The Oracle Story: The Integrated Stack

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Introduction to the Integrated Stack Strategy

Oracle has long had a vision for moving customers to a complete, consolidated, and optimized computing environment that provides maximum flexibility, scalability, and agility. Today, Oracle refers to this vision as the integrated stack. Modern enterprises understand and embrace the concept like never before—and Oracle is the only vendor that can deliver it.

How IT Is Evolving

Traditionally, our customers built their IT environments as silos of information with separate systems dedicated to specific applications such as CRM, ERP, or supply chain management. They were typically satisfied with the functionality of the individual systems, but not well served by the system as a whole. They couldn’t fully share the core infrastructure, computing power, business processes, data, and other resources. And they found that their information was often inconsistent and disconnected. To achieve greater efficiency and economy, almost all of our customers have moved to more standardized and consolidated environments with global single instances of each application.

Still, our customers struggled with the limitations of a dedicated, rigid, physical structure for each application. Computing power often sat idle for some applications, even as they purchased additional servers for other applications experiencing temporary spikes in demand. They had to reconfigure many different systems and deploy the same services and patches over and over. But the IT world continued to evolve very rapidly, and customers soon began to take advantage of grid or virtualized environments with shared services, dynamic provisioning, and standardized configurations or appliances.

Today, many customers are continuing the quest to eliminate even more complexity by moving to an optimized stack with a complete and integrated set of technologies that includes applications, middleware, databases, servers, and storage systems. But when customers purchase these technologies from different vendors, they’re still finding that they have to put a tremendous amount of work into building the optimized systems—and the systems need to be retuned or redesigned with every new business requirement that comes along. And even with the optimized systems, the pace of business is throwing new challenges at them much faster than their IT departments can respond.

To achieve the responsiveness, flexibility, and agility they need, customers are now taking the next step to cloud computing environments. With the cloud, they’re getting the single common and standardized infrastructure they want at the foundation layer. They now have platform as a service (PaaS) capability
for designing or developing their own applications. And they’re able to deliver applications to their users from public or private clouds.

In a cloud environment, many customers’ IT departments have become much more dynamic and effective at enabling the businesses to drive their own agendas, seek out new opportunities, and meet competitive threats faster and more innovatively.

Oracle Architectural Vision: An Integrated Stack

Over the last 10 years, we have been intently focused on creating the Oracle Fusion Architecture precisely to address the need for a consolidated, optimized environment. As a result, we are light-years ahead of other vendors in our ability both to provide an integrated stack and to support cloud computing from end to end.

Oracle is the only vendor in the world that has products addressing every single layer of the stack technology, from applications to middleware and databases, and all the way down to servers and storage. Each of these layers—and all the products within the layers—have been engineered to work together and tested together to ensure that they interoperate effectively. We certify the stack to let our customers know that particular configurations are designed to work together.

We also package our technologies into complete engineered systems such as Oracle Exadata and Oracle Exalogic to make the systems much easier for customers to deploy as a single unit. These solutions are designed to be effectively and efficiently managed, supported, and upgraded together. It’s a powerful vision that has become a very powerful reality—and only Oracle can make it happen.

Why Oracle: A Competitive Comparison

To understand why Oracle is a customer’s best choice for an integrated system, first take a look at the alternative. Customers can buy all the pieces for the stack from different vendors—but no single vendor has all the parts. If an organization settles on an à-la-carte approach, there will be a very labor-intensive and expensive integration up front. And, because all of the component parts have not been designed to work together, the system will be costly to maintain and complicated and risky to upgrade. Service and support will be fragmented, with different vendors pointing fingers at each other instead of solving problems.

And if the vendors seem confused as to the source of a problem, it’s for good reason. There is virtually an unlimited number of possible configurations for heterogeneous systems—it’s impossible for the person who’s providing support to truly know a particular system inside and out. This built-in complexity and fragility often leads to significant stretches of costly downtime.

In comparison, Oracle’s uniquely comprehensive and integrated approach has provided tremendous benefit for our customers in a number of important ways. We’re able to provide more innovation
much more quickly than our competitors because we have coordinated development among all of our engineering teams at all the different levels of our stack. This up-front coordination allows us to move new features and capabilities from different development teams through to the customer at an unusually rapid pace.

Because we’re able to design our technology specifically for the stack and to fine-tune the entire stack, we’re able to optimize performance overall and at every layer. This complete approach also allows us to design much greater reliability and security into the stack than the customer could achieve if they had to build it themselves.

Because the stack is complete, it’s much easier to deploy—and deployment times can be shortened by weeks or even months. And because we have management tools that run through every layer, it’s also much easier to manage the stack and upgrade it over time.

