

# Oracle9i Application Server

*Product White Paper*

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Introduction .....	5
e-Business Applications, Requirements and Trends.....	5
The Challenges Of Creating an e-Business Web site .....	6
Oracle9i Application Server.....	7
RUN ALL YOUR Web Sites and internet Applications .....	8
Serving Web Content with Oracle HTTP Server (powered by Apache)9	
Oracle HTTP Server Modules (mods).....	9
mod_plsql.....	9
mod_ose .....	10
mod_ssl.....	10
mod_perl .....	10
mod_Jserv .....	10
Perl Interpreter.....	10
Java Application Development and Deployment.....	11
J2EE and CORBA in Oracle EJE.....	11
Java Servlet Deployment with Oracle9iAS.....	13
JavaServer Pages Deployment with Oracle9iAS .....	14
Oracle Business Components for Java.....	14
PL/SQL Application Development and Deployment.....	15
Oracle PL/SQL Engine .....	15
Oracle PL/SQL Server Pages.....	15
Oracle9iAS Forms Services .....	15
Developer Kits .....	16
Oracle Database Developer Kit.....	16
Oracle LDAP Client Toolkit.....	16
Oracle XML Developer Kit (XDK).....	16
Create personalized portals.....	17
Oracle9iAS Portal.....	17
Wireless Enable Portals.....	18
Oracle9iAS Wireless .....	18
Accelerate Web Site Performance with Caching.....	19
Oracle9iAS Web Cache .....	19
Oracle9iAS Database Cache .....	20
What kind of applications benefit from Oracle9iAS Database	
Cache? .....	21
Extract Business Intelligence.....	21
Oracle9iAS Reports Services .....	22

Application Server Reporting.....	23
Portal Integration .....	23
Oracle9iAS Discoverer .....	23
Oracle9iAS Clickstream Intelligence .....	24
Integrate your business .....	25
Oracle Workflow .....	26
The Workflow Processes .....	26
Workflow Builder.....	26
Workflow Engine.....	26
Business Event System.....	26
Notification System .....	26
The Workflow Monitor.....	27
Workflow Definitions Loader .....	27
Oracle Gateways .....	27
Generic Connectivity.....	27
Transparent Gateways.....	27
Oracle Applications Interconnect .....	28
Out-of-the-box Integration .....	28
Distributed Deployment .....	28
Loose Coupling of Applications .....	28
Tools for Easy customization.....	28
Event-based Distributed Messaging System .....	29
Guaranteed, Exactly Once, In-order Message Delivery.....	29
Content-based Routing Support.....	29
Supports Major Messaging Paradigms .....	29
Collaborate with stakeholders .....	29
Internet File System.....	29
Oracle9iAS Email .....	30
Email Architecture .....	30
Open Standards-Based Messaging.....	30
Oracle8i Based Message Store.....	31
Server Side Rules .....	31
Application Integration .....	31
Web Client Access .....	31
Administration.....	31
Oracle9iAS Unified Messaging.....	31
Unified Messaging Architecture.....	32
Unified Messaging SDK.....	32
Unified Messaging Client .....	32
SMS/Notification Gateways .....	32
Manage and secure your Web Infrastructure .....	33
Oracle Enterprise Manager .....	33
Management Anywhere.....	33
End to End Monitoring and Problem Response .....	33
Oracle Internet Directory.....	33
Scalable .....	34

High Availability.....	34
Secure.....	34
Integrated Environment.....	35
Key Directory Features .....	35
Oracle Advanced Security .....	35
Encryption.....	35
Supplied Encryption Capabilities.....	36
SSL Support .....	36
Security and Directory Integration .....	36
Scalability, Availability and Load Balancing.....	36
OAS Migration .....	37
Summary.....	38

## INTRODUCTION

### **e-Business Applications, Requirements and Trends**

The Internet introduces significant opportunities for companies to reach new markets and to streamline their internal business processes. At the same time, these opportunities generate new challenges, because applications must be delivered quickly and they must scale to serve vast numbers of users. Nonetheless, e-business is still business and to be successful, a company must create a competitive advantage to differentiate itself from competitors. Creating a competitive advantage has always been a key to being a success in business and the same truth applies in the world of e-business.

How does a company create a competitive advantage? By spending their dollars where it counts the most. Studies show that companies spend approximately 80% of their IT budget to provide standard business operations and only 20% on areas where they can differentiate themselves from the competition. Why does it take 80% of the IT budget to provide standard business operations? Because integrating diverse products that were not designed to work together into a consolidated set of business applications is difficult to do, difficult to support, and therefore, is expensive. Working with a single platform that provides all the functionality required to implement business operations for a company requires much less effort, which will consume less money from the IT budget.

A core component of modern IT infrastructure is the application server. Using an application server decreases application development time and costs because developers can concentrate on creating applications that give a company the competitive advantage, not on providing the infrastructure required to create a e-business Web site. The application server provides the infrastructure required: highly scalable web servers, transaction management facilities, portal services, mobile device transformers, caching services, business intelligence functionality, industry standard APIs and services, and legacy application integration capabilities.

Unfortunately most application server products on the market today target only a subset of a company's requirements so the company must integrate products from multiple vendors to create a complete solution. To reduce costs a company chooses to build applications using a collection of different application server products, but still must integrate all the applications together to create an e-

business Web site. Integrating these new applications that run on different application server products and then integrating them with the rest of the software infrastructure adds complexity and expense to developing the base applications.

### **The Challenges Of Creating an e-Business Web site**

Companies creating e-business Web sites experience a common set of problems and challenges.

- **Building e-business sites:** The market dictates that e-Business applications be designed and delivered with short turnaround times. Applications must scale and perform flawlessly. Applications must tightly integrate with each other. How can you achieve this without increasing your development staff?
- **Simplifying information access:** How many companies have too few Web sites? How many companies can find information that they need from their collection of Web sites? How can you present vital information and application interfaces in a single, unified manner?
- **Extending the information reach to mobile devices:** It's a fact of life that more people are conducting business while out of the office. How can you make the same information that is available from a desktop, available to road warriors on their mobile devices? How can you achieve the competitive advantage that mobile access offers, without creating multiple versions of the same applications and Web sites?
- **Making it fast:** How do you increase the performance of your web site? How do you make your applications run faster without redesigning and rebuilding them?
- **Extracting business information from the Web site:** Visitor who come to your Web provide valuable information about themselves and their interests. How do you extract this valuable information so you can use it to drive business decisions?
- **How do you integrate your existing business applications into your e-business Web site?** Most likely, you have existing applications and data sources that you would like to integrate into your e-business Web site. How do you do this without rewriting your applications? How do you make the data you have in different data sources available to your e-business Web site?
- **Managing and securing the e-business Web site:** Once you have your Web site up and running, how do you manage it all? How can you simplify the process so that you can manage your Web site infrastructure from one integrated console? How do you ensure that the Web site is secure and your e-business transactions are not compromised?

## **ORACLE9i APPLICATION SERVER**

Oracle9i Application Server (Oracle9iAS) is Oracle's new application server. Unlike others, Oracle9iAS is a comprehensive and integrated application server. It runs any Web site, portal or Internet application, and it runs it faster than any other application server on the market. Oracle9iAS makes your Web site and all your applications accessible from any browser or mobile device. You can satisfy demands for the latest up-to-the minute business information using Oracle9iAS integrated business intelligence services. You can simplify your management tasks by using the single management console provided with Oracle9iAS. Oracle9iAS addresses all of the challenges you face when building e-business Web sites.

With Oracle9i Application Server you can

- build and deploy dynamic Web sites, portals' and applications;
- aggregate content into a portal;
- make sites and applications accessible from both traditional browsers and mobile devices;
- run any Web site at least 3 times faster than any other application server;
- extract business intelligence;
- integrate existing applications and data sources into one common e-business infrastructure;
- collaborate effectively with all your stakeholders;
- manage and secure all of your Web infrastructure;

Figure 1 provides an overview of Oracle9iAS.

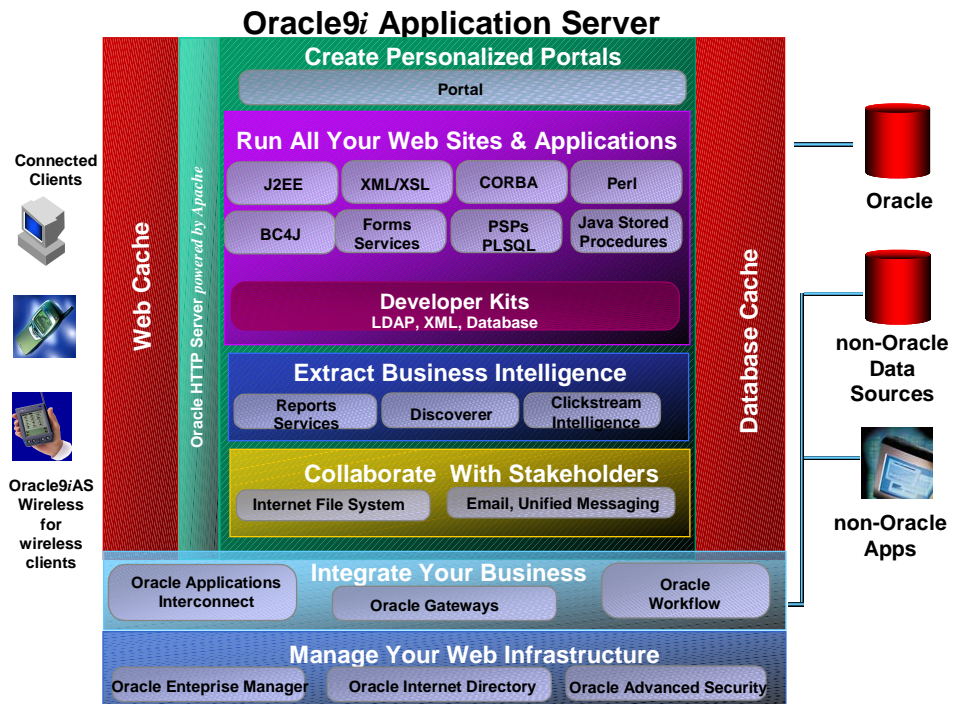


Figure 1: Oracle9iAS overview.

