

# Technology Audit

## Databases

### EnterpriseDB EnterpriseDB Advanced Server

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#### Abstract

*EnterpriseDB is an enterprise-level Relational Database Management System (RDBMS) offering a high level of compatibility with the leading mainstream enterprise databases, most notably Oracle. EnterpriseDB is perhaps unique in that although it is based on the Open Source PostgreSQL code base to which it continues to contribute, it has made significant extensions and improvements to this code. The result is a database and supporting services that aim to compare in speed and scalability to Oracle, and that will also run the large majority of Oracle-based applications without changes to their code. To enable this it has implemented the most popular proprietary features of Oracle and its SQL extensions, and in some cases it has even offered enhancements. EnterpriseDB provides a real-time support service for product releases, patches, and upgrades through the EnterpriseDB Network, and offers simple migration solutions to support the transfer of applications. The product is primarily targeted at those needing enterprise-scale solutions and at those that are happy to pay for all aspects of licensing and support. The database is offered on a subscription basis per CPU at a price that varies from an unsupported-free licence with limited capacity, to a premium level enhanced implementation at US\$5,000 per CPU, per annum. It is the compelling nature of the total cost of ownership comparison with the major players and the large potential for cost savings that this enables, which makes EnterpriseDB a potential alternative to Oracle in all but the most specialised implementations.*

#### KEY FINDINGS

Key: ✓ Product Strength ✗ Product Weakness ⓘ Point of Information

✓	Enterprise-scale relational database.	✓	Highly compliant with mainstream databases, most notably Oracle.
✓	Easy migration and applications compatibility makes the move from Oracle straightforward.	✓	Total Cost of Ownership offers significant savings over mainstream enterprise databases.
ⓘ	Has PostgreSQL as code-base of database server.	ⓘ	Aimed at large-scale users of Oracle database.
✗	Open Source code base may put off some potential customers.	✗	Exceptional performance is claimed but no published benchmarks are available.

#### LOOK AHEAD

EnterpriseDB will continue to release enhancements to its Enterprise Server that provide increasingly tight compatibility with Oracle's Enterprise Server products, and the support for migration from alternative databases is also being extended. Performance and scalability will continue to be enhanced.

## ► FUNCTIONALITY

### Product Analysis

There is an increasing interest in Open Source Software, particularly as that software matures to the point at which it can be described as Enterprise Class. For a database this means that it must be reliable, performant, scalable, and compatible with industry standards. In the last few years a number of open source communities and vendors have emerged, or re-emerged, that have attempted to meet the general needs of a wide range of users looking for a strong open source database, but no vendor has focused as intently as EnterpriseDB in delivering a true enterprise-class offering that takes advantage of the legacy of open source code. Although the core of its solution is based on the PostgreSQL open source code base it has made significant extensions to it. In effect it has delivered a new database solution that is highly compatible with Oracle and is sold and supported as an enterprise-class product, but on an annual subscription basis. Oracle itself has gone in the reverse direction, buying companies with solutions such as the Berkeley DB that allows it to compete at the lower end of the market with MySQL, and at the entry level, Microsoft SQL Server implementations for example.

Some of the work undertaken by EnterpriseDB to make its Advanced Server solution a direct replacement for Oracle, and an easy migration route for other databases, includes:

- **Optimisation of the core PostgreSQL engine** to improve performance by between 50% and 200% over native PostgreSQL.
- **SQL Compatibility.** EnterpriseDB Advanced Server executes Oracle's SQL language and its extensions.
- **PL/SQL Compatibility.** EnterpriseDB Advanced Server executes PL/SQL, Oracle's proprietary procedural language used for triggers, stored procedures, and functions.
- **Data Dictionary Views.** EnterpriseDB provides the most common Oracle catalogue views.
- **Drivers and Connectors.** EnterpriseDB supports the most common programming languages used to create database applications for Oracle.
- **Transfer/Migration Tools.** EnterpriseDB provides a suite of automated tools to move Oracle data, packages, triggers, stored procedures, and functions to EnterpriseDB in one simple step.
- **Replication.** EnterpriseDB Replication Server can replicate Oracle databases in near real-time to run reporting and other applications on duplicated EnterpriseDB databases to improve Oracle application performance.
- **Reliability and Scalability.** EnterpriseDB Advanced Server has been strengthened to make it a suitable replacement for Oracle in high-volume, mission-critical applications.
- **Oracle-Like Tools.** EnterpriseDB Advanced Server includes a robust set of integrated tools that will be familiar to professional Oracle DBAs and developers.

