

Comparing IBM WebSphere and Oracle WebLogic

*Benefits of an IBM WebSphere application
infrastructure*



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Executive summary

When you move from Oracle WebLogic to IBM® WebSphere® Application Server you can save as much as 57 percent on first-year licensing and support with WebSphere. Also, WebSphere enables more virtualization options such as VMware and Xen and you only pay for the cores you use when you virtualize with these technologies.

By switching to IBM WebSphere, you can:

Protect your investments—IBM provides backwards compatibility for applications and runtimes, offering smooth upgrade paths and promoting reuse of existing assets.

Get better software—WebSphere has a number of technical advantages over competing Oracle products, including, but not limited to better standards support, better performance, robust development tools and wide array of adapters.

Get better technical support—IBM software technical support is recognized as being a higher quality compared to Oracle.

Lower your Total Cost of Ownership—IBM offers a free TCO assessment for migration projects. Hundreds of customers who switched to IBM software found cost savings in the support, better performance and hardware savings as well as improved development productivity.



“According to the Gartner report, IBM ranks #1 in application infrastructure market share in 2010. IBM has been ranked #1 every year since 2002.”

—Gartner Market Share: All Software Markets, Worldwide 2010, Document G00211976, March 30, 2011

Application Infrastructure

By application infrastructure in this paper, we refer to these three major components (See Figure 1):

Application Foundation

This layer includes JDK, JEE compatible application server runtime and any extensions that it might provide (Web 2.0, mobile, batch, OSGi, and so on). One can build, run and scale Java and JEE business applications using Application Foundation core services.

Intelligent Management

This layer extends the Application Foundation in a way that allows increasing the automation, dynamically adjusting workloads (such as growing or shrinking cluster size on the fly without human intervention), enforcing SLA levels, automating health management, providing additional scalability and simplifying administration.

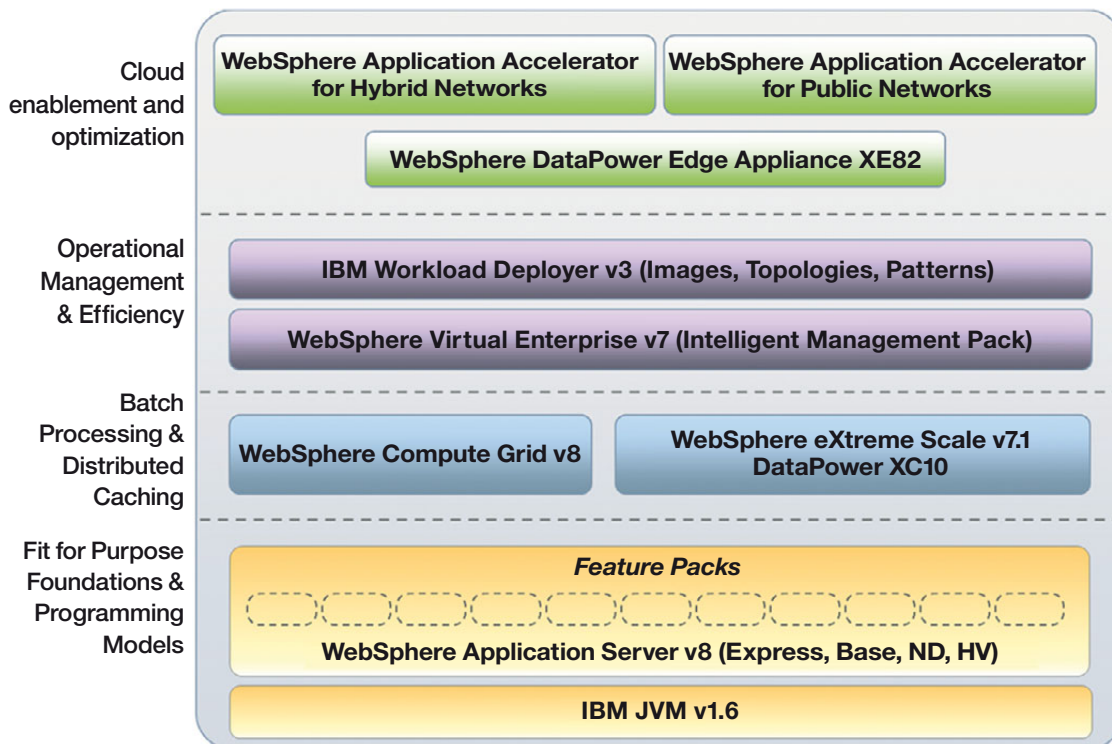


Figure 1: IBM WebSphere application infrastructure capabilities

Extreme Transaction Processing

The Extreme Transaction Processing (XTP) layer is designed for those high volume applications that demand the highest scalability and immediate response times. The tools provided as part of this layer are data caching and batch processing runtimes that can scale to very large transaction volumes and maintain short response times.

