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The Forrester Wave™: Enterprise Database Management Systems, Q2 2009

by Noel Yuhanna
for Application Development & Program Management Professionals

FORRESTER® Making Leaders Successful Every Day

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Oracle, IBM, And Microsoft Lead, With Sybase Following Closely; Ingres Tops Open Source Databases In Current Offering

by Noel Yuhanna
with Mike Gilpin and David D'Silva

EXECUTIVE SUMMARY

In Forrester's 153-criteria evaluation of enterprise open source and closed source database management systems (DBMSes), we found that Oracle, IBM, Microsoft, and Sybase lead the pack because each offers mature, high-performance, scalable, secure, and flexible solutions. It was no surprise to see Oracle dominating in most of the features and functionality such as performance, availability, security, and administration. IBM DB2 for Linux, UNIX, and Windows showed strong support for application and data integration, performance, scalability, and administration, while Microsoft has impressive capabilities for database programmability, application development, administration, and security. Sybase Adaptive Server Enterprise continues to show improvement in its product, offering good support for availability, performance, and administration. IBM Informix Dynamic Server, MySQL, and Ingres came out as Strong Performers, following very closely on the heels of the Leaders and offering very respectable alternatives and a multitude of choices for application developers and architects. PostgreSQL lacks the Leaders' breadth of features but is a reputable Contender for some use cases.

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NOTES & RESOURCES

Forrester interviewed 21 vendor and user companies, including IBM, Ingres, Microsoft, Oracle, PostgreSQL, Sun Microsystems, and Sybase.

Related Research Documents

"TPC Benchmarks Don't Matter Anymore" March 6, 2009

"The Forrester Wave™: Enterprise Data Warehousing Platforms, Q1 2009" February 6, 2009

THE DBMS MARKET IS MATURE

Databases remain a critical asset to any enterprise. Although database management systems (DBMSes) are mature, DBMS vendors continue to innovate, extending beyond the traditional relational model by embracing new technologies such as XML, content management, and Web services. Forrester estimates that the DBMS market will grow at 8% annually through 2012 as enterprises deploy new applications, expand existing ones, and deal with increasing data volume. Today, most DBMSes offer very good enterprise-class features and functionality, but a few lead the pack in delivering extreme high-end performance, scalability, and availability. The DBMS market has consolidated to three major vendors — IBM, Microsoft, and Oracle — that dominate more than 88% of the market. Other DBMS players — such as CA, Software AG, and Sybase — continue to cater to the specialized DBMS market to support legacy applications, complex requirements, and low-cost DBMSes. In addition, open source databases such as Ingres, MySQL, and PostgreSQL continue to expand their features and functionality, providing viable alternatives that can support most small to moderately sized business applications.

Today, 90% of enterprises support more than one enterprise DBMS product, such as IBM DB2, Microsoft SQL Server, and Oracle, for their mission-critical database applications, but they often choose to deploy one primary DBMS more extensively than the others. Why have more than one DBMS? The need is often driven by application requirements, the size of databases, cost, performance, availability requirements, and incumbent IT skills. Choose carefully, though, because once you deploy a database, migration is usually costly and complex. Hence, choosing a DBMS is often a long-term, strategically important commitment.

The Database Market Landscape

Forrester estimates the current database market to be $27 billion — including new database licenses, technical support, services, and consulting — and it is likely to grow to $32 billion by 2013. The database market today is divided into three main categories:

- **Online transaction processing (OLTP) databases.** This category primarily focuses on applications such as enterprise resource planning (ERP), customer relationship management (CRM), supply chain management (SCM), call center, order entry, and other custom applications that require databases to support high concurrency, performance, scalability, and security. Products in this category deal with real-time data; are optimized to support high levels of inserting, deleting, and updating information; and support many concurrent users. Each of the transactional databases would have a set of production and nonproduction databases (test, development, and staging) to support any given application. Vendors such as CA, IBM, Microsoft, Oracle, Software AG, and Sybase provide OLTP databases. In addition, open source databases that support such usage include Ingres, MySQL, and PostgreSQL.

- **Data warehouses.** In this category, data stored in a warehouse is used for business intelligence, analytics, and other decision support requirements. Usually, data is moved from OLTP databases into the warehouse on a regular basis using extract, transfer, load (ETL) and other data movement technologies. Data warehouse vendors such as Greenplum, Netezza, Sybase, and Teradata have created specialized software for this category, and some traditional DBMS vendors such as IBM, Ingres, Microsoft, and Oracle have extended their products to support warehouse requirements.