Butler Group would offer a note of caution in the expectation that EnterpriseDB offers a better database that is fully compatible with Oracle, and is pleased to see that EnterpriseDB is realistic in its positioning. Although it claims to offer a simple migration for the vast majority of applications running on Oracle, it recognises that Oracle still has significant functionality that currently excludes it from a small percentage of clients or requires a degree of customisation in order to migrate the applications. But key to that proposition is the issue of Total Cost of Ownership (TCO) which is likely to prove advantageous to EnterpriseDB in a large percentage of situations.

### Product Operation

The EnterpriseDB Advanced Server product suite includes the Database Server, the Replication Server, and an integrated set of tools for DBAs and developers. The product description below should be very familiar to those who have applications based on Oracle or who support them.

#### EnterpriseDB Database Server

EnterpriseDB Database Server is the relational database engine at the core of the EnterpriseDB Advanced Server product suite.

The database is based on PostgreSQL which has a solid reputation for reliability and has been enhanced by EnterpriseDB to give significantly improved performance.

PostgreSQL uses a multiple-row data storage strategy called Multi-Version Concurrency Control (MVCC) to provide rapid responsiveness in high-volume environments. Oracle also uses this technology for the same reason. Other technologies used by PostgreSQL to enhance its performance include shared row-level locking, an advanced technique that improves upon the row-level locking feature of other databases, especially tuned Symmetric Multiprocessor Performance (SMP), dynamic conversion of indices to bitmaps in memory, and table partitioning using constraint exclusion. When EnterpriseDB is installed it further optimises itself for high performance making it a strong contender in the OLTP market. This is a significant improvement on some of the vendors that offer open source solutions.

### Performance Features

- Row-level locking.
- Deadlock detection.
- Tablespaces for partitioning data.
- Dynatune™ which automatically tunes the database to a user-defined usage model.

### Data Protection and Integrity Features

- Savepoints for hot backups, point-in-time recoveries.
- Always ACID-compliant to ensure data protection.
- Commit, rollback, foreign keys, and referential integrity for excellent data integrity.

### Security and Administration Features

- Views, schemas, multiple access-control lists, permissions, and encryption.
- Numerous logging options for robust and efficient auditing.
- SSL and Kerberos cryptography support.

### Advanced Programming Features

- Native XML support.
- SQL subselects, transactions, and user-defined functions.
- Sequences, outer joins.
- Client Connectors. EnterpriseDB provides connectors for the most common enterprise programming environments, including: JDBC , ODBC, NET, ESQL / C++, PERL, PYTHON, and PHP.

### Cross-Platform Support

- Supports Windows and multiple Linux releases on Intel x86 + AMD platforms including Linux x86 Win32 Solaris SPARC Linux x86-64.

## EnterpriseDB Replication Server

EnterpriseDB Replication Server replicates data in near-real time to meet a wide array of business needs. Data can be replicated to or from heterogeneous EnterpriseDB, Oracle, and PostgreSQL databases, across distant geographies, complex enterprise data infrastructures, and heterogeneous operating platforms, including Linux, Solaris, and Windows.

EnterpriseDB Replication Server enables enterprises to run reporting and other applications in separate but linked Oracle environments, to ensure availability and seamless disaster recovery of critical database services. It can also speed-up database performance by offloading non-critical updates. Replication Server also enables the transfer of data across heterogeneous data sources while maintaining transactional integrity and allows clients to migrate to updated or upgraded versions of EnterpriseDB Advanced Server with no database downtime or risk to data.

Key Features of EnterpriseDB Replication Server include:

- EnterpriseDB Replication Console, which enables the configuration, monitoring, and maintenance of multiple EnterpriseDB Replication Servers from a single graphical user interface.
- The Database Pooling Connection Framework, which automates intelligent usage of database and network resources.
- Single-master, multi-slave replication, which enables the deployment of multiple warm standby databases, either locally or remotely.
- Snapshot replication or scheduled incremental replication, which provides increased flexibility.