While some of the Oracle products that came from years of acquisitions are good quality (such as JRockit JVM, WebLogic Server), others are not as mature or functional. Additionally,

there are significant gaps in the overall Oracle middleware platform with significant functions not being offered by Oracle today. Figure 2 compares the IBM WebSphere application infrastructure to the Oracle offerings. Please note that the diagram reflects functional capabilities and not the product bundling or the way products are sold. This is purely a technical comparison that “peels the onion” of Oracle’s “Suites” marketing. There are significant gaps in the Oracle Fusion middleware offering. The detailed description of these gaps is the subject of the following sections.

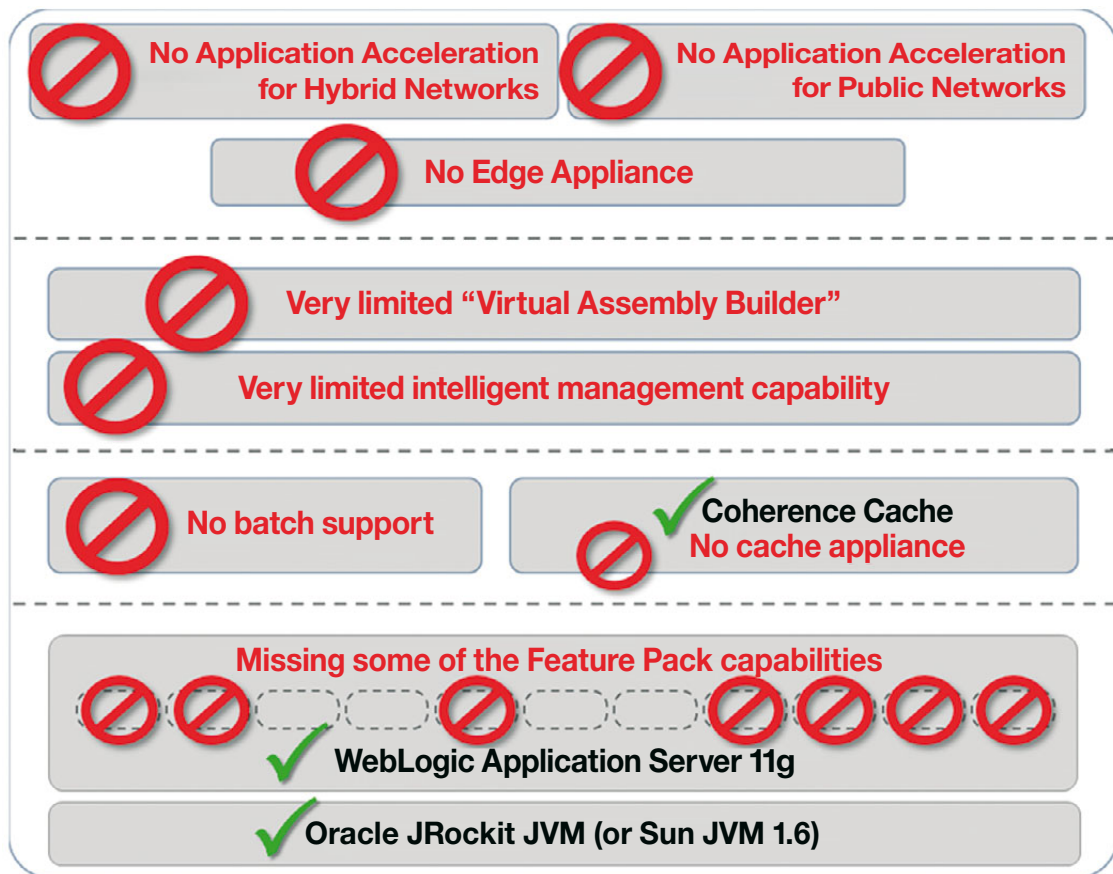


Figure 2: Oracle Fusion Middleware application infrastructure capabilities

JEE 6 support

IBM WebSphere Application Server v8 (WAS) shipped in June 2011 and it is the first production-grade product to be fully JEE6 certified (GlassFish Application Server is certified, but is not considered to be ready for mission critical deployments). As of September 1, 2011 Oracle has yet to ship a WebLogic version with full JEE6 support.