The net result for our customers is a much lower cost of ownership and much lower risks in terms of the actual deployment and maintenance of the system throughout its lifetime. Everything is delivered and supported by Oracle, which has one of the best and largest support organizations in the world. That means if customers ever do run into trouble, Oracle is the only vendor they have to work with to solve their problems.

Defining Stack Integration

Oracle’s vision for the complete and optimized computing environment centers on complete stack integration, but what does that term really mean? At Oracle it means integration across four critical dimensions:

- Within each stack layer
- Across the stack layers
- With other systems
- Through the lifecycle of a system

Integration within a stack layer means integration between different applications, between the different middleware suites, between the various database products, and so on.

Integration across stack layers refers to integration across every layer from applications all the way down to servers and storage—so, for example, between applications and middleware, between middleware and databases, and so on.

Integration with other systems emphasizes our commitment to open standards so that Oracle integrates easily and effectively within heterogeneous environments.

And integration isn’t just about software and hardware. It’s also about integrating the set of services that is needed to install, deploy, maintain, and even end the life of a system over time.
Integration Within Stack Layers

We’ve already touched on the primary product category layers of the Oracle stack, but there are also many different functional layers of the stack that are key to integration within the stack layers. There is the user interface that the end user sees. There are business processes that define how actual workflows occur and what a user sees through the interface. All the business processes depend on data and metadata to actually drive the processes. The management layer ensures that the stack runs smoothly. And you need development tools across the stack to create applications.

Oracle Fusion Middleware 11g: Integration in the Middleware Layer

Oracle Fusion Middleware 11g provides an excellent example of the tight integrations we have created among the many products within individual stack layers. Oracle Fusion Middleware 11g comprises multiple suites of many products that have all been seamlessly integrated. These middleware suites include Oracle SOA Suite, Oracle Business Intelligence Suite, Oracle Enterprise Content Management Suite, Oracle Data Integration Suite, Oracle Identity and Access Management Suite, and OracleDeveloper Suite. Each suite contains many different products, all carefully designed so that each interacts smoothly with all the others, and so that all the suites interoperate seamlessly.

After years of development and testing—including millions of hours developing the code and stress testing, cluster testing and regression testing—Oracle is confident that Oracle Fusion Middleware 11g is the most highly integrated and well-tested middleware available from any vendor.

Integration Across the Stack

Our second dimension of integration is integration across the stack. This level of integration includes optimizing the performance, reliability, availability, and serviceability of the entire stack, as well as optimizing security and manageability throughout the stack. It also includes enabling a high degree of flexibility and customization while maintaining full integration.

Oracle Fusion Middleware 11g: The Foundation for All Oracle Applications

Oracle Fusion Middleware plays an important role in achieving integration across the stack layers. All Oracle Fusion Middleware products are certified with every major Oracle Applications product line, including Oracle E-Business Suite and Oracle’s PeopleSoft Enterprise, JD Edwards EnterpriseOne, JD Edwards World and Siebel Customer Relationship Management. The next-generation Oracle Fusion Applications are the first and only set of applications built natively on Oracle Fusion Middleware. While other solutions can leverage components and features of Oracle Fusion Middleware and are certified for use with Oracle Fusion Middleware, Oracle Fusion Applications are 100 percent open-standards-based business applications that set a new standard for the way we innovate, work, and adopt technology.
Oracle Database 11g Release 2: Standard for All Enterprise Applications

All of Oracle’s major applications—including Oracle Fusion Applications—have also been tested and certified with Oracle Database 11g Release 2. This means the applications are integrated not only with the core database product but also with all the major database option products, including Oracle Real Application Clusters, Oracle Partitioning, Oracle Advanced Compression, Oracle Advanced Security, Oracle Database Vault, Oracle Audit Vault, Oracle Enterprise Manager for Database, and so on. As this illustrates, integration across the stack implies a very deep level of integration.

Oracle Server and Storage Systems: Standard for All Enterprise Applications

We’ve also tested all Oracle applications, middleware, and database products on the new Oracle server and storage systems. This includes integration with Sun X86 systems (Oracle Sun Blade, Oracle Sun Fire, Oracle Sun Netra) running Oracle Solaris or Oracle Linux, Oracle SPARC Servers running Oracle Solaris, Oracle VM, Oracle Sun Storage, Oracle Sun ZFS Storage Appliance, and Oracle StorageTek.

Engineered Systems

The ultimate expression of how we deliver integration across stack layers is what we call our “engineered systems.” An engineered system is an off-the-shelf bundle of hardware and software that is integrated, optimized, and ready to go. Only Oracle can offer these engineered systems because only Oracle owns the entire stack.

Oracle Exadata Database Machine

The perfect example of an Oracle engineered system is the Oracle Exadata Database Machine. It’s a complete database system and includes all the database software, operating systems, virtualization software, servers, storage, and networking. Because Oracle owns all the technology inside the Oracle Exadata box, our development teams are able to work together and more tightly optimize all the components from the beginning. As a result, we now offer the world’s fastest system for running both online transaction processing and data warehousing—and it’s also the price/performance leader in its market.