## RUN ALL YOUR WEB SITES AND INTERNET APPLICATIONS

All development teams face a similar set of challenges when creating an e-business Web site. They need to rapidly design, create and deliver, Web sites and applications that run fast over any network and on every device. They need to provide business intelligence to support daily operations and strategic decisions. And they need to seamlessly integrate all of this functionality, make it secure, and provide an easy, efficient way to manage everything.

Oracle9iAS supports all of your e-business transactional applications and data publishing needs, whether you need a web site, a company portal, or an Internet application. It provides a flexible deployment platform that supports the latest industry standard technologies and programming languages such as J2EE APIs with Java servlets, JSP, EJB, as well as XML.

Oracle9iAS tightly integrates with the Oracle Database and provides unique functionality database developers can use to quickly become productive Web developers. Developers can quickly leverage their PL/SQL knowledge to build dynamic database applications with PL/SQL Server Pages (PSPs), the PL/SQL Web toolkit, or Oracle9iAS Forms Services.

## **Serving Web Content with Oracle HTTP Server (powered by Apache)**

Serving Web content requires a Web server, and serving content reliably to users requires a robust and reliable Web server. Oracle9iAS provide a Web server that can reliably serve requests to thousands of users in a scaleable and predictable manner.

Oracle HTTP Server is based on the Apache Server, the de facto standard web listener on the Internet. Apache serves over 60% of the world's Internet sites, offering robust, scalable technology, in a thoroughly tested server product.

Oracle HTTP Server provides a completely configured, tested, and supported version of the Apache Web server. Oracle HTTP Server incorporates extended Apache functionality through the OpenSSL module to provide SSL and HTTPS support, and the Apache JServ servlet engine to support the running of Java Servlet applications. On top of this, Oracle9iAS also provides a number of additional modules, described below, to further extend the functionality of the Web server.

Using the Apache Web server as the basis for the Oracle HTTP Server allows you to benefit from the robust and high performance nature of the worlds leading Web server in a totally supported manner.

### **Oracle HTTP Server Modules (mods)**

Modules (mods) are plug-ins to the HTTP Server that extend its functionality either by offering native services (e.g. mod\_ssl) or by dispatching requests to external processes (e.g. mod\_Jserv dispatching to Apache JServ). mods are implemented in C code and run within the process space of the Oracle HTTP Server. In addition to the standard, compiled Apache mods provided with Oracle HTTP server, Oracle has enhanced several of the standard mods and has added Oracle-specific mods, which are described in the following sections.

#### **mod\_plsql**

This module routes HTTP requests for stored procedures to an Oracle database engine for processing. mod\_plsql executes within the HTTP Server process and facilitates the execution of the requested PL/SQL stored procedure within an Oracle database engine. The PL/SQL stored procedures generate dynamic content, using the PL/SQL Web toolkit, which is then returned to the browser via Oracle HTTP Server.

mod\_plsql maintains database connections which are specified with DADs (database access descriptors). No connection pooling is necessary for mod\_plsql as each Oracle HTTP server process will have a stateless database connection that it can reuse to service each of its requests.

mod\_plsql is the upgrade from the PL/SQL Cartridge supplied with the Oracle Application Server.

### **mod\_ose**

This module routes HTTP requests for Java servlet applications and JavaServer Pages (JSP) configured to run in the Oracle Servlet Engine (OSE) to an instance of OSE running in Oracle9iAS. It uses HTTP tunneling over Net8 as the protocol between the Oracle HTTP Server and OSE, leveraging Net8 features such as load balancing, firewall support, and the connection manager.

mod\_ose maintains the appropriate database connections specified by database connection descriptors set up for mod\_ose. Unlike mod\_jserv, which closes the connection for every request, mod\_ose holds on to the connection with OSE for the duration of the client connection to support stateful applications. OSE is described in more detail in the Oracle Servlet Engine section.

### **mod\_ssl**

This module provides standard support for HTTPS protocol connections to Oracle9iAS. It enables secure connections between the HTTP server and a browser client by using an Oracle-provided encryption mechanism over a Secure Sockets Layer (SSL). It may also be used for authentication over the Internet through the use of digital certificate technology.

### **mod\_perl**

This module forwards Perl application requests to the Perl Interpreter that is embedded in the Oracle HTTP Server. The embedded Perl interpreter saves the overhead of starting an external interpreter process. The code-caching feature, in which modules and scripts are loaded and compiled only once, allows the server to run pre-loaded and compiled code, therefore incurring less overhead costs in repeated executions of the same Perl script. This is described in more detail in the Perl interpreter section.

### **mod\_Jserv**

This module routes requests for Java servlets and JavaServer Pages (JSPs) configured to run on the Apache JServ servlet engine to an instance of the Apache JServ servlet engine. mod\_Jserv communicates with the JServ engine using the Apache JServ Protocol (AJP). In the case of JSPs, the Oracle JSP runtime will manage the execution of the page within the Apache JServ environment. This is described in more detail in the Apache JServ section.

## **Perl Interpreter**

A Perl runtime environment is linked into and embedded within the HTTP Server process, reducing the overhead of starting an external interpreter or making IPC calls to execute Perl scripts when they are requested. When the Oracle HTTP server receives an HTTP request for a Perl script, the request is routed to mod\_perl, which passes the request to the Perl interpreter for processing. The

Perl interpreter returns the results of the request back to the HTTP server via `mod_perl`.

## **Java Application Development and Deployment**

Oracle9iAS provides a complete environment for the development and deployment of Java applications.

Oracle9iAS supports the deployment of Java applications to two Java Virtual Machines (JVM); the standard Java Development Kit (JDK) and Oracle Enterprise Java Engine (EJE).

Oracle EJE is the scalable Java engine and the common Java infrastructure for the Oracle9i database and Oracle9i Application Server. Oracle EJE provides exceptional application partitioning capabilities. Oracle is the only enterprise software vendor that offers a common Java environment for both its application server and database. After three releases, Oracle EJE is now a very robust and mature Java platform. Oracle EJE was specifically designed to address the demanding requirements of executing applications in server environments. Oracle EJE provides a Java2 compliant JVM and API implementation which is consistent across all hardware platforms where Oracle9iAS operates.

Oracle EJE runs the Oracle Servlet Engine (OSE) which executes Java Servlet 2.2 applications, and the Oracle EJB container which execute Enterprise JavaBeans 1.1 applications.

Oracle EJE provides Java code execution acceleration capabilities through its ability to convert Java bytecode (the platform independent binary representation of a Java program) into native machine code that runs directly on the hardware platform. This conversion, or native compilation process, is performed way-ahead-of-time, removing the need to interpret and convert the Java bytecode at request time. This results in a significant performance improvement of the Java code at runtime.

A standard platform JDK is supplied to power the Apache JServ engine used within Oracle9iAS to execute Java Servlet 2.0 and JavaServer Pages 1.1 applications using OracleJSP.

### **J2EE and CORBA in Oracle EJE**

Designed as a highly scalable, server-side Java platform, Oracle EJE is an enterprise-class, 100% Java-compatible server environment that supports CORBA, Java stored procedures and the core Java2 Enterprise Edition (J2EE) APIs. Oracle EJE achieves high scalability through its unique architectural design, which minimizes the burden and complexity of memory management even as the number of concurrent users on the server increases. This makes it the ideal deployment environment for enterprise applications built for J2EE platforms such as Oracle9iAS .

Oracle9iAS supports the J2EE platform by providing the following APIs and containers where required, as defined in the J2EE 1.2 specification: JDBC 2.0, JTA 1.0, JNDI 1.2, Servlet 2.2, JSP 1.1, EJB 1.1, RMI-IIOP 1.0, JMS 1.0.

### ***Enterprise JavaBeans***

Oracle9iAS supports the development and deployment of distributed e-business applications using Enterprise JavaBean (EJB) technology. Using EJB technology, application developers can focus directly on implementing the business logic for the e-business application rather than on developing system level functionality required to run and manage the application. In accordance with the J2EE specification, Oracle9iAS provides an EJB 1.1 compliant container for session and entity beans and for standard and provider specific XML deployment descriptors.