Why is this important? There are number of ease-of-use improvements and simplification of the programming model as well as significant new capabilities offered in JEE6. In the past six years, IBM has consistently been the first to market with support for the latest Java specifications. By providing development tools and runtime for these specifications ahead of other vendors, IBM allows customers to take advantage of these platform improvements to increase their competitiveness and reduce development costs.

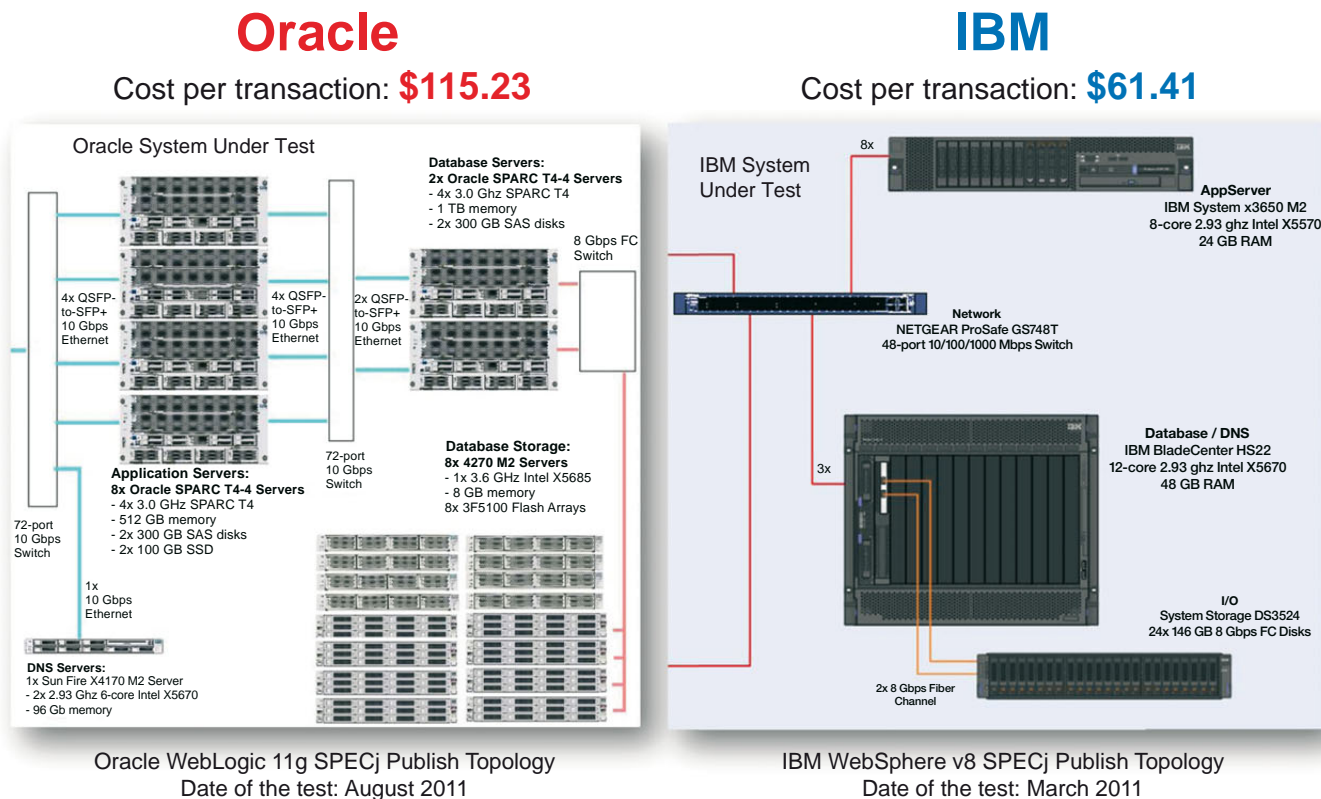
Here are some of the key JEE6 improvements that **are available** in WAS v8 today, but are **not available** in WebLogic 11g:

