AberdeenGroup

Profile

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Oracle Application Server 4.0: A Keystone for the Web-Enterprise Bridge

Preface

Application servers are the central components in multi-tier enterprise application infrastructures. They provide a stable point about which organizations can develop, deploy and manage a spectrum of Web, other client-independent, and traditional client/server enterprise applications. Applications built upon enterprise application servers minimize client maintenance costs and are more manageable, scalable and efficient. A new generation of application servers helps developers create enterprise-class, strategic applications instead of only tactical, localized ones. These servers also integrate in the middle tier information from a variety of heterogeneous enterprise data sources, including backbone applications and databases.

Oracle Application Server 4.0 is a major product from a leading enterprise software supplier that directly addresses the core needs of the enterprise Web application marketplace. This *Profile* describes how Oracle Application Server 4.0 successfully meets the key criteria by which organizations assess and select application servers, especially information integration, scalability and flexibility.

Executive Summary

Oracle Application Server 4.0 is an enterprise platform integrating the development and deployment services and middleware necessary for scalable, reliable and secure distributed applications. Oracle Application Server 4.0, the company's market-leading Oracle8 DBMS, and Oracle development tools are the core components of Oracle's comprehensive Network Computing Architecture for client-independent, multi-tier computing. This comprehensive and coherent enterprise application infrastructure blueprint blends open programming, middleware and transaction standards and proven commercial products. Such a strategy properly positions the application server as a vital but not isolated linchpin supporting a range of data-driven applications.

The application server market is young and volatile and yet still must serve the needs of both small and Fortune 1000 organizations. Because of this users should especially

value several key Oracle Application Server qualities. Oracle Application Server is a relatively mature product for such a new market. Additionally, Oracle's experience and stability as a supplier of enterprise software and services is distinctive. The Network Computing Architecture demonstrates this experience — the strategy helps organizations use new technologies to solve enterprise problems and gain enterprise benefits. Finally, Oracle Application Server's open standard support, deployment and development flexibility, and data connectivity tools help users integrate at the application level diverse enterprise information sources.

True enterprise application servers like Oracle Application Server 4.0 unite in one environment a complete set of middleware and development support services organizations need to create multi-tier applications. These leading application servers:

- *Execute business logic*, in the form of code or objects, in a flexible and scalable middle layer between the client and database or other back-end software. This allows users to interact with enterprise programs via application-neutral, "thin" client software such as Web browsers or Java clients instead of heavy-maintenance proprietary software.
- *Manage distributed applications.* Application servers provide easy-to-use interfaces by which developers and administrators can configure, monitor, tune and control application execution and components and the server itself. Since an application whose components are distributed can be more effectively managed in a middle tier, application performance improves.
- *Facilitate interaction between clients and back-end data sources*. Application servers allow organizations to separate comparatively agile types of object and Internet-based applications from less flexible legacy and backbone systems. The servers establish a "neutral zone" within which diverse application components can more easily interact with each other and back-end and client-side software. As a result developers can more easily integrate information and manage access and transactions.
- *Facilitate application development*. Application servers integrate a variety of traditionally distinct middleware and development products, including Object Request Brokers, TP monitors, presentation and database access middleware, and messaging services. The integration itself is a core benefit — developers can build applications upon a coherent and reusable platform instead of each time assembling and integrating an appropriate array of middleware and tools. Although application servers will not obviate the need for point solutions, and indeed should interoperate with these, the more thoroughly they integrate key middleware and development functions the more productive they will allow programmers to be.

Advanced application servers like Oracle's offer these core capabilities and enable organizations to create enterprise-caliber, "strategic" Web applications. Corporations

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have successfully created first generation, "tactical" Web applications relatively limited in scope and scale, such as self-service human resource and simple catalog applications. Now they want to gain similar benefits for more important, permanent business functions such as portfolio or account analysis, e-commerce, and workflow/project management. Strategic applications require a more robust middle tier, and compared to tactical applications are:

- broader in scope — more users, greater and more diverse information;
- more complex — multiple transactions per session, multiple stages per transaction;
- of greater value and more sensitive to risk.

Organizations implementing multi-tier application infrastructures should seriously evaluate Oracle Application Server 4.0, especially if they are operating many Oracle database servers on the back end, if they are running a range of multi-tier application types, from simple to complex, or if they will be running application servers on a variety of platforms. Given Oracle's determination to offer the key product underpinnings of a unified multi-tier infrastructure, organizations also should consider Oracle Application Server as a primary piece of their information integration strategies.