- **Specialized databases.** Beyond the OLTP and warehouse categories, the specialized database category provides DBMSes used by applications for specific purposes — such as mobile applications, XML applications, or standalone applications that need an embedded database repository. Most of these requirements come from value-added resellers (VARs), original equipment manufacturers (OEMs), and independent software vendors (ISVs) that use a specialized database to store data and metadata for their applications. Vendors of specialized databases include IBM, Microsoft, Oracle, and Sybase, as well as smaller vendors such as Mark Logic, Progress, and Software AG.

DATABASE EVALUATION OVERVIEW

Forrester assessed the state of the enterprise database market and evaluated the strengths and weaknesses of top DBMS vendors and open source database projects to see how they stack up against each other.

Evaluated Criteria: Offering, Strategy, And Market Presence

After examining past research, user needs assessments, surveys of database administrators, and vendor interviews, we developed a comprehensive set of evaluation criteria. We evaluated vendors and projects against 153 criteria, which we grouped into three high-level buckets:

- **Current offering.** To assess product strengths, we evaluated each offering against seven groups of criteria: data types and data integrity; performance, scalability, and very large databases (VLDBs); application development; database availability; database security; platform support; and database administration.

- **Strategy.** We reviewed each vendor and project's strategy and vision and considered planned enhancements for positioning products to meet future customer demands. We also looked at the financial resources available to support the product and the vendor's go-to-market and overall corporate strategies. We also reviewed each of the product's pricing and licensing options and cost of production and development deployments, in addition to the commitment of the vendor or community. For open source projects, we considered the project's overall strategy and cost as well as the size and activity level of its community.

- **Market presence.** To assess each product's market presence, we combined information about each vendor's company financials, adoption, training and certification, systems integrators and partners, and global presence. For open source projects, we assessed the project's installed base, its number of paying customers, the scope and size of its community, its level of support, and the size of its ecosystem.

Evaluated Vendors Meet Enterprise Database Requirements With Credible Deployments

Forrester included seven DBMS vendors and open source database projects in the assessment: IBM, Ingres, Microsoft, Oracle, PostgreSQL, Sybase, and Sun Microsystems (MySQL). All of the DBMS vendors and projects assessed in this Forrester Wave™ offer very good basic database features and functionality to support any application that simply needs to store, manage, and access records. Any enterprise DBMS not listed in the Wave should be carefully evaluated before being used for any new applications, even basic ones. Of many criteria, most notably, all of the evaluated DBMS vendors and projects (see Figure 1):

- **Have enterprise-class database features and functionality.** We included vendors and open source database projects that have strong database features and functionality to support any type of enterprise application deployment. These include features such as support for application development, high availability, disaster recovery, security, high performance, a wide range of data types, and backup and recovery.

- **Have a credible installed base.** All of the evaluated DBMS vendors and open source database projects have 500 or more customers using their product in production.

- **Have enterprise usage for mission-critical applications.** Each project or vendor has active customers using its products to support mission-critical applications.

Figure 1 Evaluated Vendors And Projects: Product Information And Selection Criteria

Vendor	Product evaluated	Product version evaluated	Version release date
IBM	IBM DB2 IBM Informix Dynamic Server	9.5 11.5	October 2007 May 2008
Ingres	Ingres Database	9.2	November 2008
Microsoft	SQL Server	2008	August 2008
MySQL	MySQL	5.1	November 2008
Oracle	Oracle Database	11g	August 2007
PostgreSQL	PostgreSQL	8.3	February 2008
Sybase	Adaptive Server Enterprise	15.0.3	December 2008

Vendor selection criteria
The product focuses on database management, and evaluated products were released prior to January 1, 2009.
The product has enterprise-class database features and functionality, including support for high availability, security, performance, manageability, and integration with applications.
The product works with enterprise transactional applications such as ERP, CRM, SCM, and in-house-developed transactional applications such as eCommerce, Web 2.0, etc.
The product can be a closed source or open source enterprise-class database product.
The product supports integration with popular programming models including .NET and Java.
The product has been deployed for at least 500 customers.
If closed source, the product has had database revenue growth of 5% or more over the past 12 months.
The product was mentioned by Forrester clients in five or more inquiries in the past 12 months.
Products that focus solely on a particular application type — including embedded databases, mobile databases, in-memory databases, XML databases, Java databases, cache databases, and data warehouses — are not included in this Wave.

Source: Forrester Research, Inc.