- **Enterprise JavaBeans (EJB) 3.1**—enhances developer productivity through simplification including testing outside of the application server, new timer support and asynchronous enhancements, singleton pattern support, elimination of the need to replicate interface methods in the implementation class, the ability to package EJB classes in .WAR files, and more.
- **Java Servlet 3.0**—provides easier web application development with enhanced annotations and integrated Web 2.0 programming model support, security enhancements, asynchronous support, “pluggability,” simplified configuration and other improvements.
- **Contexts and Dependency Injection for Java (CDI) 1.0**—accelerates time to value through tighter and simpler integration between web (JSF) and business logic (EJB) tiers resulting in a significantly simplified programming model for web-based applications; provides a programming model suitable for rapid development of simple data-driven applications. This is a domain where Java EE has been perceived as overly complex in the past.
- **Bean Validation 1.0**—improves developer productivity through declarative means for describing validation constraints for data. Prior to the bean validation feature in JEE6, developers had to write their validation rules in the presentation framework (JSF), then in the business layer (EJB, POJO), and also in the persistent layer (JPA) and keep all of them synchronized. This was time-consuming and prone to errors. The bean validation model is supported by constraints in the form of annotations placed on a field, method, or class of a JavaBeans component.
- **Java Architecture for XML Binding (JAXB) 2.2**—provides improved performance via new default marshalling optimizations. JAXB defines a programmer API for reading and writing Java objects to and from XML documents, thus simplifying the reading and writing of XML via Java.
- **Enterprise Web Services 1.3**—delivers improved integration and reuse support by enhancing the programming model, XOP and MTOM control, deployment descriptor updates, EJB bindings and hundreds of other enhancements.
- **Java API for XML-Based Web Services (JAX-WS) 2.2**—provides developer productivity and security enhancements, enhanced client programming model, improved binding and addressing capabilities.

Performance

IBM has a long history of performance leadership with our application server. In January 2010, IBM was the [first vendor to publish](#), and for entire 2010, held the top position in the [SPECjEnterprise2010](#) benchmark with the result of 15,829.86 Enterprise jAppServer Operations per Second

(EjOPS). Oracle published their result almost a year after IBM and trailed significantly behind IBM for well over a year. In July 2011, Oracle finally published results with a higher overall number of EjOPS. However, the cost per transaction¹ is 1.88 times higher² than the IBM configuration, as can be seen in Figure 3.



Cost per transaction with Oracle WebLogic + Oracle DB is 1.88 times higher than IBM WebSphere + DB2

Source: <http://www.spec.org/jEnterprise2010/results/jEnterprise2010.html>

Figure 3: Comparison of the cost per transaction for the SPECjEnterprise2010 results

Going back in history, IBM has been leading every, single public benchmark³ since 1999. Here are just a few examples:

- IBM was first to publish results to the [SPECjAppServer2001](#) and [SPECjAppServer2002](#) benchmarks and led those benchmarks for significant periods of time. Oracle did not publish anything for more than a year after IBM's first publication.
- IBM was the first and only to publish a [SPECjAppServer2002](#) distributed result, which included distributed transactions. None of the other vendors have ever published a result in this category.
- IBM was the first to publish a [SPECjAppServer2004](#) result.

Further, it took BEA more than a year to publish their first result and Oracle two and a half years to publish theirs. Until recently, Oracle continued to publish new results in the old benchmark SPECjAppServer2004 and claimed "performance leadership." Why publish results in the antiquated benchmark? Who is interested in EJB 2.x performance numbers?

None of the SPECj benchmarks are run in a failover configuration and, as such, do not highlight the availability aspect of the topology. WebSphere Application Server has several features that distinguish it from WebLogic Server in clustered, highly available configurations. For example, WebSphere provides efficient mechanism for automated JMS and EJB failover with very low latency.

Another capability is the efficient replication of HttpSession state. While WebLogic Server also supports HttpSession failover, it does not do it efficiently. Unlike WebSphere Application Server, WebLogic Server does not support granular updates to HttpSession, resulting in significant network and CPU overhead and slowing down the entire system. IBM internal tests show that this may provide a double-digit percentage performance advantage for WebSphere Application Server compared to WebLogic.

WebSphere Application Server includes a Dynacache capability that allows for very flexible HTML, Servlet, JSP and SOAP/HTTP (using parts of the SOAP header and body) caching without modifications to the source application. This cache can also be dynamically replicated to the edge of the network using WebSphere Edge.

WebLogic Server has limited caching available and requires manual editing of the source code to put in JSP tags. This editing requires designers of the applications to be overtly aware of the cache, while in WebSphere Application Server it is a purely administrative task and developers do not have to do anything special to enable it. Customer and internal IBM tests demonstrated that the IBM WebSphere Dynacache can help improve performance of some web applications by a significant amount, as shown in Figure 4.