Session beans are used to implement business objects that facilitate some level of business operation. For example, a session bean may provide a common service to retrieve and update inventory data stored in a database. Session beans may contain state for a specific client. Unlike entity beans, the data contained in a session bean instance is not expected to be persistent and is not required to be stored in a database for subsequent use. This does not prevent the session bean from operating with a database using JDBC to extract and store data. Session beans are supported as both stateful and stateless objects. A stateful session bean will maintain conversational state that is specific to one and only one client at a time and can't be shared between multiple client instances. The same client instance will always be directed to the same instance of the session bean during its lifetime. A stateless session bean will not store client-specific conversational state. Multiple clients can use the services provided by the stateless session bean at the same time. Session beans are considered transient since they are not capable of surviving a server crash or network failure in an unaffected manner.

Entity beans are designed to represent a view of business data that is permanent; the data exists beyond the use of any single client and is maintained in a persistent store. For example, an entity bean can represent a purchase order, providing methods that can be utilized to manipulate, retrieve and to make the purchase order persist. The use of entity beans mandates that the data contained within the entity bean must be able to be persisted. The EJB container assists with the persistence requirements by providing two object persistence mechanisms: Container Managed Persistence (CMP) and Bean Managed Persistence (BMP).

With CMP, the application developer delegates the operation of data persistence to the container that is managing the entity bean instance. This is accomplished in a declarative manner by identifying the specific attributes within the entity bean that should be made persistent. CMP requires the use of an Object-Relational (O-R) mapping layer. A simple O-R mapping layer is provided that uses a publicly available Persistence Service Interface (PSI). The PSI is available to vendors of O-R mapping tools to incorporate in their products.

With BMP, the developer is responsible for managing the persistence of the entity bean attributes. BMP can be accomplished using direct database calls with JDBC or it can be done in a more abstract manner with a data access object that handles the storage of the attributes. With the persistent mechanisms provided, entity beans are capable of surviving a server or network failure. After a server fails, an entity bean instance can be restored to its prior state.

The EJB container supplied with Oracle9iAS runs in Oracle EJE. It benefits from the same scalability and high performance features as the other Java components of Oracle9iAS.

### **CORBA**

In addition to EJB, Oracle9iAS provides support for distributed application development and deployment using CORBA. CORBA provides tools and services that application developers can use to consolidate disparate application objects into a single, consolidated application.

A core component of the CORBA specification is the object request broker (ORB). The ORB makes it possible for a remote client to send messages to a server, and for the server to return values to the client. The ORB handles all communication between a client and a server object. The Oracle9iAS ORB is implemented in Java and runs in Oracle EJE, benefiting from the same high performance and scalability features as the other Java components.

### **Java Servlet Deployment with Oracle9iAS**

Oracle9iAS provides comprehensive support for running Java servlet applications. Oracle9iAS includes the standard Apache JServ servlet engine which executes Servlet 2.0 applications for those customers migrating from an existing Apache environment. Oracle9iAS also provides the Oracle Servlet Engine (OSE) which implements the Servlet 2.2 specification and runs in Oracle EJE.

#### **Oracle Servlet Engine**

The Oracle Servlet Engine (OSE) implements the Sun Microsystems, Inc. Servlet 2.2 API specification. OSE provides a highly scalable and secure environment for executing servlets in Oracle EJE within Oracle9iAS. While Apache JServ offers a scalable servlet execution environment for stateless applications by running servlets in the JDK, OSE offers a highly scalable environment for running stateful applications because it leverages the session-based architecture of Oracle EJE. The session-based architecture of Oracle EJE was designed for enterprise applications and is highly efficient for stateful applications.

Oracle HTTP Server communicates with OSE via `mod_ose` (see “Oracle HTTP Server Modules” on page 9). `mod_ose` communicates with OSE using HTTP tunneling over Net8.

### **Apache JServ**

Apache JServ is a Java servlet engine fully compliant with the Sun Microsystems Java Servlet 2.0 API specification. Apache JServ is implemented with 2 core components: The Oracle HTTP server module, mod\_jserv and the Apache JServ servlet engine. mod\_jserv runs within the Oracle HTTP server process and dispatches HTTP requests for servlets to instances of the servlet engine (see “Oracle HTTP Server Modules” on page 9.) mod\_jserv communicates with a servlet engine using the Apache JServ Protocol (AJP). AJP uses TCP/IP, so the servlet engine can run locally or remotely. Apache JServ, the servlet engine itself, is implemented in 100% Java. The servlet engine runs directly with the JDK JVM and supports JDK 1.1 and upward.

### **JavaServer Pages Deployment with Oracle9iAS**

JavaServer Pages (JSP) are a core component of modern Web applications. JSPs provide an easy way to separate page presentation and business logic, allowing HTML designers with no knowledge of Java to create highly dynamic web pages. JSPs use the Java programming language, including the use of the JavaBeans programming model, to facilitate creating reusable business logic components. Additionally, JSP application can call on Servlets and EJB components to provide business logic for the Web application.

Oracle9iAS fully supports Sun Microsystems, Inc. JavaServer Pages 1.1 specification with the OracleJSP component of Oracle9iAS. Oracle9iAS can run JSP applications in the OSE or in Apache JServ.

### **OracleJSP**

OracleJSP is a translator and runtime engine for JavaServer Pages (JSP). OracleJSP runs on Apache JServ or any standard servlet engine that supports version 2.0 or higher of the Servlet API, including OSE. OracleJSP automatically translates JSPs into corresponding Java servlet code, which is then executed to create the dynamic HTML page. The translation of the JSP into servlet code happens automatically when a client requests the JSP. When a request is made for a JSP that has been translated and not altered, the translation step is omitted and the servlet code executes to create the dynamic HTML page. OracleJSP offers exceptional functionality for database applications by extending support to SQLJ, national language support (NLS), and supplemental custom tag libraries.

### **Oracle Business Components for Java**

Oracle Business Components for Java (BC4J) is a 100% Java and XML framework that enables productive development, portable deployment, and flexible customization of multi-tier, database applications from reusable business components. Application developers can use the BC4J framework to:

- Author and test business logic in components that automatically integrate with databases.

- Reuse business logic through multiple SQL-based views of data that support different application tasks.
- Access and update views from Java servlets, JavaServer Pages, and thin Java Swing clients.
- Customize application functionality in layers without modifying the delivered application.

The BC4J runtime components can be deployed to any JVM. BC4J applications run as JSPs in Apache JServ or Oracle Servlet Engine, as EJBs in Oracle EJE , or as standalone applications. BC4J applications may be called via IIOP, HTTP, or by direct Java method calls when running locally.

## **PL/SQL Application Development and Deployment**

Oracle9iAS supports the use of PL/SQL as an application development environment so database developers can use their existing skill sets to quickly become productive Web developers.

### **Oracle PL/SQL Engine**

The Oracle PL/SQL engine is a scalable environment for executing PL/SQL stored procedures, PL/SQL Web applications, and PL/SQL Server Pages (PSPs). The Oracle PL/SQL engine runs within the Oracle database process and on the middle tier, within Oracle9iAS. PL/SQL stored procedures and PSPs can be cached on the middle tier and executed within the Oracle PL/SQL engine in Oracle9iAS, thus offloading processing from the data tier.

### **Oracle PL/SQL Server Pages**

Oracle PL/SQL Server Pages (PSPs) are similar to JavaServer Pages because they provide an easy way to separate page presentation from business logic for the creation of dynamic HTML pages. PSPs differ from JSPs because they use PL/SQL rather than Java for the server-side scripting language. Oracle9iAS provides a compiler for PSPs which translates the text of the PSP into a PL/SQL stored procedure and stores it in the database. The PL/SQL Web Toolkit is also provided which assists with the dynamic generation of HTML, and which is used at runtime by the generated stored procedures. PSPs offer a productive way to author and run database-intensive web pages or to leverage existing applications written in PL/SQL.

### **Oracle9iAS Forms Services**

Oracle9iAS Forms Services provides a runtime environment for the deployment of Oracle Forms applications built with Oracle Forms Developer. This enables Forms applications to be accessible from a browser, over the Internet or your corporate intranet.

On the application server tier, Oracle9iAS Forms Services consists of a listener and a runtime engine. The runtime engine access data in an Oracle database using Net8 or can connect and use non-Oracle data sources using the gateway technology provided with Oracle9iAS.

On the client tier, Oracle9iAS Forms Services consists of a generic, lightweight Java client applet. The Forms runtime engine runs the business logic defined in the Form application and provides the connection to the database. The generic Forms Java Applet provides the user interface for the running Forms application.

The single, generic Forms Java Applet is used for any Form application that is run on the middle-tier. It renders the user interface defined in the application based on metadata sent from the Forms runtime process running on the middle tier. The Forms Java Applet running in the browser client and Oracle9iAS Forms can exchange messages using a number of mechanisms: directly over TCP/IP sockets (generally appropriate for corporate intranets), or with structured messages encapsulated within HTTP/HTTPS packets for use in Internet environments. Using the HTTP/HTTPS message mode allows access to Forms applications through firewalls and proxy servers.