LARGE DBMS VENDORS CONTINUE THEIR DOMINANCE

We weighted our evaluation criteria to assess the vendors and projects for enterprise transactional applications that require comprehensive features and functionality. We included criteria such as disparate data types, data integrity, high availability, security, performance, application development, database administration, scalability, and manageability. The weightings are balanced to represent the priorities of DBAs and enterprise architects aiming for a broader database implementation that covers support for packaged and custom applications and the ability to support small to large databases in a 24x7 environment. Clients with a narrower range of requirements — for example, for specialized application usage scenarios — should re-weight the Wave criteria to reflect those specific priorities.

Our evaluation found that (see Figure 2):

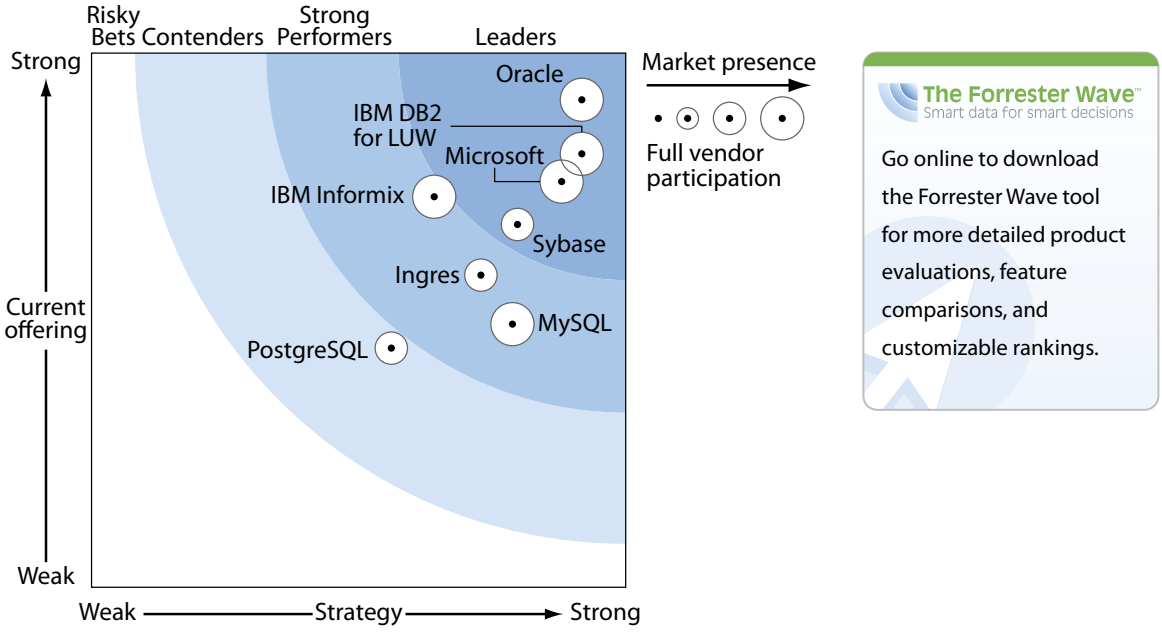
- **Oracle, IBM DB2 for LUW, and Microsoft lead the pack; Sybase is strengthening.** Oracle topped the current offering criteria and tied the top spot in the strategy category with IBM DB2 for LUW. Oracle has very strong set of database features and functionality in availability, security, performance, administration, data types, and integration. IBM DB2 for LUW has a good balance of features and strategy. Microsoft has done extremely well with its overall current offering, with high scores in database programmability, security, availability, and application/data integration. Sybase has done well to gain a spot in the Leader position. Sybase's product is highly reliable with a good set of enterprise-class features and functionality to support most types of applications.

- **IBM Informix, Ingres, and MySQL offer competitive options.** Strong Performers include IBM Informix, Ingres, and MySQL. Each offers database features and functionality that are a good fit for many applications. IBM Informix did well overall, offering a viable low-cost enterprise-class DBMS solution. Ingres topped the open source database products, followed by MySQL, with both offering a good alternative for customers seeking a low-cost DBMS.

- **PostgreSQL lags behind.** PostgreSQL has some good capabilities across the board but lags in performance, scalability, administration, application development, support for disparate data types, and VLDBs.

This evaluation of the database market is intended only as a starting point. Readers are encouraged to view detailed product evaluations and adapt the criteria weightings to fit their individual needs through the Forrester Wave Excel-based vendor comparison tool.