But the tight integration and optimization enable more than just competition-crushing high performance. Oracle Exadata is also reliable and secure, and is an excellent system for consolidating and simplifying your infrastructure and consolidating databases for all different types of workloads on a single system. It has 100 percent redundant hardware and is scalable on-demand.

Oracle Exalogic Elastic Cloud

Oracle Exalogic Elastic Cloud is another example of an innovative, engineered system that sets a new bar for the industry. It’s the world’s only integrated cloud machine that has server hardware and middleware software engineered together for maximum performance with minimum set up and cost. Designed for the middle tier, it provides all core middleware software (such as Oracle WebLogic Server and Oracle Coherence) on a complete server, storage, and network infrastructure. It provides the
highest level of Java performance in the industry and is an ideal system for consolidating many different types of application workloads.

Because it’s designed as a large cluster configuration, it delivers the elastic capability required to scale out on-demand for as much capacity as needed for any particular application. And, because it’s a completely engineered system, it drives down customer costs even as it optimizes overall performance. The combination of Oracle Exadata and Oracle Exalogic creates the perfect core infrastructure for a cloud-based, on-demand environment.

Having access to the entire stack at all stages of development also enables many other opportunities for integration and optimization at all levels. Let’s take a look at some specific examples.

**Oracle Exadata’s Smart Scan Technology**

Smart Scan is a feature of the Oracle Exadata Database Machine that dramatically improves query performance. Typically, when a query is made, huge blocks of data move from the storage layer to the SQL layer for processing. Smart Scan technology allows the data to remain in the storage engine as the query calculations are performed—only the actual result of a query is returned. Alone, this more efficient approach dramatically improves overall performance. Combining this feature with hardware technology advancements such as Infiniband Networks allows the software to run even faster.

This is yet another example of breakthrough performance Oracle was able to achieve only because we own all the technology. Our database development team worked very closely with our server and storage developers to write specialized drivers for the Infiniband connections and to write special software to run in the storage servers.

The optimization of features and capabilities like Smart Scan technology throughout the entire stack produces incredible results at the application level. No other vendor can design engineered systems with the same close and constant collaboration, so no other vendor can approach the same results.

**Oracle Maximum Availability Architecture: Better Availability Through Integration**

Another example of the integration Oracle can accomplish across the stack is the Oracle Maximum Availability Architecture (MAA). The MAA is specifically designed to address very high availability for transaction processing systems and decision-support systems at the database layer.

We achieve this by maximizing the coordination of the high-availability features that exist in both the database software and in Oracle Exadata. Oracle Exadata provides fully redundant hardware, power supplies, processors, and networking. And this software has many high-availability capabilities, including flashback query, flashback tables, and Failover or disaster recovery. With MAA, the software becomes aware of the hardware and is able to take full advantage of its Failover capabilities, creating an even more resilient system.
Secure from End to End

Today more than ever it is not only more effective but also more efficient to have security built into
the IT environment. Social computing has increased collaboration and information sharing, but has
also exposed data to new risks. Governance, risk, and compliance present an ongoing challenge that
requires tireless diligence. And regulatory requirements are constantly moving targets.

Built upon 35 years of security experience, Oracle Database provides deep security controls that enable
both transparency and protection. We offer a wide variety of security capabilities for encrypting data at
the database level or at the row or table level. We enable customers to manage separation of duties
between database administrators and audit any activity in the database.

Oracle Identity Management 11g delivers service-oriented security—a revolutionary architectural
approach that drastically simplifies application security. It makes a wide range of security functions,
such as user provisioning and authentication, available as discrete, reusable Web services. Instead of
adding security in piecemeal components, it’s woven into the applications themselves.

Best of all, the database security is supported by the applications themselves. Security is maximized
through all the layers, from the application to the identity management system and all the way down to
the actual database.

And with Oracle, even the applications you build yourself can be integrated securely. Oracle Platform
Security Services (OPSS) is a standards-based security framework that helps simplify security
implementation for application developers. It shortens application development time, lowers costs, and
is certified for interoperability with most Oracle Fusion Middleware products. The unique hot-
pluggable design enables developers to rely on OPSS as the single security framework for both Oracle
and third-party application environments.

Oracle Cloud Platform and Management: The Full Stack

Oracle’s strategy is to offer a broad portfolio of software and hardware products and services to enable
public, private, and hybrid clouds, allowing customers to choose the right approach for their business.
Unlike competitors with narrow views of the cloud, Oracle provides the broadest and most complete
and integrated cloud offerings in the industry.

