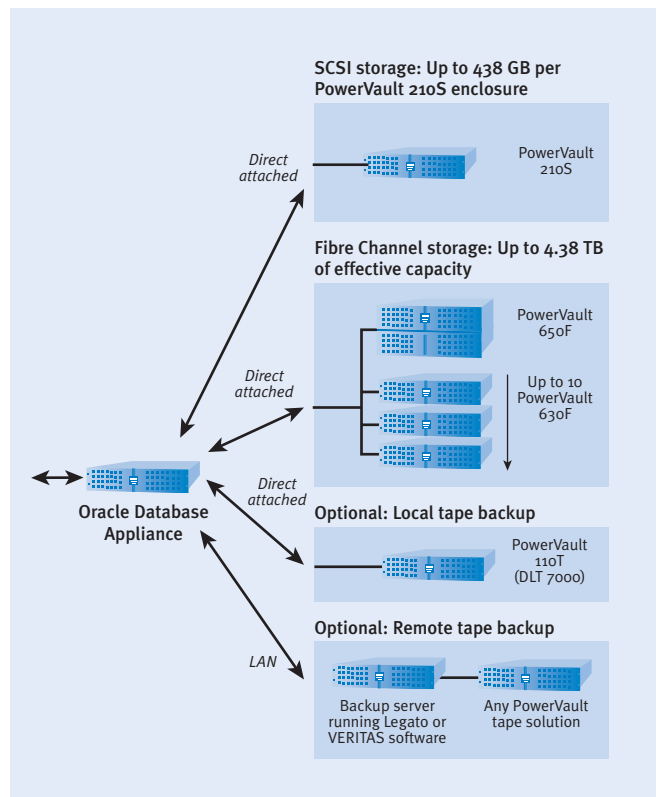Figure 4. Deployment options for the Oracle Database Appliance: front end

Figure 5. Storage deployments for the Oracle Database Appliance: back end

Fibre Channel storage

The Dell PowerVault 650F/630F Fibre Channel storage solution features up to 100 MB/sec throughput, up to 120 hot-plug drives, and expandability to 4.38 TB of effective storage in a RAID-10 configuration.

Optional tape backup

The Oracle Database Appliance by Dell offers local and remote tape backup solutions.

Local tape solution. This solution is an inexpensive way to perform backups in situations where storage requirements are low and cost-effectiveness is a primary concern. A local tape backup unit (the PowerVault 110T-DLT 7000 External has been certified) attaches directly to the PowerEdge 6450 server's SCSI connector. The software for performing local tape backup is bundled with the appliance.

Remote tape solution. The preferred mechanism for tape back-ups, the remote LAN backup, uses the network to back up the database from the appliance to a remote tape storage. This solution consolidates backup of multiple servers on a remote machine and enables more powerful tape backup solutions such as autoloaders and libraries. Tape backup software (VERITAS® or Legato® server software) runs on the remote machine, and the software license must be purchased separately from the software vendor.

Management of Oracle Database Appliances and their storage

The Oracle Database Appliance system and database software automatically recognize and reconfigure themselves for hardware upgrades such as adding CPU, memory, and disk. All ongoing error notification, routine backups, fix-it events, and other administration tasks are fully automated.

The Oracle Enterprise Manager (EM), bundled with the appliance, typically is deployed on a client machine located on the network. Software patches and updates can be remotely applied from the centralized EM console. A Web-based interface lets authorized administrators manage the Oracle Database Appliance via EM from any browser over the Internet.

The Appliance Management Pack extends the capability of EM to manage not only the database, but also the entire software environment and various hardware components on the Oracle Database Appliance.

The EM Appliance Management Pack also eliminates the need for local IT administration. The secure, centralized, remote management capabilities, as well as the appliance's auto-tune and auto-maintenance features, allow one DBA to manage up to 60 Oracle appliances on the network (see Figure 6). The appliance is an excellent solution for a stand-alone Oracle database,
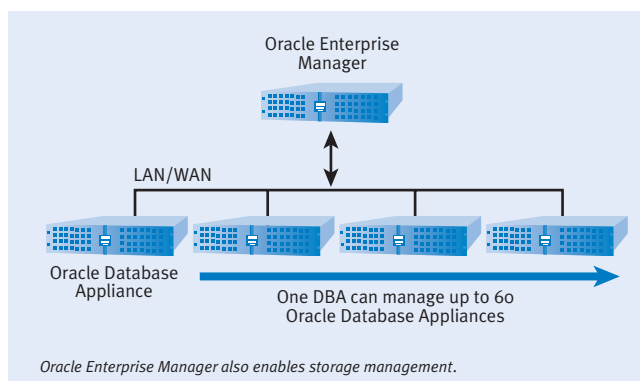

Oracle Enterprise Manager also enables storage management.

Figure 6. Oracle Enterprise Manager on the network allows management of multiple appliances

and large database rollouts can be simplified and less costly to IT departments.

Simple and cost-effective

The Oracle Database Appliance by Dell offers simple deployment and ongoing management, and the appliance provides the Oracle features to successfully run and administer an enterprise-quality database. This solution combines cost savings for the CIO as well as automated routine tasks for DBAs and IT administrators, who now have less worry and more time to focus on other projects that add value to their company. ✪

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