## EnterpriseDB Migration Toolset

EnterpriseDB Migration Toolset. The EnterpriseDB Database Migration Toolset is a collection of utilities that automatically migrate the data and business logic contained in existing Oracle databases to EnterpriseDB databases. After the data and business logic has been transferred from the Oracle database to the EnterpriseDB database, the database application originally written for the Oracle database may be run on the EnterpriseDB database without any re-coding or translation. Data migration support for MySQL, Sybase, and Microsoft SQL Server is also supported but without transparent applications support.

The EnterpriseDB Database Migration Toolset can:

- Import a complete or partial Oracle database schema.
- Migrate all data and Oracle database objects, including tables, constraints, indexes, triggers, sequences, views, stored procedures, functions, and packages.
- Provide customised migration through command-line switches.

## EnterpriseDB Developer Studio

EnterpriseDB Developer Studio is a cross-platform developer and DBA console that the users of Oracle database tools can use with virtually no retraining. Developer Studio users can:

- Browse multiple EnterpriseDB, Oracle, MySQL, SQL Server, Sybase and PostgreSQL databases simultaneously.
- Conduct sophisticated SQL query profiling and analysis.
- Dynamically monitoring database performance to optimise and tune EnterpriseDB Advanced Server.
- Use pre-configured Wizards for security, backup, and restore.

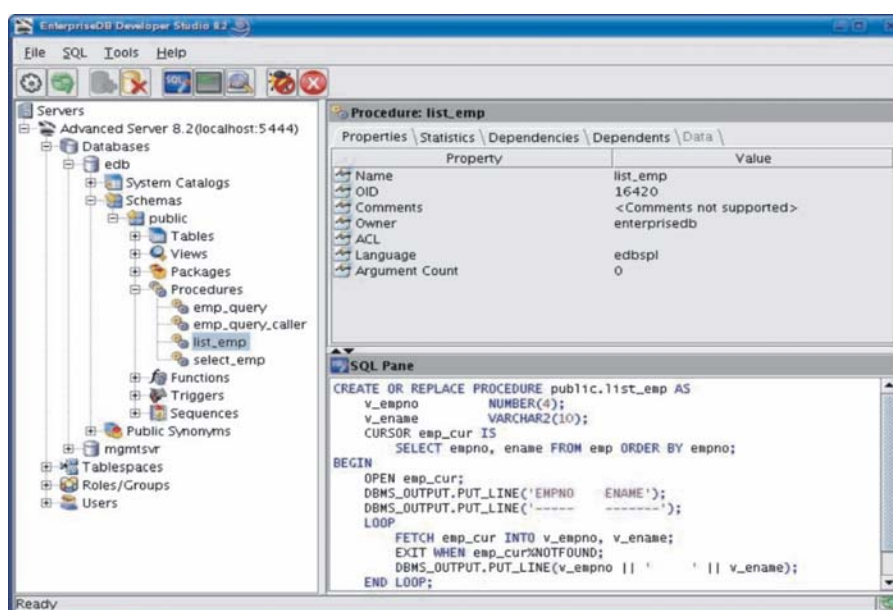


Figure 1: EnterpriseDB Developer Studio

## EnterpriseDB DBA Management Server

EnterpriseDB DBA Management Server is a database monitoring, profiling, reporting, and querying tool that enables DBAs and developers to analyse, manage, and tune any number of EnterpriseDB or PostgreSQL databases from a single Web browser. DBA Management Server also delivers richly-formatted reports in both HTML and PDF formats.

DBA Management Server users can:

- Locate and tune complex queries based on usage.
- Monitor real-time user activity and lock status.
- Prioritise and execute commands based on user-defined rules.
- Analyse log files on both local and remote databases using a single interface.
- Create detailed statistical analysis of tables, indexes, and columns.
- View and modify run-time configuration parameters.
- Execute and view ad-hoc queries using a single interface.

## EnterpriseDB Procedural Language Debugger

EnterpriseDB Procedural Language Debugger is used to develop and analyse stored procedures, functions, and triggers in applications written for EnterpriseDB, Oracle, and PostgreSQL databases. The EnterpriseDB Procedural Language Debugger allows developers to step through code one line at a time as it executes, to set and remove conditional breakpoints, to watch and modify variables, and view the execution stack for example.