Application Servers as Infrastructure

Organizations must select application servers for strategic applications differently than they would those for tactical applications. A tactical application server is not part of a standard enterprise architecture, and the localized nature of tactical projects emphasizes deployment ease and speed over other server criteria. Conversely, enterprise IT professionals should assess servers for strategic applications from within the context of a comprehensive Web investment strategy that blends traditional enterprise infrastructure values with new criteria specific to distributed, multi-tier application development. Multi-tier application infrastructures must support strategic applications and broadly integrate a potential explosion of tactical applications. Since Internet and object technologies are fluid, organizations assessing application servers will need to future-proof their strategies by balancing immediate needs for robustness and stability, both in supplier and product, with the flexibility to accommodate emerging technologies.

Aberdeen finds that three of many important application server criteria successfully addressed by Oracle Application Server 4.0 are especially important:

- *Information integration infrastructure.* A supplier's strategy for providing all the pieces of a distributed, multi-tier application architecture. This strategy should both support new application development and help integrate at an application level disparate and frequently incompatible applications and data sources of all types, including unharmonious tactical Web applications.

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- *Scalability*. How well the application server accommodates tremendous and even unpredictable increases in traffic or transactional complexity without having performance — or application cost — suffer.
- *Flexibility/interoperability.* How effectively the application server accesses different clients and data sources and executes different types of application components.

Oracle Application Server 4.0

The new version of Oracle Application Server, 4.0, builds impressively upon one of the original application servers for multi-tier development. Version 4.0 fundamentally positions Oracle Application Server as an enterprise product by bolstering its reliability and scalability and by broadening its interoperability with other enterprise products and data sources. Oracle Application Server's fitness for enterprise-caliber application support partly reflects its maturity — Oracle recognized early the need for application processing and management in the middle tier. Oracle thus is generations ahead of several competitors and has an internally-developed product that is fully integrated into the company's overall product strategy.

Oracle Application Server 4.0 offers the four critical application server capabilities:

- execute and manage objects and code;
- manage distributed applications;
- manage connections (with clients, data sources, and applications);
- provide development support and options.

Oracle built its application server around its own CORBA 2.0-compliant Object Request Broker (ORB). The ORB and additional object and Web services provide the core management capabilities. The server's cartridge architecture provides customizable run-time environments that execute business logic. For example, when a client requests a particular Java application, the Oracle Application Server Resource Manager initiates the application within the Java cartridge (a Java Virtual Machine) and returns the results to the client. Oracle Application Server includes cartridges for most standard application types, including Perl, Java, PL/SQL, C, and Java-CORBA, but also enables developers to create their own cartridges for user-defined or enterprise-standard applications and data types.

The server also manages connections with databases, both Oracle's and other suppliers', enables these relationships to scale, and integrates diverse databases and legacy applications. Comprehensive support for Java, including Enterprise Java Beans, places Oracle Application Server 4.0 at the forefront of the market and further facilitates programmer productivity and information integration.

Core Application Server Assessment Criteria

Aberdeen research finds that end user organizations consider the following appli-

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cation server capabilities essential to building a scalable and flexible architecture for client-independent, multi-tier applications.

Scalability
Will your application server support greater traffic volumes and more complex transactions without surrendering performance? An application server can scale if it can safely and efficiently apportion the processing tasks composing a transaction among different instances of a server, different physical machines, or among different server processes (units of execution). A scalable application server will "load balance" tasks not only in a relatively simple, "round robin" method, but also dynamically according to several different parameters, including the capacity of each server or process and how busy each may be at a particular moment.

Oracle Application Server 4.0 includes a spectrum of features enabling it to scale to thousands of concurrent users and hundreds of thousands of daily hits. Oracle Application Server fully leverages a distributed or "clustered" set of physical servers and employs multi-threading within both the general server manager and the cartridges that actually execute program code. These capabilities enable developers to finely partition applications so that they make maximum use of each server instance and can be efficiently distributed to other instances and other machines as processing loads increase. Oracle Application Server 4.0 offers both basic round-robin and several flexible types of dynamic load balancing.

Flexibility/interoperability
A flexible application server:

- provides efficient access to heterogeneous clients and data sources;
- can run in a variety of typical enterprise operating environments;
- can accommodate different objects and application types;
- offers a variety of development and deployment options.

Flexibility and interoperability are absolutely vital qualities for an application server, given that its chief purpose is to make possible client-independent applications that interact with existing enterprise applications and data.

Release 4.0 bolsters Oracle Application Server's ability to interoperate with a range of enterprise systems and data sources. It optimally interacts with Oracle databases, Oracle Applications, and other programs created using Oracle technologies and products. Further, Oracle Application Server cartridges expedite interaction with other DBMSs through ODBC, JDBC, SQL, SQLJ and other database access standards. The cartridges also execute major types of code and components and deliver Java, HTML, and other standard and custom output to clients.