Figure 2 Forrester Wave™: Enterprise Database Management Systems, Q2 '09



Source: Forrester Research, Inc.

Figure 2 Forrester Wave™: Enterprise Database Management Systems, Q2 '09 (Cont.)

	Forrester's Weighting	IBM DB2 for LUW	IBM Informix	Ingres	Microsoft	MySQL	Oracle	PostgreSQL	Sybase
CURRENT OFFERING	50%	4.04	3.64	2.90	3.77	2.44	4.54	2.22	3.37
Data types and data integrity	10%	4.60	4.36	2.76	4.36	2.81	4.84	2.13	3.78
Performance, scalability, and VLDB	15%	4.21	3.81	2.10	3.06	2.30	5.00	1.80	2.81
Application development	15%	4.73	3.99	3.16	4.61	2.72	4.70	2.97	3.01
Database availability	20%	3.94	4.22	3.46	4.40	1.46	5.00	1.81	4.22
Database security	15%	3.36	1.95	2.34	3.43	1.52	3.56	1.89	2.86
Platform support	10%	2.96	2.88	3.09	1.60	4.74	3.27	4.16	3.09
Database administration	15%	4.32	4.05	3.24	4.17	2.77	4.94	1.52	3.55
STRATEGY	50%	4.58	3.20	3.65	4.40	3.93	4.58	2.80	3.98
Product strategy	50%	4.75	3.00	3.50	5.00	3.25	4.75	2.80	3.95
Commitment	50%	4.40	3.40	3.80	3.80	4.60	4.40	2.80	4.00
Pricing and licensing	0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MARKET PRESENCE	0%	4.19	4.11	3.01	4.60	4.06	4.60	3.44	3.83
Company financials	20%	4.00	3.70	5.00	4.00	5.00	4.00	5.00	4.00
Adoption	20%	4.30	2.90	2.60	5.00	5.00	5.00	3.60	3.60
Training and certification	20%	3.70	3.95	1.40	5.00	3.30	5.00	3.00	2.90
Systems integrators and partners	20%	3.95	5.00	3.05	5.00	4.00	5.00	2.60	4.65
Global presence	20%	5.00	5.00	3.00	4.00	3.00	4.00	3.00	4.00

All scores are based on a scale of 0 (weak) to 5 (strong).

Source: Forrester Research, Inc.

VENDOR PROFILES

All the products and projects assessed in this Wave offer good, basic DBMS features and functionality for a wide range of data types, data integrity, application development, administration, security, performance, and scalability needed to support most small to medium-sized applications. However, for applications that require the most-comprehensive DBMS features and functionality, look at Oracle, IBM DB2 for LUW, Microsoft SQL Server, and Sybase. If applications will require large and complex transactional databases, then Oracle and IBM DB2 for LUW are the best choices. And finally, if you are looking for a low-cost enterprise-class DBMS, then look at IBM Informix, MySQL, and Ingres. The products included in this evaluation represent a wide range of options to meet a wide variety of requirements.

Leaders: Broad Set Of Functionality To Support Any Critical Transactional Application

- **Oracle: The most comprehensive set of database features and functionality.** Most customers agree that Oracle offers the best overall database technology among DBMS vendors. Oracle continues to innovate, offering new features and functionality for scalability, availability, integration, performance, security, and manageability with every new release. Oracle is executing very well against its DBMS vision, and, with its recent acquisition of Sun, is likely to extend its vision to include a database machine tightly integrated with Oracle's DBMS to deliver high performance and automation and to fill out its low-cost DBMS offering with MySQL.

  Suitability: Oracle DBMS is well known for its scalability architectures, especially using Oracle RAC (Real Application Clusters), which is a key differentiator to support scale-out and high availability for high-end applications. Customers today are running tens of terabyte-sized Oracle databases for transactional applications, with some supporting hundreds and thousands of concurrent users. Application developers and architects who need the best in high availability or scale-out clustering database technology should look first at Oracle.

  Issues: Oracle has no issues regarding lagging database features and functionality. Although some customers have major concerns about Oracle database licensing cost, Oracle often gives deep discounts, especially to larger enterprises, to make its product more competitive. Oracle has in the past focused more heavily on large enterprises; however, in the past three to four years, its focus has expanded to include small and medium-size businesses (SMB) and moderately sized companies through offering Oracle Express (a free DBMS) and Standard Edition One (a low-cost product). MySQL under Oracle is likely to further strengthen its SMB market support, helping Oracle compete against Microsoft, which continues to dominate the SMB segment.