Key features of the EnterpriseDB Procedural Language Debugger include:

- An easy-to-use GUI integrated with EnterpriseDB Developer Studio.
- Support for Oracle-style packages.
- Support for EDB-SPL – EnterpriseDB’s Oracle-style stored procedure language.
- Support for PL/pgSQL – PostgreSQL’s native stored procedure language.
- Support for multiple breakpoints.
- Step Into, Step Over, Restart, Continue, Stop, and Exit functions.

## Product Emphasis

EnterpriseDB is squarely targeted as a replacement for a large majority of an enterprise’s Oracle databases aiming to match the performance required to support even large scale applications. We would expect to see continued development of features that extend the compatibility with Oracle, such that the vast majority of applications can be migrated without change.

## ► DEPLOYMENT

EnterpriseDB is one of a number of vendors that has delivered an on-line support environment similar to that of Red Hat Inc’s Network update delivery service and support subscription model. The service is named EnterpriseDB Network and is included in EnterpriseDB Advanced Server.

The EnterpriseDB Network connects EnterpriseDB and its customers. The EnterpriseDB Network provides automatic update notification for the delivery of upgrades and patches. EnterpriseDB customers also receive automated software delivery as part of the EnterpriseDB Network. And, all members receive access to the user forums.

## Migration

EnterpriseDB has recognised that the easy migration of applications written for Oracle onto its platform is fundamental to its potential for success. Unless the migration is close to hands-free the costs and requirement for skilled support could make the move either risky or costly. To ensure that this is not the case EnterpriseDB has developed a migration toolset that automates the process and continues to do everything possible to match Oracle's database functionality. The result is that currently well over 75% of applications can simply be picked up and transferred over to EnterpriseDB without any manual intervention, and this figure increases with each new release. Specialist implementations such as those using Oracle Real Application Clusters (RAC) or the Oracle Call Interface (OCI), or other specialised extensions of Oracle will currently need support to migrate.

Sony Online Entertainment has migrated from Oracle databases to EnterpriseDB to support its massively multiplayer on-line gaming service that enables thousands of players to take part around the clock. Sony believes that it will save as much as 80% on its licence costs through this move. Sony also states that "80% of SOE's selected Oracle applications required little or no re-coding to run on EnterpriseDB"

## Pricing

EnterpriseDB adopts the annual-subscription model rather than concurrent-user licensing or perpetual licensing.

Butler Group believes that perpetual software licensing will cease to be the de facto standard approach to purchasing and using software in the next five years. The introduction of Software as a Service (SaaS) and Open Source Software (OSS) will change the landscape, and pay-as-you-go or all-inclusive deals will become the dominant methods. The EnterpriseDB model clearly supports that proposition.

EnterpriseDB Advanced Server is offered at two levels. A basic licence at US\$1,500 per CPU and a premium subscription charged at US\$5,000 per CPU per annum. Replication server is an option that is only available to premium subscribers at an additional fee. Basic support and access to the technical library is included in the basic subscription. The premium subscription offers code indemnification and Escrow, as well as extended 24 X 7 support and optional consultancy and technical support services. The basic product may also be used for free without support in an implementation, limited to 6 Gbytes of data and a single CPU with no more than 1Gbyte of memory.

Clearly there will be a sliding scale of discount where large scale customers are implementing EnterpriseDB across multiple applications.

EnterpriseDB's pricing is linear (such that each additional CPU running EnterpriseDB costs the same as the one before, where a CPU is defined as a single socket on the motherboard).

## Consultancy Support

EnterpriseDB can offer consultancy support to aid migration if required, but in reality most Oracle trained DBAs and support staff will be sufficiently familiar with the migration and support tools, to need little if any help.

Enterprise DB also offers support for PostgreSQL as well as for its own Advanced Server products. This service has recently been taken up by SUN to support the second-level support needs of those using PostgreSQL on their Solaris platform. The support is priced at US\$1,000 per CPU for a basic subscription and US\$3,000 for a premium subscription that includes 24 X 7 support and advanced consultancy, technical support, and tuning options. PostgreSQL support is offered to the many thousands of current users of PostgreSQL directly as well as through distributors such as SUN.