Reliability/availability
Infrastructures for enterprise applications have to be robust, period. Localized

tactical or non-transactional "publishing" applications need to be continuously available and reliable, but these qualities are absolutely critical for applications providing broad interaction with vital company data. Application servers must resist failure at all levels of their operation but be able to resurrect failed processes should a failure actually occur.

Oracle Application Server 4.0 incorporates most of the important means by which products of this type achieve high reliability and availability. Oracle Application Server isolates application processes so that if one part of an application or even an entire application crashes, other concurrently running applications continue operating uninterrupted. Oracle Application Server helped pioneer this increasingly standard feature. Oracle Application Server 4.0 backs up and, in the event of failure, restores failed processes and the server generally to their original conditions. Oracle Application Server process managers are distributed, eliminating single points of failure.

Supplier's information infrastructure strategy
To address the needs of organizations creating sophisticated, multi-tier applications, suppliers need to provide more than a point solution or even a tightly integrated development, deployment and management set. Suppliers need to detail for organizations a comprehensive product and technology strategy both enabling them to develop their applications and providing a flexible but sound application infrastructure blueprint.

The supplier's blueprint must define and relate primary infrastructure components:

- *Network application environment*, consisting essentially of the network operating system and server and client platform strategies (NT, UNIX, mainframe, etc.).
- *Service middleware*, which includes application, Web, directory, messaging and other servers, and the products that store and manage objects and components (ORB and repository, for example). This facet of the blueprint would include support for middleware standards underlying middleware communication, such as LDAP and other increasingly important directory standards.
- *Object and component support strategy* and related inter-object communication support (Java, EJB, CORBA/IIOP, COM, etc). The strategy must define the parts that can constitute an application and how they cofunction.

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- *DBMS and backbone application integration strategy*. The structural means and connectivity standards by which middle-tier applications will interact with enterprise data sources.
- *Application development support strategy*, either through a supplier's own products, integration with third-party products, or both.

Oracle Application Server 4.0 is a key component in Oracle's Network Computing Architecture (NCA), the company's comprehensive product and technology strategy for client-independent, multi-tier enterprise applications. NCA incorporates all of the primary enterprise infrastructure needs outlined above. Oracle bases NCA on open Java, HTTP, and other standards but also establishes robust cornerstones in the form of its own and other best-of-breed server and development products. Users can gain optimal benefit from NCA by using Oracle's own products, especially Oracle Application Server, the market-leading Oracle8 DBMS, and Oracle tools such as JDeveloper and Developer and Designer. However, the NCA strategy allows organizations to employ other open-standards based products. For example, Oracle Application Server 4.0 supports the LDAP directory standard and interoperates with directory servers from Oracle itself, Netscape and Novell. Such open directory support is crucial for effective multi-tier application development.

Execution/Transaction Processing and Management Environment
Enterprise applications — indeed, most applications of any value — require complex transactions that must be managed efficiently. New-generation application servers integrate many, if not most, of the basic functions provided by TP monitors in traditional mainframe-driven environments but perform them while supporting frequently stateless and transaction-averse Internet technologies.

Oracle Application Server's distributed, multi-threaded architecture delivers the processing performance and management today's transaction-intensive applications demand. Oracle Application Server's CORBA-based Object Transaction Service not only can maintain state across multi-phased object, messaging and Internet-based transactions, it can manage transactions across multiple instances of the server itself by leveraging Oracle8 to employ a two-phased commit transaction method. Oracle Application Server supports open transaction standards such as CORBA OTS, X/Open XA and TX, which helps it interact with databases and dedicated TP monitors. Finally, Oracle Application Server 4.0 features an easy-to-use and comprehensive management console that centralizes all administrative functions for an entire distributed application server system, from processes to cartridges to applications.

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Programmer productivity
Enterprise application servers must support both open standards and leading development environments. They must provide both a measure of language independence, so that IT organizations can leverage current in-house skills and resources, and optimize for new technologies and languages, especially Java, so that enterprises can gain new technology.

Oracle Application Server 4.0 helps developers efficiently create applications in several ways, ultimately providing both language independence and specific Java advantages. Oracle Application Server's cartridge architecture establishes customizable deployment and development environments so that developers can create applications in Java and CORBA or in established languages such as C and Perl.

Oracle Application Server and Oracle's Networking Computing Architecture actively support Java development and deployment throughout an organization's entire information infrastructure, fostering code reuse and portability within and between projects. Java is especially attractive for corporate developers developing in today's heterogeneous networking environments. Oracle Application Server 4.0 also will support the new Enterprise Java Beans (EJB) standard, which will further help developers reuse code and integrate applications.