### **Developer Kits**

A set of development kits that assist application development for the Oracle9iAS platform are provided free with the product.

#### **Oracle Database Developer Kit**

The Oracle Database Developer Kit contains client libraries for the Oracle Database and Java2 Enterprise Edition support (EJB, JSP, Servlet, JMS, SQLJ, JDBC and JNDI). Developers use the libraries in the applications they write. Applications developed run on Oracle9iAS and access an Oracle Database.

#### **Oracle LDAP Client Toolkit**

Oracle LDAP Client Toolkit is used to develop and monitor LDAP-enabled applications. It supports client calls to directory services, and you can use it to access your directory data. Application developed run on Oracle9iAS and access the Oracle Internet Directory (or other LDAP v3 compatible directory service)

#### **Oracle XML Developer Kit (XDK)**

The Oracle XML Developer Kit (XDK) contains XML component libraries and utilities that can be used to XML-enable applications and web sites. The XDK for Java contains the Oracle XML Parser, XSL Translator, XML Class Generator, XSQL Servlet, and XML Transviewer Beans. XML components are also available for C, C++ and PL/SQL languages.

## CREATE PERSONALIZED PORTALS

Secure, easy-to-use portals are essential infrastructure for e-business. Portals provide the personalized information and self-service applications that your customers, employees, suppliers, and trading partners need to operate more effectively.

Oracle9iAS Portal provides an out-of-the-box portal solution that does not require endless programming and maintenance.

### Oracle9iAS Portal

Companies need a way to enable their employees to easily publish and manage content on the web. They would like to centrally administer their portal data, produce a consistent look-and-feel to the site, and provide internal access to content, transaction, and business intelligence applications. Oracle9iAS Portal supports all of these requirements, using single sign-on, personalization, and portlet extensibility technologies to provide a simple, integrated view of external content, corporate information, and applications.

Oracle9iAS Portal is a browser-based software environment for building and deploying enterprise portals. It provides a secure, manageable framework for delivering access to distributed software services and information resources. The easy-to-use portal interface offers an organized, personalized view of the business information, web content, and applications required by each user. Self-service publishing features eliminate webmaster bottlenecks by allowing end users to post and share any kind of document or web content with other users anywhere in the world. The deployment architecture is optimized for scalability and security, and allows for centralized administration of all portal services through a browser.

In addition to its core portal development and management features, Oracle9iAS Portal provides an extensible framework for integrating applications and business information. The framework is based on Oracle's unique portlet technology. Portlets are reusable interface components that provide access to web-based resources. Any Web page, application, business intelligence report, syndicated content feed, hosted software service or other resource can be accessed through a portlet, allowing it to be personalized and managed as a service of Oracle9iAS Portal. The portal framework provides additional services including single sign-on, content classification, enterprise search, directory integration and security. Developers use the Portal Developer Kit (PDK) to create portlets Java, and XML technologies.

HTTP requests for Oracle9iAS Portal are routed from Oracle HTTP Server to mod\_plsql, which then executes the requested PL/SQL stored procedure in an Oracle PL/SQL engine. The PL/SQL procedures may run in the Oracle Database or in Oracle9iAS. The results are routed back to Oracle HTTP Server via mod\_plsql and then to the requesting client.

## WIRELESS ENABLE PORTALS

Wireless technology and the Internet are converging, allowing users to access the Internet from a variety of wireless devices. The Wireless Internet is growing rapidly due to the combination of broad penetration of Wireless devices and the growing standardization of Internet access from such devices. According to market research performed by the Meta group, "by 2003, over 50% of Internet access will be by non-PCs". Similarly, Gartner predict that "by the year 2005, one billion mobile devices will be used worldwide." Staff, customers, and business partners want the power and convenience of being able to tap into any information, from any device, any time, and from anywhere.

Oracle9iAS Wireless Edition provides a wireless portal service for delivering information and applications to mobile devices. This service is provided with Oracle9iAS Wireless. Oracle9iAS Wireless allows you to create custom portal sites that use different kinds of content, including Web pages, database content, custom Java applications, and XML-based applications. Oracle9iAS Wireless makes this diverse range of information accessible to any mobile device without rewriting the content and application for each target device.

### Oracle9iAS Wireless

Oracle9iAS Wireless works by isolating content acquisition from content delivery. It provides an intermediary format layer, Oracle9iAS Wireless XML, between the source format and the target format. Oracle9iAS Wireless XML is a set of DTDs (Document Type Definitions) and XML document conventions used to define content and internal objects. Using XSL style sheets, Oracle9iAS Wireless transforms these XML documents to the mark up language format appropriate for the specific mobile device. The mobile devices are linked to the Oracle9iAS Wireless Edition through a protocol gateway (for example WAP or SMS) that issues HTTP requests on behalf a user's mobile device.

Since mobile devices can be more cumbersome to use than traditional content browsing terminals such as PCs, Oracle9iAS Wireless provides a personalization feature so users can tailor and simplify their displays. Users can customize the way they browse available information, customize the content that they receive, and configure commonly entered data which they can access with shortcuts.

Oracle9iAS Wireless has three primary components. The first component is a Java servlet is the primary interface for all incoming HTTP requests generated by a wireless protocol gateway on behalf of a user's mobile device. The HTTP requests get routed to Apache Jserv via Oracle HTTP Server mod\_jserv. The second component is the Oracle Wireless Core engine, which consists of adapters and transformers to gather and transform content for the mobile devices. The Core is written in Java and uses XML/XSL to perform content transformation. The third component is a provisioning service that allows customers to select or customize the services and content that is supplied to their mobile device.

## ACCELERATE WEB SITE PERFORMANCE WITH CACHING

Currently, the demand for complex data on e-business Web sites and the number of users of these sites expected to serve is growing rapidly. E-businesses face the challenge of storing and managing this data and making it easily accessible to their employees, customers, and partners. Oracle9iAS Cache includes powerful Web caching and data caching capabilities that help manage these challenges.

Oracle9iAS Web Cache significantly improves performance and scalability of Web applications by caching both static and dynamic content, reducing the need for Web servers to provide popular content. Oracle9iAS Database Cache provides a transparent database caching service for transferring data processing from the data tier to the middle tier.

### Oracle9iAS Web Cache

Today's leading high-volume Web sites are faced with the challenge of serving thousands of users concurrently and providing them with accurate data in a dynamic environment where content changes rapidly. To address the performance and scalability demands of such Web sites, Oracle9iAS provides a Web caching solution with the unique capability of caching both static and dynamically generated web content. The Web Cache component of Oracle9iAS offers a very cost effective solution for significantly improving the performance and scalability of heavily loaded Web sites. A single instance of Oracle9iAS Web Cache can sustain throughput levels equal to that of tens or even hundreds of Web servers serving a Web site.

Oracle9iAS Web Cache operates as a caching reverse proxy server that is situated in front of the Oracle HTTP Server. It improves performance of Web server instances by storing frequently accessed pages in memory, eliminating the need to repeatedly process requests for pages from the Web server, the applications, or the Oracle database. Unlike existing caching proxy servers, which are capable of handling only static content, Oracle9iAS Web Cache accelerates the delivery of both static and dynamic Web content. Using the administrative tools provided, Oracle9iAS Web Cache can be configured with custom rules used to determine when to invalidate and refresh cached content.

In addition to providing unique caching capabilities to increase performance and scalability of Web sites, Oracle9iAS Web Cache also provides a number of other powerful features to ensure that Web sites using Oracle9iAS technology provide consistent and predictable responses:

- **Web Server Load Balancing.** Highly visited Web sites on the Internet today are served by a cluster of Web servers, running on a set of host machines. These farms of Web servers share the load of HTTP requests, providing better scalability and reliability. The HTTP requests are usually distributed via a load balancing mechanism, which can be implemented using a variety of software and hardware solutions. Oracle9iAS Web Cache provides content aware load balancing for distributing HTTP requests. In

the case where Oracle9iAS Web Cache is unable to fulfill a request from its memory cache, it distributes the cache miss to the most available and highest performing Web server in the cluster.

- **Failover.** Oracle9iAS Web Cache detects failures of back end Web servers and automatically routes requests around the failed server by distributing the request load amongst the remaining Web servers in the cluster. Once a failed Web server has been identified, Oracle9iAS Web Cache will periodically check its status. When the failed server restarts, Oracle9iAS Web Cache automatically routes requests to it again. No intervention is required.
- **Surge Protection.** Oracle9iAS Web Cache has a surge protection feature to prevent back-end Web servers from overloading when request volumes are high. You can configure the maximum number of concurrent requests that are served to a Web server. This feature limits the number of concurrent requests given to a Web server, preventing Web servers from being overloaded with requests and allows them to work at their peak efficiency. If the number of requests exceeds the limit set for a Web server, the incoming requests are placed in a queue.
- **Web Server Binding.** Oracle9iAS Web Cache supports application affinity. Web sites that use session IDs or cookies to bind a specific user session to a particular Web server so that the state of the session can be maintained for a period of time are fully supported with Oracle9iAS Web Cache.