- **IBM DB2 for LUW: A strong database offering with good momentum.** IBM DB2 for LUW offers strong database features and functionality, especially in the areas of application development, database programmability, application/data integration, data types, XML hybrid storage, automation, caching, and performance. Enterprises like DB2's XML storage, strong compression support, and high reliability to support their extremely mission-critical applications. Although IBM DB2 for LUW has done well over the years, Oracle continues to overshadow it with overall features and functionality. With the recent release of DB2 9.7, IBM now offers support for native PL/SQL, which makes it easier to migrate applications from Oracle to DB2.

  Suitability: IBM DB2 for LUW is known for its robustness and high performance, especially on UNIX platforms such as AIX, HP-UX, and Linux. It currently holds the title for the fastest TPC-C transactional application benchmark.[1] IBM DB2 for LUW is suitable for moderately sized to large transactional applications, XML applications, and complex transactional applications. Enterprises that are already using DB2 on the mainframe will like the tighter integration with DB2 LUW to support mashups, Web 2.0, and other applications using data federation.

Issues: Although DB2 for LUW offers good high availability and scale-out features, it still trails Oracle in this area. Its support for data and index partitioning is average.

- **Microsoft: The most aggressive DBMS vendor with a strong road map.** Microsoft has done reasonably well in the database business but over the past three years has shown increasing focus and commitment to going after the enterprise market. SQL Server 2005 and, more recently, SQL Server 2008 have enabled Microsoft to take market share in moderately sized to large enterprises, delivering good performance, scalability, security, and availability functionality. Five years ago, hardly any enterprises ran multiterabyte databases with SQL Server to support critical applications. Today, hundreds of enterprises are running 10-terabyte and larger transactional SQL Server databases.

  Suitability: SQL Server is known for its easy-to-use, simplified enterprise DBMS and for delivering the best price-performance for most business applications. Many enterprises like the breadth and depth of the packaged applications SQL Server supports across various industries. In addition, SQL Server 2008 offers strong support for unstructured and semistructured data. Enterprises that want a cost-effective and easy-to-use enterprise DBMS should look at SQL Server.

  Issues: Although SQL Server lags in distributed caching and scale-out architectures, Microsoft is adding such features in future releases. For example, "Velocity" is a distributed caching technology that supports high-volume transactions.

- **Sybase: A good set of features to support most business requirements.** Sybase is known for its reliability and robustness and for its reasonably broad set of database features. Sybase remains committed to Sybase ASE; it has extended its features to support column-level encryption, shared-disk clustering, and XML. Sybase continues to experience growth in database revenue and customer adoption. In 2008, its DBMS revenue grew by 28%, and it added 1,200 new customers. Also, Sybase announced that its upcoming release will include in-memory-database and caching technologies.

  Suitability: Sybase has been especially strong in the financial sector, supporting critical applications where reliability, robustness, and availability are top requirements. Sybase ASE is suitable for custom transactional applications, focusing primarily on structured data. Sybase ASE's sweet spot is moderately sized applications with databases of up to 5 TB in size, supporting hundreds and thousands of concurrent users. In addition, unlike other DBMS vendors, Sybase offers a separate data warehouse product called Sybase IQ that supports business intelligence (BI), data warehousing, data marts, and analytics.[2]

Issues: Sybase is not widely supported by packaged applications such as CRM, ERP, and SCM. Most of the deployments today are for moderately sized deployments; few support extremely high-end databases, especially transactional databases that are more than 5 TB in size. Sybase customers often raise concerns regarding the difficulty they have in finding qualified staff members, as DBAs skilled in working with Sybase are not as easy to find as DBAs skilled in working with Oracle or SQL Server.

Strong Performers: Viable Low-Cost Alternatives To Support Most Business Applications

- **IBM Informix: An offering with good features but average momentum.** When IBM acquired Informix more than five years ago, some customers were concerned that it might cease to exist, requiring them to move to DB2. However, IBM Informix is not only alive but continues to grow at a healthy rate of 18% and is used by more than 100,000 enterprises worldwide. IBM Informix has a good balance of database features to support many business applications.

  Suitability: IBM Informix is suitable for most custom small to moderately sized transactional applications.

  Issues: IBM Informix is not widely supported by packaged applications such as CRM, ERP, and SCM or in vertical industries other than finance. In addition, DBAs and application developers for the Informix platform are often hard to find, creating a staffing challenge.