Our cloud offering begins with the Oracle Exadata and Oracle Exalogic engineered systems, which
include Oracle server and storage systems, Oracle Solaris or Oracle Linux operating systems, Oracle
VM virtualization software, and the application grid and database grid. On top of that foundation
customers can layer the remaining Oracle Fusion Middleware solutions and Oracle Applications or
third-party applications. Even custom applications can be run on our foundation as a highly flexible set
of services in a private cloud, public cloud, or in both. We also provide full cloud management
capabilities with Oracle Enterprise Manager. And we provide the tools to help customers develop
their applications in the cloud.
Many people in the workforce have become accustomed to the simple, intuitive, and productive applications on their personal phones, PDAs, and tablets—and they’re demanding the same easy access from their work applications—anytime, anywhere.

To empower their users—and maintain control of the applications and devices being used—enterprises have responded quickly. Within the next year, nearly 75 percent of the U.S. workforce will be mobile, and there are already 1 billion mobile workers worldwide. If companies want to keep up with the competition, it is no longer a matter of if they go mobile, but rather, how fast they go mobile.

Oracle has everything our customers need for comprehensive, flexible, and secure mobile solutions that will integrate seamlessly with the rest of their enterprise technology.

Oracle’s mobile enterprise application platform provides the foundation for delivering mobile applications. Oracle Berkeley DB helps extend existing applications to mobile devices with unparalleled performance. Oracle ADF Mobile enables you to develop new applications once and deploy them on multiple devices. And Oracle Database Lite Mobile Server provides data synchronization and a centralized back-end interface for management.

Java Platform, Micro Edition (Java ME) for embedded systems already runs on more devices than any other mobile application runtime, and it’s the best way for customers to bring their own advanced, feature-rich content to mobile phones and PDAs. Carriers and OEMs around the world have standardized on Java ME, and it’s bolstered by a massive Java ecosystem.

Oracle is also actively developing Oracle Applications specifically for the mobile workforce. Oracle Mobile Sales Assistant and Oracle Mobile Sales Forecast work on most popular handheld devices. And we have three mobile apps—Oracle Business Indicators (for BI), Oracle Business Approvals for Managers, and Oracle Business Approvals for Sales Managers—that were built for Apple iPhones.

Committed to Open Standards: Integrating Heterogeneous Environments

Although we have the complete stack technology covered from end to end, the reality is that no organization runs 100 percent on any single vendor’s technology. That being the case, we participate heavily in standards organizations to drive open standards and we are fully committed to maintaining open standards interfaces between all the layers wherever possible.

Oracle Fusion Middleware works with all popular brands of databases and Oracle Database 11g works with all popular brands of middleware. By creating open standard interfaces, we ensure that our customers can take up our technology at their own pace. And we enable them to follow their own best path to consolidate, standardize, optimize, and cut costs by implementing Oracle integrated systems over time.

Customer Services Vision

By design, stack integration is a dynamic approach to computing, which means it’s about more than just the software and hardware products. An integrated experience of customer services throughout the
lifecycle of a system is also of critical importance. Oracle is committed to providing superior services to accelerate deployments, reduce the complexity and risk of running our systems over time, ensure that users get true operational excellence out of their business processes, and make certain customers get the maximum value out of their Oracle investment.

**Oracle Lifecycle Services**

Oracle offers a wide variety of services that enables us to provide every customer with the support they need throughout the entire lifecycle of their systems. For example, Oracle Consulting is a valuable resource for helping define the types of solutions businesses want to deploy into their datacenters and assisting in the process of designing those systems. Oracle Advanced Customer Services provides prepackaged services for the deployment of systems, maintenance of systems, and upgrades. Oracle Support provides the ongoing servicing, patches, and related expertise needed to help maintain systems over time. And Oracle University offers classes and other forms of Oracle product knowledge to help users, developers, and IT staff stay current on the latest technology.

Oracle On Demand even provides the option to deploy software as hosted and managed applications or as software as a service (SaaS). Customers can run their stack onsite, in the cloud, or in a mixed environment with the systems fully integrated.

**Customer Benefits of a Complete Integrated Stack**

From individual products and layers to a full cloud environment, Oracle offers a comprehensive and flexible stack that provides customers with a wide variety of price points, deployment options, capabilities, and applications.

The ultimate benefits to our customers are numerous and significant. We deliver innovations in the stack more quickly so customers can innovate faster. We provide better performance, reliability, and security than any other vendor—and better than any customer could provide for themselves. We reduce deployment times by weeks or months because we offer deployments as complete, integrated systems. We simplify maintenance and upgrades because we provide the right patches and management tools across the stack. We lower the cost of ownership and reduce the risk of owning and managing the stack. And we stand behind the stack with one-stop support.

Only Oracle has the complete stack with hardware and software, engineered to work together. And only Oracle can deliver the innovation and optimized performance that customers need.