Oracle9iAS Web Cache can also accelerate delivery of content generated by third party Web servers including Sun Netscape iPlanet, Microsoft IIS, BEA WebLogic, and IBM WebSphere

### **Oracle9iAS Database Cache**

Oracle9iAS Database Cache is a read-only data and application cache that resides on the middle tier as a component of Oracle9iAS. It improves the performance and scalability of applications that access Oracle databases by caching frequently used data and stored procedures on the middle-tier machine. With Oracle9iAS Database Cache, applications can often process several times as many requests as their original capacity. Oracle9iAS Database Cache provides the following benefits:

- **Performance.** Processing database queries on the middle tier reduces time spent sending and receiving data over the network.
- **Scalability.** Reducing the load on the database server tier allows existing databases to support more users.
- **Transparency.** Existing applications built using the Oracle Call Interface(OCI, the client interface for applications connecting to an Oracle database) can make use of Oracle Database Cache without requiring any modification to their code.

### What kind of applications benefit from Oracle9iAS Database Cache?

Some applications can derive huge performance and scalability benefits by deploying Oracle9iAS Database Cache in the middle tier. The effect of the cache is largely dependent upon the character of the application. The applications that will benefit most are those that:

- **Access data from an Oracle database over a network.** Using Oracle9iAS Database Cache on the local node will provide faster data access to applications.
- **Have significant dynamic read-only content.** Naturally, the more data-intensive an application, the more it will benefit from using a data cache. As data updates will always be propagated to the origin database, those applications that predominantly query data will derive greater benefit from the cache.
- **Have discrete tables with low volatility.** The data replication process to populate and update the cache will be easier for data sets that are less volatile.

A good example of an application that will benefit from Oracle9iAS Database Cache is an e-commerce site with product catalog data. This Web site could be a bookseller, for instance, which keeps a database of all its books, including title, author, and reviews. The data is relatively static, and may be updated once a day or once a week. For a Web site that does not use Oracle9iAS Database Cache, the HTTP server serves static Web site contents directly from the file system. The database contains the catalog data, that needs to be queried to fulfill every dynamic request. Most requests to the web site are dynamic queries, because users are often searching for books by author, title, or subject. This will generate requests for the database instance. As the user population grows, the number of concurrent requests made to the database increases significantly. The single database instance becomes the bottleneck to scalability if it gives slow responses under the heavy load.

Using Oracle9iAS Database Cache offloads the request demand on the database by transferring query processing to the middle tier. With Oracle9iAS Database cache, the catalog data can be cached in the middle tier. All catalog queries can therefore be serviced locally on the middle-tier node, reducing the need to query the database for every catalog page generation request. This architecture provides better performance by eliminating the network round-trips required to fulfill each data query. It also enables greater scalability of the application by offloading work from the database. The database is no longer the bottleneck.

### EXTRACT BUSINESS INTELLIGENCE

As companies become e-businesses, the amount of data that is available which tracks the fundamentals and operations of the business increases. With an e-business, traditional information sources such as Enterprise Resource Planning

(ERP) systems and CRM (Customer Relationship Management) systems can be correlated with information that comes directly from the usage patterns of the companies Web site. This enables companies to more closely analyze their consolidated business data, to cement existing business relationships, forge new revenue generating opportunities, and to assist with the formulation of strategies to improve their operating efficiencies.

To accomplish these tasks, a robust business intelligence solution is required to put the right information, into the right users hands, at the right time, to let workers who can best make use of the data, make informed decisions.

Oracle9iAS provides comprehensive business intelligence services through Oracle9iAS Reports Services, Oracle9iAS Discoverer and Oracle9iAS Clickstream Intelligence. Together these business intelligence services enable companies to generate high fidelity, board room style reports to communicate results of operations, perform ad-hoc query analysis to answer “what if” style questions, and to analyze user accesses of the Web site.

### **Oracle9iAS Reports Services**

Oracle9iAS Reports Services is an enterprise reporting service used by information systems departments to produce high quality, production reports. These reports dynamically retrieve, format, and distribute database information reports in an unlimited number of formats to an unlimited number of recipients and are easily, dynamically generated via the Web with a standard Web browser.

#### **Unlimited data Formatting**

Oracle9iAS Reports Services performs high quality data publishing in a number of different formats, such as Adobe’s Portable Document Format (PDF ), HTML, HTML Cascading Style Sheets (HTMLCSS), XML, Postscript, PCL, delimited text, and Rich Text Format (RTF).

Oracle9iAS Reports Services is the runtime component that executes report definitions. The reports are created with the Oracle Reports builder tool that ships with Oracle9i Developer Suite.

Oracle9iAS Reports Services, unlike other reporting products, does not impose any restrictions on the layout of the report. Being based on a page and frame model rather than the more simplistic banded reporting paradigm, it allows for an almost unlimited number of report formats, without the need to resort to the complexity of nested report modules or complex procedural code.

Oracle9iAS Reports Services provides a series of pre-defined templates to assist with the rapid creation of reports. Generated reports support advanced Web features such as embedded hyperlinks, bookmarks, and page-on-demand viewing. Reports can be customized via parameters input at runtime by the user, or by merging supplementary XML report definitions with the original for truly customized output.

### **Application Server Reporting**

Oracle9iAS Reports Services provides a flexible architecture for the distribution and automated management of report generation engines on the same server and across multiple servers. In addition to managing report generation engines and load balancing of requests across the available report engines, Oracle9iAS Reports Services also caches generated output for reuse on similar requests.

Oracle9iAS Reports Services integrates into standard Web environments with its CGI and Java Servlet interfaces.

### **Portal Integration**

Oracle9iAS Reports Services is integrated with Oracle9iAS Portal, using the security repository of Portal to manage access to reports being executed on the server. This feature is also able to manage user access to printers and server machines from the Portal security repository.

Further integration with Oracle9iAS Portal is achieved through the unique ability of Oracle9iAS Reports Services to schedule the running of reports, and the publishing of generated reports directly into the content areas of Oracle9iAS Portal. This enables reports to be shared easily across users, lines of businesses, and partners through the features of Oracle9iAS Portal.

### **Oracle9iAS Discoverer**

Oracle9iAS Discoverer is an intuitive ad-hoc query, reporting, and analysis tool that empowers people to make better decisions. Oracle9iAS Discoverer offers on-demand access to e-business data at internet speeds, to all levels of the organization. Oracle9iAS Discoverer includes Discoverer Plus and Discoverer Viewer.

Oracle9iAS Discoverer provides powerful query and analytical capabilities that can be used for example, to find out who are the top 5 customers or suppliers for a company, how their supply timelines have changed from the year prior, and how much money was spent with them.

Oracle9iAS Discoverer uses a Web browser based interface that makes it easy for novice and experienced users to create queries, navigate through data, and publish report results.

Oracle9iAS Discoverer uses an advanced query predictor which can determine how long it will take for a query to run, before it is executed. This eliminates frustration by allowing the end user to determine which queries to run and when to run them. Designed with the administrator in mind, Oracle9iAS Discoverer advanced query predictor includes a resource governor to stop long running queries and control resource usage

Oracle9iAS Discoverer with its tight integration with the database simplifies analysis, security and scalability, offering OLAP without "the cube". Oracle9iAS

Portal provides the framework for deploying business intelligence solutions throughout the enterprise. Users can execute queries and publish query results, all through a highly customizable e-business intelligence portal. Oracle9iAS Discoverer is the only tool that provides an "Out-of-the-Box" solution for supporting Oracle Application's security model.

### **Oracle9iAS Clickstream Intelligence**

Oracle9iAS Clickstream Intelligence is an integrated e-business intelligence application with Portal-based reports for measuring Web traffic and improving Web site effectiveness. Oracle9iAS Oracle Clickstream Intelligence provides a robust data mart model that delivers exceptional out-of-the-box value while also providing the extensibility to meet a broad range of business requirements. Oracle9iAS Clickstream Intelligence provides rapid response time and performance by leveraging Oracle8i's advanced data warehousing features. It is integrated with Oracle Warehouse Builder, Discoverer, and Express to enable a complete e-business intelligence system.

Oracle9iAS Clickstream Intelligence empowers end-users with analysis of Web site performance, visitor traffic, the effectiveness of Web content, and customer loyalty. Oracle9iAS Clickstream Intelligence integrates a set of open data warehousing technologies available in the Oracle database and tools to provide key elements and requirements of a robust clickstream data mart solution, such as:

- The ability to read Web server logs and parse cookies and query string data to identify unique visitors and sessions, and capture other critical application data
- The ability to transform server log data into business facts such as page impressions and sessions
- The ability to integrate Web traffic with business transaction data such as orders and marketing campaigns
- A flexible reporting structure which employs standard reports for rapid deployment and supports user-defined reporting
- Performance, scalability, and manageability consistent with the potentially enormous data volumes generated by large-scale Web environments
- Extensibility to accommodate new user-defined data sources over time, such as call centers, ad servers, etc.

#### ***Portal-Based Reports***

Clickstream Intelligence delivers a Web-based "dashboard" with reports and graphs that provide easy access to relevant Key Performance Indicators. This dashboard may be customized to meet the management needs of individual users. Users may drill down on charts and reports to access supporting detail.