- **Ingres: Best open source database but lacking in visibility.** Ingres has the best set of enterprise database features and functionality among open source databases. It offers good capabilities for availability, security, administration, programmability, and platform support.

  Suitability: Ingres is a viable open source database that offers good reliability and features. Enterprises looking for a low-cost DBMS to support their custom transactional applications should consider Ingres. The sweet spot for Ingres is for small to midsized applications with databases smaller than 1 TB in size and supporting 1,000 concurrent users.

  Issues: Ingres is not supported by many packaged applications, which is a key issue. Also, many existing Ingres customers remain concerned about the difficulty in finding Ingres skills.

- **MySQL: An improved offering with increased adoption.** MySQL has done well in narrowing the features and functionality gap with Ingres and even relative to closed source databases. MySQL has the largest open source database community, and hundreds and thousands of enterprises use it for their mission-critical deployments.

  Suitability: MySQL is suitable for small to moderately sized custom applications with databases smaller than 1 TB in size. MySQL has good support for programmability, administration, and replication. Applications that are suitable to run on MySQL include Web-based applications,

Web 2.0, reporting, and other internal apps. Enterprises looking to lower the cost of data management should consider MySQL.

Issues: Although MySQL is supported by many packaged applications including some in key vertical industries, it lacks the support of others such as PeopleSoft, SAP, and Siebel.

Contender: Mainly To Support Small Non-Mission-Critical Business Applications

- **PostgreSQL: An offering that lags in enterprise database features and functionality.** Although PostgreSQL offers a good set of basic database features and functionality, it lags in enterprise-class capabilities for availability, security, programmability, and performance. In the past, Sun and Fujitsu have supported PostgreSQL — and more recently EnterpriseDB — but its enterprise adoption has been slow, although it has the second-largest developer community after MySQL.

  Suitability: Enterprises looking for a low-cost option for supporting small non-mission-critical databases should consider PostgreSQL. It is suitable for supplementing an existing DBMS, for usage in reporting, as an archival data repository, or for supporting small Web-based applications.

  Issues: Although PostgreSQL has good features and functionality, it is not a proven enterprise-class DBMS to support mission-critical deployments.

SUPPLEMENTAL MATERIAL

Online Resource

The online version of Figure 2 is an Excel-based vendor comparison tool that provides detailed product evaluations and customizable rankings.

Data Sources Used In This Forrester Wave

Forrester used a combination of two data sources to assess the strengths and weaknesses of each solution:

- **Vendor surveys.** Forrester surveyed vendors on their capabilities as they relate to the evaluation criteria. Once we analyzed the completed vendor surveys, we conducted vendor calls where necessary to gather details of vendor qualifications.

- **Customer reference calls.** To validate product and vendor qualifications, Forrester also conducted reference calls with seven of each vendor's current customers.

The Forrester Wave Methodology

We conduct primary research to develop a list of vendors that meet our criteria to be evaluated in this market. From that initial pool of vendors, we then narrow our final list. We choose these vendors based on: 1) product fit; 2) customer success; and 3) Forrester client demand. We eliminate vendors that have limited customer references and products that don't fit the scope of our evaluation.

After examining past research, user need assessments, and vendor and expert interviews, we develop the initial evaluation criteria. To evaluate the vendors and their products against our set of criteria, we gather details of product qualifications through a combination of lab evaluations, questionnaires, demos, and/or discussions with client references. We send evaluations to the vendors for their review, and we adjust the evaluations to provide the most accurate view of vendor offerings and strategies.

We set default weightings to reflect our analysis of the needs of large user companies — and/or other scenarios as outlined in the Forrester Wave document — and then score the vendors based on a clearly defined scale. These default weightings are intended only as a starting point, and we encourage readers to adapt the weightings to fit their individual needs through the Excel-based tool. The final scores generate the graphical depiction of the market based on current offering, strategy, and market presence. Forrester intends to update vendor evaluations regularly as product capabilities and vendor strategies evolve.

ENDNOTES

[1] Although TPC benchmarks have been in use for more than a decade, their value has diminished in recent years. See the March 6, 2009, "TPC Benchmarks Don't Matter Anymore" report.

[2] Having introduced low-cost enterprise data warehouse (EDW) appliances that incorporate its mature Sybase IQ database, Sybase has positioned itself as a go-to EDW vendor for the midmarket and for budget-constrained large enterprises. See the February 6, 2009, "The Forrester Wave™: Enterprise Data Warehousing Platforms, Q1 2009" report.

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