## ► PRODUCT STRATEGY

EnterpriseDB has brought an enterprise-class RDBMS to market in a matter of two years. The company has developed a strong support base in the two years since its launch. Such a proposition would have been impossible without the ability to base its core on the existing and widely respected open source PostgreSQL code-base. From its inception, EnterpriseDB has set itself up as a commercial database company that also has great expertise and commitment to the PostgreSQL community that it relies upon for a large level of testing and support. In return, it offers to enhance the PostgreSQL code base and extend and enhance it in all areas except in the areas of its own value proposition as an enterprise-class replacement for the mainline databases.

Although EnterpriseDB will continue to enhance and support the migration of databases from alternative vendors such as MySQL, Sybase, and Microsoft SQL Server, it will not target the PostgreSQL community in this way, as it wishes to support a healthy community around the PostgreSQL code-base. Instead it will work hard to support that community, and in truth, there are a number of key members of that community who also work for EnterpriseDB.

EnterpriseDB also includes usage governance to limit the capacity of licences used for trial purposes or downloaded and used for free. This is seen as a requirement to assist the ISVs and SIs that might otherwise worry that their own associated software could easily be replicated and used without a supporting license.

## ► COMPANY PROFILE

EnterpriseDB was founded in March 2004 to bring the benefits of open source to enterprise databases. The company launched its first product in May 2005. Headquartered in New Jersey, EnterpriseDB has engineering and support centres in North America, Europe, and Asia.

EnterpriseDB Corp raised US\$20 million in series B funding in August 2006, and a new line of credit that it intends to use to grow its sales and marketing worldwide. The latest round of funding brings the total amount of venture capital funding to US\$28.5 million, which featured US\$16.5 million from Series B funding led by Fidelity Ventures, including previous investors Charles River Ventures and Valhalla Partners. EnterpriseDB also announced a US\$3.5 million line of credit from Comerica Bank.

While the company already has development sites in the US, UK, India, and Pakistan, its sales presence has been largely limited to the US, but this is likely to change soon. With 15% of sales last year being international, the company is opening an EMEA beachhead in London.

EnterpriseDB added more than 50 customers in the first three quarters of 2006, including AgriStats, Atomogy, Proxicom, Sony Online Entertainment, Sun Microsystems, and xPrima. The announcement of a major sale to Vonage in November 2006, is the latest in a number of high-profile companies that are moving a large number of databases over to the EnterpriseDB platform, including some from rival MySQL.

The financial figures for EnterpriseDB are not available in detail due in part to the recent nature of its launch, but turnover for 2006 was in the few million dollars and will more than double in 2007.

EnterpriseDB has the desire to be a global competitor for enterprise-scale database implementations, and as such recognises that it needs to build up a global company that is capable of offering a high level of support and expertise. This will be the major challenge that will limit its potential in the near future, although Butler Group might expect to see further funding to exploit the potential for explosive growth.

EnterpriseDB has partnered with vendors that provide components of the open source stack such as JBoss, which offers open source Java middleware, and Red Hat the leading Linux provider who has also recently acquired JBoss. As part of the relationship, EnterpriseDB and JBoss will work together to bring joint offerings to market, and positions this EnterpriseDB favourably as the combined Red Hat and JBoss attempt to become the “super company for open source”.

EnterpriseDB is keen to partner with those that implement their solutions including the major application vendors as well as the SIs and are aggressively recruiting these.

## ► SUMMARY

EnterpriseDB offers an enterprise-scale RDBMS at a significantly reduced cost of ownership when compared to mainstream databases without the usual compromise on scalability and performance that one might expect. The ability to migrate applications from Oracle without change is already impressive and is continually being enhanced. The open source legacy does not inhibit development but underpins the quality and rigour of standards adherence and the scope of testing. EnterpriseDB is not an open source product but a commercial RDBMS licensed by subscription. The company should be regarded as a direct competitor for the mainstream vendors, particularly Oracle that it is initially targeting. Butler Group believes that on the evidence of a number of key users, EnterpriseDB is already a strong competitor for large-scale non-mission critical applications and that it is increasingly capable of replacing most non-specialised implementations of Oracle.

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