User-defined reports may be added using Oracle9iAS Portal using the complete framework for the development and deployment of Web-based portlets. It

includes user administration, security, content customization, and development features to create and maintain basic reports, charts, and form-based applications.

### ***Performance & Summary Management***

Web sites generate enormous volumes of log data that must be loaded, transformed, and summarized to meet the reporting and analytical requirements for understanding e-business. The data mart infrastructure fully leverages the unique data warehousing features in the Oracle8i database that support the performance and manageability requirements of large-scale e-business intelligence applications, including:

- **Materialized Views.** Materialized views allow the creation of summary tables to which the database query optimizer may redirect queries to reduce response times. Oracle Clickstream Intelligence provides a full set of materialized views to optimize query performance for the included set of reports. DBAs may utilize Oracle Enterprise Manager or other tools to implement additional materialized views to support user-defined reports and queries.
- **Partitioning.** Clickstream Intelligence provides a mechanism for systematically removing data when it is no longer needed, or simply to manage the size of the database. Clickstream Intelligence leverages the partitioning feature of Oracle 8i to implement a "rolling window" partitioning scheme which allows detail data to be removed independently of summary data.
- **Parallelism.** In order to optimize the loading of large volumes of data, Clickstream Intelligence transformations and aggregations are designed to run in parallel.

### ***Extensibility***

While Oracle9iAS Clickstream Intelligence realizes immediate business value, the product is extensible to support unique e-business intelligence needs that go beyond Web traffic analysis. Built on an OWB framework, Clickstream Intelligence leverages OWB bridges for sharing metadata with Oracle's BI tools. OWB can also be used to extend the Oracle9iAS Clickstream Intelligence data mart model by modeling new user-transaction tables.

## **INTEGRATE YOUR BUSINESS**

Building an e-business from an existing business is not done in a vacuum. Existing business processes, application systems and data stores do not need to be cast aside as you move to the e-business world. Integration projects can be challenging and expensive, but with Oracle9iAS you get a comprehensive set of functionality that helps you reduce the complexity and cost of the project. Using the mature and robust business integration technologies supplied with Oracle9iAS, such as Oracle Workflow, and Oracle Gateways, will allow you to integrate your existing businesses into your new e-business.

## **Oracle Workflow**

Oracle9iAS provides a complete workflow management system that supports business process definition, automation and integration. Its technology enables automation and continuous improvement to business processes, routing information of any type according to user-defined business rules.

### **The Workflow Processes**

A series of activities and inter-activity dependencies. Oracle Workflow supports results-based branching, parallel branching, looping, timeouts, voting and sub-processes within a workflow. Each activity is either a PL/SQL function that the engine automatically executes, or a notification to a human user to perform some work, or a sub-process in itself. Notification activities deliver messages to users via e-mail or a Notification Web page, accessible using any Web browser.

### **Workflow Builder**

A native windows program (NT or 95) that supports full GUI capability to allow design of a complete workflow process and its components (item types, process activities, function activities, notification activities, notification messages, etc.)

### **Workflow Engine**

A set of tables and PL/SQL stored procedures that manages the execution of a workflow process and tracks work in process. It maintains the state information of a workflow item and generates a complete history for the item (including an audit trail). It executes workflow rules and functions, which you define as PL/SQL procedures, automatically. It also calls the Notification System to deliver notifications to a user if an activity requires human intervention. The Workflow Engine includes a complete set of PL/SQL API's and public views that can be used to workflow-enable any Oracle-based applications.

### **Business Event System**

An application service that uses the Oracle Advanced Queuing (AQ) infrastructure to communicate business events between systems. The Business Event System consists of the Event Manager, which lets you register subscriptions to events that are significant to your systems, and event activities, which let you model business events within workflow processes. When a local event occurs, the subscribing code is executed in the same transaction as the code that raised the event. Subscription processing can include executing custom code on the event information, sending event information to a workflow process, and sending event information to other queues or systems.

### **Notification System**

A set of tables, PL/SQL stored procedures, a Notification Mailer program and a Web Agent interface that all work towards sending and processing end-user notifications. viewable from an electronic mail application (via the Notification

Mailer) or from the Notification Web page (via the Web Agent interface). The Notification System processes the user's response and relays the information back to the Workflow Engine so as to complete the notification activity.

#### **The Workflow Monitor**

A Java-based tool accessible from a Web browser that lets you graphically monitor a workflow's progress as well as view its transaction history.

#### **Workflow Definitions Loader**

A server program that controls loading/unloading of workflow process definitions between a database and flat file. The functionality of the Loader is also integrated into the Oracle Workflow Builder.

### **Oracle Gateways**

Oracle9iAS offers two solutions for integrating data from non-Oracle systems with data stored in an Oracle database. They are Generic Connectivity and Oracle Transparent Gateways. These solutions provide the ability to transparently access data stored in non-Oracle systems creating the appearance that all of the data resides within a local Oracle database server. Generic Connectivity uses the ODBC or OLE DB standards for accessing the non-Oracle systems. Oracle Transparent Gateways are agents designed specifically for a particular non-Oracle system. Both solutions extend Oracle9iAS functionality to non-Oracle systems.

#### **Generic Connectivity**

Generic connectivity is a feature that enables users to use ODBC and OLE DB drivers to access non-Oracle systems having an ODBC or an OLE DB interface.

A gateway using generic connectivity must have an additional ODBC or OLE DB driver to provide an interface between generic connectivity and the non-Oracle system. These drivers are not provided by Oracle Corporation. However, as long as Oracle Corporation supports the ODBC and OLE DB protocols, you can use these gateways to access their respective non-Oracle systems.

The ODBC and OLE DB drivers using generic connectivity are installed in the same Oracle Home directory as the Oracle database server. Connecting to one of these gateways from another Oracle database server is not supported.

#### **Transparent Gateways**

An Oracle Transparent Gateway is a particular kind of agent that is designed to access commercially produced brands and versions of database systems not marketed by Oracle Corporation. For example, an Oracle Transparent Gateway for Sybase on Solaris is designed to access Sybase database systems that are running on Solaris platforms.

With Oracle Transparent Gateways, you can use an Oracle database to access data anywhere in a distributed database system without needing to know the location of the data or how it is stored. Also, when the results of your queries are returned to you by the Oracle database, they are presented to you as if the data stores from which they were taken all resided within a remote Oracle database. This functionality is called transparency; when you are using it, you are transparently accessing a non-Oracle database system.

### **Oracle Applications Interconnect**

Oracle Applications InterConnect is a comprehensive and flexible application integration platform that enables seamless integration of enterprise software. Applications InterConnect is specifically designed to integrate Oracle products with other Oracle products or third party legacy systems.

Applications InterConnect allows de-coupled integration of applications. It eliminates the complexities of point to point solutions. In addition, OAI provides a tool (iStudio) for modeling the data in the integration scenario. iStudio eliminates the need for "hardwired" or "hard-coded" integrations. Users define their integration using iStudio which minimizes (at best eliminates) the need to write any code for the integration. The integration information is captured as metadata in a repository.

### **Out-of-the-box Integration**

The integration packs described above provide the pre-configurations required to enable integration between supported applications with little or no need for customization. This acts as a plug-and-play feature for most standard integration.

### **Distributed Deployment**

Applications Interconnects infrastructure supports reliable, high-performance integration between applications installed either locally or distributed over a WAN. This gives you the flexibility of deploying geographically distributed applications.

### **Loose Coupling of Applications**

Oracle Applications InterConnect is based on an asynchronous messaging architecture. This allows the applications being integrated to be loosely coupled with each other. When loosely coupled, applications can continue to function normally even when participating applications become unavailable. Further, when an application is upgraded or modified, loose coupling minimizes the impact on the other applications.

Synchronous messages are supported using the request/reply paradigm.

### **Tools for Easy customization**

Oracle Applications InterConnect includes iStudio, a GUI-based integration specification tool that allows the product developer, consultant or IT professional

to visually review and modify the pre-configured integration specifications. iStudio thus supports the easy definition of integration customization, providing the ability to extend existing integration to support additional applications. The configuration information you create in iStudio is stored in the InterConnect Repository for use by the applications at runtime.

#### **Event-based Distributed Messaging System**

Each application specifies specific events that are of value that originate from another application. For example, when a CRM application adds a new customer, the ERP application must be notified of the new customer. iStudio allows developers to define events that encapsulate this kind of information.

#### **Guaranteed, Exactly Once, In-order Message Delivery**

Oracle Applications Interconnect runtime synchronizes all interconnected applications, and coordinates and verifies the receipt, transformation and delivery of each message in the system to insure inter-system integrity.

#### **Content-based Routing Support**

Messages can be routed to a specific application based on specific content values contained in the message. For example, an electronic funds transaction settlement application is designed to transmit bank transactions with a specific bank code to identify the destination bank system. When the EFT application publishes each message at runtime, the Oracle Application InterConnect runtime component determines the BankCode value based on objects stored in the repository, and routes the message to the appropriate recipient system.

#### **Supports Major Messaging Paradigms**

Applications InterConnect supports the three major messaging paradigms. These paradigms are defined by IT professionals using iStudio at design time. The definitions are used at runtime to route each message appropriately, to the widest possible pool of interconnected applications.