Although Oracle offers its own excellent JDeveloper Java IDE and Developer and Designer development and modeling tools, developers can efficiently use any Java or other language IDEs.

Security
Oracle Application Server 4.0 greatly enhances the security capabilities of its earlier versions by supporting major new security protocols, especially Secure Sockets Layer Version 3 (SSLv3) and the X.509v3 standard for digital certificates. Oracle Application Server employs SSLv3 to secure Internet Inter-ORB Protocol (IIOP) communication between CORBA objects constituting the core of the server itself and multi-tier applications. The server reinforces and complements SSLv3 protection by comprehensively supporting the X.509v3 digital certificate standard, by which developers can authenticate users accessing and managing the server and multi-tier applications. Oracle Application Server 4.0 interoperates with directory servers supporting the Lightweight Directory Access Protocol (LDAP) industry standard, enabling developers to more easily manage digital certificates.

Cost
Although still cheaper than traditional enterprise applications, multi-tier enterprise applications still are expensive to develop and deploy. Because they are more complex, the cost of these applications is proportionally driven more by software development, maintenance and other human expenses than by hardware and software product costs.

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Then there are the potential "opportunity costs," generally measured in lost revenues and dissatisfied customers, produced by major applications that don't scale or infrastructures that don't mesh with existing investments or accommodate new technologies. These factors simply underscore the previously prioritized factors, especially programmer productivity, scalability, flexibility and the supplier's infrastructure strategy. In Version 4.0, Oracle reduces multi-tier application costs by targeting those factors that most heavily contribute to their expense.

Service and Support
The quality and breadth of a supplier's service and support, both its own internal offerings and its network of distributors, developers, and integrators, directly influences project costs and potential success. Oracle possesses one of the largest enterprise software sales and support organizations in the industry and an enormous network of third-party developers and system integrators. These resources ensure that enterprises understand the benefits of Oracle Application Server 4.0 and can successfully use it to achieve substantial business benefits.

Competing Products
Application servers may be divided into several general categories:

- Servers designed specifically to support enterprise applications;
- Tactical server/IDE bundles evolving to support enterprise applications;
- Application servers supporting major ERP packages;
- Application servers built on middleware components (ORBs, TP monitors).

The first category describes those products most suitable for developing and deploying *new* multi-tier strategic applications. The third category reflects the fact that most large organizations are buying packaged applications to address backbone business functions. Extending these applications through a middle tier is a major use of application servers. Oracle Application Server 4.0 is a clear leader in the first and third categories, reflecting its excellent development and deployment capabilities and the company's own strengths in the enterprise application market as supplier of both applications and the de facto standard Oracle8 DBMS.

Now in its fourth generation, Oracle Application Server was designed from the outset to provide middle-tier development, deployment and management in the company's enterprise application infrastructure blueprint. Although other suppliers offer some fine enterprise-caliber application servers, Oracle Application Server is the only mature, originally enterprise-scale product created in-house by a successful enterprise software supplier with a clearly articulated infrastructure vision. This combination, increasingly crucial as Web and other client-independent applications evolve, clearly distinguishes Oracle Application Server 4.0.

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Conclusions

Oracle has for several years identified the application server as a critical piece of a large organization's future application infrastructure. For Oracle the application server thus represents both a critical strategic technology and a potentially enormous market opportunity. Strategically, Oracle Application Server enables broad and sophisticated client interaction with both packaged (Oracle Applications) and custom-developed enterprise applications driven by data stored in Oracle8 and other suppliers' DBMSs. Oracle thus is committing enormous resources on every level, from R&D to channel partnering, to making Oracle Application Server 4.0 an outstanding enterprise solution.

Although Oracle Application Server 3.0 was not as open a product as some competitors, and thus less successfully reached beyond the limits of the Oracle installed base, Version 4.0's comprehensive Java, CORBA, and Enterprise Java Beans support and other enhancements make it very interoperable and flexible and competitive with other enterprise application servers. Oracle always will feel the opposing appeals of trying to optimize for its own products while being as open as possible. Oracle Application Server 4.0 manages to balance the two needs, and thus offers users a product that both addresses their critical application development, deployment and management needs while extending to them supplier stability and extensive technical and support services that end-user organizations will find uncommon and reassuring in an emerging market.

Oracle Application Server 4.0 is a compelling product for any organization whose data management infrastructure includes Oracle databases. It is a more than competitive product for enterprises who do not currently use Oracle products. Large organizations implementing multi-tier application infrastructures should seriously review Oracle Application Server 4.0.

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Aberdeen Group is a computer and communications research and consulting organization closely monitoring enterprise-user needs, technological changes and market developments.

Based on a comprehensive analytical framework, Aberdeen provides fresh insights into the future of computing and networking and the implications for users and the industry.

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