## **COLLABORATE WITH STAKEHOLDERS**

### **Oracle Internet File System**

The Oracle Internet File System component of Oracle9iAS consolidates all forms of corporate data into a single, unified and manageable repository. It allows you to store all your data, including documents, presentations, graphic images, HTML and XML Web pages, e-mails, and video in the same file system that is an extension to the Oracle Database. Users can access this content through familiar interfaces and protocols including the Windows file system, Web browsers, FTP, and e-mail clients.

Internet File System consists of the following major components:

- **Repository:** All files are centrally stored and managed as Large Objects in a repository, which is held within an Internet File System schema in the Oracle Database. The files are stored and retrieved using standard Oracle JDBC calls to read and write Large Objects in the database.
- **Internet File System Server:** The Internet File System server houses the processes that manage the repository. It contains the *Protocol servers* and the *Java API*. *Protocol servers* handle communication between the clients and the Internet File System repository. Internet File System supports numerous protocols including HTTP, FTP, SMB, IMAP4, SMTP. The *Java API* is a class library that the developers can use to customize and extend the functionality of Internet File System, including creating custom parsers and additional protocol servers.

To assist with the development of Internet File System extensions, Oracle9iAS provides an Internet File System Developer Kit, based on standard Java and XML based APIs that can be used to build Internet File System applications.

### **Oracle9iAS Email**

Oracle9iAS Email is a highly scalable, open standard based server for providing electronic messaging services, designed to support current and future messaging needs of growing companies, large enterprises and service providers. Oracle9iAS Email is a messaging server that supports standard IMAP4, POP3, and SMTP clients, and allows users to choose the email client they are most comfortable working with. Oracle9iAS Email stores and process emails with the power and scalability of the Oracle8i database.

#### **Email Architecture**

Oracle9iAS Email is designed to grow to almost any size while maintaining its performance and ease of administration. You customize Oracle9iAS Email based on the number of messages you need to store, how many users will access the system during peak loads, and how many messages will be sent over a period of time.

#### **Open Standards-Based Messaging**

Oracle9iAS Email lets users access their messages with the messaging client of their choice. Messages can be accessed using Internet Message Access Protocol version 4 (IMAP4), or Post Office Protocol version 3 (POP3) standards compliant clients such as Netscape Messenger, Microsoft Outlook Express, or Eudora. Oracle9iAS Email provides directory services that will work with any Lightweight Directory Access Protocol (LDAP) compliant directory, such as Oracle Internet Directory.

### **Oracle8i Based Message Store**

Oracle9iAS Email stores messages and attachments in an Oracle8i database based message store. Using Oracle8i as the message store provides Oracle9iAS Email with unmatched data availability, data integrity, low recovery time and fault tolerance capabilities. Oracle9iAS Email can run thousands of users and provide extremely rapid response times.

### **Server Side Rules**

Oracle9iAS Email supports the use of server side rules to set up automatic filters that can be applied to all incoming messages, for multiple users, independent of the client being used. With email messages being stored as relational data, server side rules allow other database applications to utilize the same logical rules, providing consistency in the message store.

### **Application Integration**

Oracle9iAS Email provides a PL/SQL based API (application programming interface) to let developers integrate Oracle9iAS Email with other applications. The PL/SQL API enables applications to directly manipulate stored messages, and to create MIME (Multipurpose Internet Mail Extensions) standard outgoing messages.

### **Web Client Access**

Oracle9iAS Email provides a customizable Web based application that allows users to access their email through a Web browser.

### **Administration**

Oracle9iAS Email supplied a Java based administration tool that is used as the single point of administration. To assist with capacity planning and current usage evaluations, the administration tool can create graphs of metrics such as the size of the queues, the number of concurrent connections, the sum of messages received and sent, and other assorted statistics. With the recent problems surrounding email borne viruses, Oracle9iAS Email

### **Oracle9iAS Unified Messaging**

Unified Messaging is defined as a messaging solution that consolidates different types of messages into one location which can then be accessed from a single device, irrespective of the original message type. Simply, it allows a user to access different types of messages, such as email, voicemail, and facsimile, from a single device. For example, a user may access voicemail, fax as well as email from a browser running on a desktop machine; or a user may use a mobile phone to access email in addition to voicemail. The range of devices that can be used by the user to access their consolidated messages include computers, telephones, mobile phones, personal digital assistants, and newer devices such as pagers and television set top boxes.

Oracle9iAS supports unified messaging with Oracle9iAS Unified Messaging. Oracle9iAS Unified Messaging is an open, scalable solution with access to all messages and the flexibility in choosing what devices message access will be available from. Oracle9iAS Unified Messaging is built on top of Oracle9iAS Email and Oracle Internet Directory. Oracle9iAS Email provides the underlying messaging engine and message store. Oracle9iAS Unified Messaging acts as an application user of Oracle9iAS Email.

#### **Unified Messaging Architecture**

Oracle9iAS Unified Messaging uses the Virtual Inbox approach to unified messaging, displaying a unified inbox through a Java middle tier. Messages continue to be stored in their respective legacy message stores. Using this architecture allows Unified Messaging to provide easy web access to a wide variety of message stores that expose the standard IMAP4 protocol as well as additional proprietary interfaces. Oracle9iAS Unified Messaging can be integrated with third party interactive voice response (IVR) and voice messaging systems for access to email messages through the telephone. Oracle9iAS Unified Messaging provides unified messaging functionality without the need to replace costly legacy systems.

#### **Unified Messaging SDK**

The heart of Oracle9iAS Unified Messaging is the Unified Messaging Toolkit. The toolkit is a set of supplied Java beans that provide unification logic and associated infrastructure components that display messages from multiple IMAP4 based inboxes. The toolkit includes Java beans to access IMAP4 message stores, directory services using LDAP (lightweight directory access protocol, a standard protocol for communicating with directory service) compliant directories, and other administrative functionality. The toolkit can be extended using custom Java code to create a complete messaging solution for any environment.

#### **Unified Messaging Client**

Oracle9iAS Unified Messaging provides a Unified Messaging Web Client sample application which allows Web access to the Unified Messaging system using a standard Web browser. Industry standard JavaServer Pages technology, running on Oracle9iAS JavaServer Pages engine, is used to render dynamic content that displays users' messages. Developers can easily extend the sample code to create Web interfaces that suit their companies' specific needs.

#### **SMS/Notification Gateways**

Oracle9iAS Unified Messaging provides the ability to create and send SMS (simple mail system, a messaging protocol used to send text messages between mobile phones) messages. The SMS functionality allows large emails to be broken down into smaller pieces to enable them to be completely retrieved from mobile phones.

## **MANAGE AND SECURE YOUR WEB INFRASTRUCTURE**

To provide system management and security services, Oracle9iAS include Oracle Enterprise Manager, Oracle Internet Directory, and Oracle Advanced Security. These system services provide a comprehensive management framework for your entire Oracle environment, your users, and network security with SSL (Secure Sockets Layer) based encryption, authentication and single sign-on facilities.

### **Oracle Enterprise Manager**

Oracle Enterprise Manager is a system management tool for centrally managing your Oracle platform. Combining a graphical console, Oracle Management Servers, Oracle Intelligent Agents, common services, and administrative tools, Oracle Enterprise Manager provides a comprehensive systems management platform for managing both Oracle9iAS and Oracle8i.

#### **Management Anywhere**

The Oracle Enterprise Manager Console and front-end management applications are fully accessible through thin clients and Web browsers. Administrators have the option of installing and using the 100% Java console from their local machine, or they can use the Web interface by simply pointing their Web browser at the administration URL. The Web browser interface provides the same user interface, all the same functionality, and a consistent set of task-based tools that are available with the installed Java client.

#### **End to End Monitoring and Problem Response**

Early indication and rapid response to problems is the key to maintaining system performance and availability. Oracle Enterprise Manager allows administrators to prevent problems before they occur through it's advanced event monitoring, and job execution and scheduling services.

The event monitoring service provides a set of event tests that can be run on managed services, to check for specific conditions, such as a database being down, 24 hours a day. Integration of event notifications with external messaging systems, such as pagers, allow around the clock monitoring.

The job execution and scheduling service provides the ability to automate redundant and repetitive tasks. Administrators can use any of the pre-defined job tasks provided, or can define their own custom tasks.

Using these services together, an administrator can create fix-it tasks, which will respond to notifications of problems, and automatically resolve the issue without intervention.

### **Oracle Internet Directory**

Oracle Internet Directory is an LDAP Version 3 service that combines the mission critical strength of Oracle's database technology with the flexibility and

compatibility of the LDAP directory standard. Oracle Internet Directory provides scalability, high availability and security features.

Oracle Internet Directory offers the flexibility and extensibility of the LDAPv3 Internet standard supported by the scalability and reliability of the Oracle platform. The Oracle Internet Directory server is implemented as an application running on the Oracle8i database. Through its tight integration, Oracle Internet Directory effectively leverages the features of the Oracle platform to make it the compelling choice for mission-critical applications.

#### **Scalable**

Oracle Internet Directory exploits the massive strengths of Oracle8i, enabling support for terabytes of directory information. It scales to support over half a billion real-world directory entries on a single server. In addition, technologies such as multithreaded LDAP servers and database connection pooling allow it to support thousands of concurrent clients with sub-second search response times.

Oracle Internet Directory also provides data management tools for manipulating large volumes of LDAP data. For example with the LDAP bulk loader, based on Oracle8i's SQL\*Loader, administrators can populate a million user-entry directory in about one hour.

#### **High Availability**

Oracle Internet Directory was designed to meet the needs of mission critical deployment applications. One way this is reflected is in its replication capability. Oracle Internet Directory supports full, multi-master replication between directory servers. This means if one server in a replication community is unavailable for any reason, administrators have the ability to administer the directory from any other server to perform functions such as directory user administration, schema extensions and entry modifications. Information about changes made to a server are stored in special tables on the Oracle8i database. These are replicated throughout the directory environment by Oracle's Advanced Symmetric Replication, a robust, field-proven replication mechanism which has benefited from thousands of hours of Oracle development effort.

Oracle Internet Directory also leverages all of the availability features of the Oracle8i platform. Because directory information is stored securely in the Oracle8i database, it is protected by Oracle's hot backup capabilities. Additionally, the Oracle8i database running with large data stores and heavy loads can recover from system failures in a matter of seconds.

#### **Secure**

Oracle Internet Directory offers comprehensive and flexible support for directory access control. This includes entry level, attribute level, and prescriptive access

control to provide varying levels of security to custom fit enterprise and service provider needs. An administrator can grant or control access to a specific directory object, or an entire directory subtree. Oracle Internet Directory implements three levels of user authentication: anonymous, password-based, and certificate-based using Secure Sockets Layer (SSL)v3 for authenticated access and data privacy.

### **Integrated Environment**

Oracle Internet Directory includes Oracle Directory Manager, a graphical directory administration tool for managing and administering directory information from anywhere in the distributed environment. It also manages directory schema and access control information. Built with the same user interface framework as Oracle Enterprise Manager, Oracle's flagship system management application, Oracle Directory Manager allows administrators to reuse their existing experience with Oracle Enterprise Manager to manage Oracle Internet Directory. Written entirely in Java, Oracle Directory Manager is portable to all Oracle platforms.

### **Key Directory Features**

Oracle Internet Directory provides the following key directory features.

- X.500 information model.
- Extensible directory schema.
- Supports online changes to directory schema.
- Implements relevant LDAP Version 2 and 3 RFCs.
- LDAP developer toolkit provided to assist with application development.

### **Oracle Advanced Security**

Oracle Advanced Security provides a comprehensive suite of security services for Oracle9iAS Database Cache, Oracle EJE, and Oracle PL/SQL. It provides two key areas of secure functionality. First, its network security features protect enterprise networks and securely extend corporate networks to the Internet. Second, it integrates security and directory services to provide enterprise user management and single sign-on.

Oracle Advanced Security provides the following features.

#### **Encryption**

Oracle Advanced Security secures networks by encrypting data that flows across Net8. Encrypting data provides privacy of data during transmission; that is, no one can read the information during transmission over a network. Oracle Advanced Security check-summing detects modifications of packets, replays of packets and missing packets. Check-summing provides data integrity; verification that data has not been tampered with during transmission.

### **Supplied Encryption Capabilities**

Oracle Advanced Security provides the following encryption capabilities

- RSA RC4 Public Key encryption
- 40, 56 and 128-bit key length encryption
- Data Encryption Standard (DES) algorithm support
- Message Digest 5 (MD5) checksumming algorithm support

### **SSL Support**

Oracle Advanced Security supports the Secure Socket Layer ([SSL](#)) protocol. SSL support in Oracle Advanced Security secures Net8 and the underlying networks. It provides encryption of network traffic and authentication of clients and servers using Public Key-based technology.

### **Security and Directory Integration**

A directory service is a software process that listens for requests from clients (Web browsers, e-mail clients, management software, etc.) and processes the request by querying the directory information base, or it sends the request to another directory service (referrals). It returns the results of its query to the requestor. The concept of supporting a directory service into a computing environment is known as directory integration.

Oracle Advanced Security supports directory integration in Oracle9iAS with Oracle Internet Directory. Oracle Internet Directory integrates with Oracle9iAS and Oracle Advanced Security to provide benefits in the administration of user and privilege management in large computing environments.

### **SCALABILITY, AVAILABILITY AND LOAD BALANCING**

A key to the success of any Web site is how fast the server can deliver content to users. If a Web server takes too long to respond, or fails, users will take their business elsewhere. Three areas that determine how well your Web site performs are scalability, availability, and the ability to balance incoming loads across multiple servers.

Oracle9iAS addresses these issues and provides a highly scalable, highly available platform for the web site deployments. The key problem areas addressed by Oracle9iAS are:

- **Scalability:** Quality that indicates how well your web site can respond as the user demands increase. Oracle9iAS provides hardware, data, request, and application scalability. To provide hardware scalability, Oracle9iAS is available on all the major hardware platforms so you can choose different capacity servers without redeveloping your hosted applications; to provide data scalability with no application modifications, Oracle Database Cache serves database queries from the middle tier without having to route the

request to your back-end database; to provide request scalability, Oracle Web Cache caches and serves commonly requested content without routing the request to your Web server; to provide application scalability, Oracle EJE offers a unique session based architecture

- **Availability:** Quality that indicates how your web site responds in the case of a software or hardware failure. Oracle9iAS has no single point of failure and can be deployed in a fully redundant configuration. Oracle9iAS uses session isolation to isolate executing user sessions from each other so single application failures have minimal impact on other users. Oracle9iAS automatically detects system components failures, re routes connections, restarts failed processes, and can move executing application code to a different node.
- **Load Balancing:** Feature that allows you to share the distribution of requests amongst different hosts operating together as a virtual server. Oracle9iAS is completely flexible and can be deployed in many different configurations. Oracle9iAS provides load balancing mechanisms and can operate fully with third party load balancing products such as Cisco Local Director.

Please refer to the comprehensive white paper entitled, “Scalability, Availability and Load Balancing with Oracle9iAS” for more details on this topic. The white paper is downloadable from the Oracle Technology Network, <http://technet.oracle.com>

## OAS MIGRATION

Oracle9iAS is the upgrade path from OAS (Oracle Application Server), Oracle’s earlier application server product. A very smooth migration path exists for the most popular components of OAS to the new platform. Users of the OAS PL/SQL Cartridge should have little or no difficulty migrating to mod\_plsql. OAS users that ran standard Java components such as Java servlets, JSPs, and EJBs should similarly have little or no problem migrating these components to the Oracle9iAS platform. A few of the proprietary OAS components are not supported in the Oracle9iAS product, including the JWeb, ECO, JCO, LiveHTML, and C cartridges. These components were pre-standard implementations of emerging Internet standards. Oracle9iAS now has services which correspond to the deprecated OAS components that full comply with current Internet standards. For more information, please refer to the *OAS Migration* documentation within the Oracle9iAS documentation.

Oracle9iAS is also the upgrade path for all other Oracle middle-tier products whose functionality is included within Oracle9iAS. These earlier products include Oracle Forms Server, Oracle Reports Server, and Oracle Discoverer Viewer, among others. There should be no major upgrade issues introduced by the consolidated Oracle9iAS product for users of these services.

## SUMMARY

Oracle9i Application Server is Oracle's new application server that provides a simple, complete, and integrated platform for running Web sites and all types of Internet applications. Oracle9iAS provides support for open standards application development with CORBA, BC4J, and full support for the Java2 Enterprise Edition platform, database intensive programming with PL/SQL, and model-based development with Oracle9iAS Forms Services and Oracle9iAS Reports Services. Oracle9iAS combines the strength and reliability of mature Oracle technology with the power of new features such as the Oracle HTTP server powered by Apache, Oracle9iAS Web Cache, and Oracle9iAS Database Cache to dramatically improve the performance of your Web site. Oracle9iAS offers high levels of scalability, availability, and load balancing. Oracle9iAS can be deployed in a multitude of configurations, enabling you to re-deploy your applications for additional performance or reliability without needing to alter their application code.

Oracle9iAS provides the infrastructure needed to run all elements of your e-business and allows you to focus on your business operations and decision making:

- Oracle9iAS provides an integrated platform to build, deploy and maintain e-business Web sites using any standard technology and leveraging tight integration with the Oracle Database.
- Oracle9iAS allows you to aggregate all of your disparate Internet systems and Web content into personalized, secure portal pages for all of your users.
- Oracle9iAS enables you to run any Web site, portal or e-business application at least 3 times faster than any other application server.
- Oracle9iAS allows you to make your internet applications and Web sites accessible to traditional browsers and wireless devices;
- Oracle9iAS provides business intelligence solutions tightly integrated with the Oracle Database to allow you to make strategic decisions based on facts.
- Oracle9iAS allows you to manage your entire Web infrastructure within a comprehensive management framework.
- Oracle9iAS lets you connect your existing business systems and data stores to form an integrated e-business solution.
- Oracle9iAS lets you collaborate effectively with all lines of business within your organization in a scaleable and open standards manner.



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