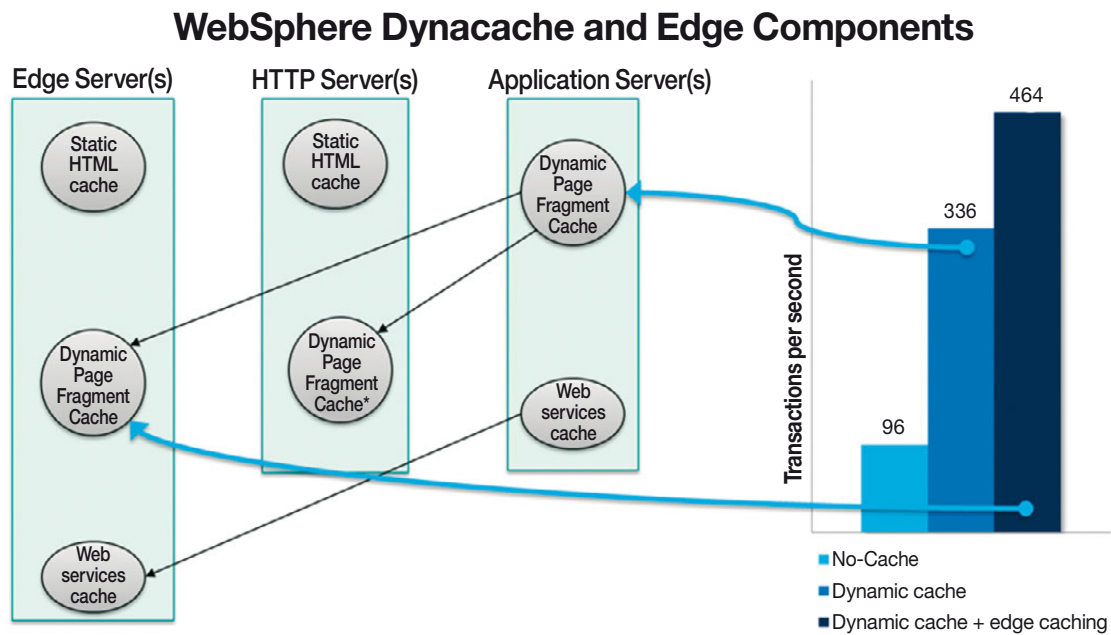


Figure 4: Impact of WebSphere Dynacache on overall system performance

Several factors contribute to the WebSphere Application Server having a performance advantage over WebLogic. These include:

- The IBM Java Runtime which is optimized for different hardware architectures with special optimizations done for the latest IBM POWER7® platform
- Fast Web services stack and XML processing
- caching at every level of processing
- Special optimizations performed for IBM DB2® connectivity and session persistence
- Highly optimized application server runtime and persistence engines

You can find performance tutorials and best practices for WebSphere Application Server at: <http://bit.ly/1Mmdp>

Administration

WebSphere Application Server has a unique capability called **Flexible Management** that allows one to submit administrative jobs asynchronously for application servers registered as administrative agents of the deployment manager. Jobs can be submitted to one or more servers, including geographically dispersed servers. Figure 5 shows the large scale administration topology of the WAS Job Manager.

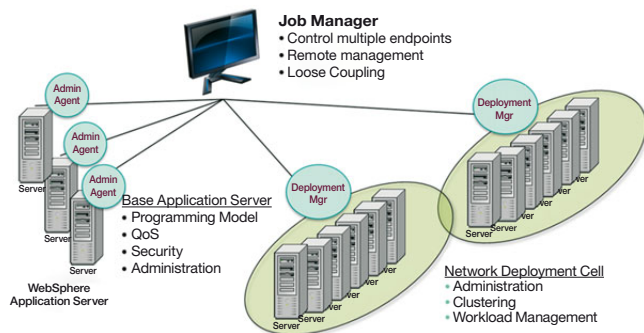


Figure 5: Large scale administration topology with the WAS Job Manager

The administrative job manager can queue jobs directed at the standalone application server nodes (WAS Base) or clustered domains (WAS ND). The job manager can schedule and asynchronously administer job submissions and can complete tasks such as:

- Set the job submission to take effect or expire at a specified date and time.
- Specify that the job submission reoccurs at a specified time interval.
- Notify the administrator through email that the job has completed.
- Combine multiple targets into logical groups.
- Monitor execution of the job against multiple target systems.
- Send and receive files to and from remote systems.
- Remotely manage applications.
- Remotely install updates and fixes into WebSphere runtime.
- Stop, resume, and cancel jobs.

Figure 6 is a screen capture of the Job Manager user interface.

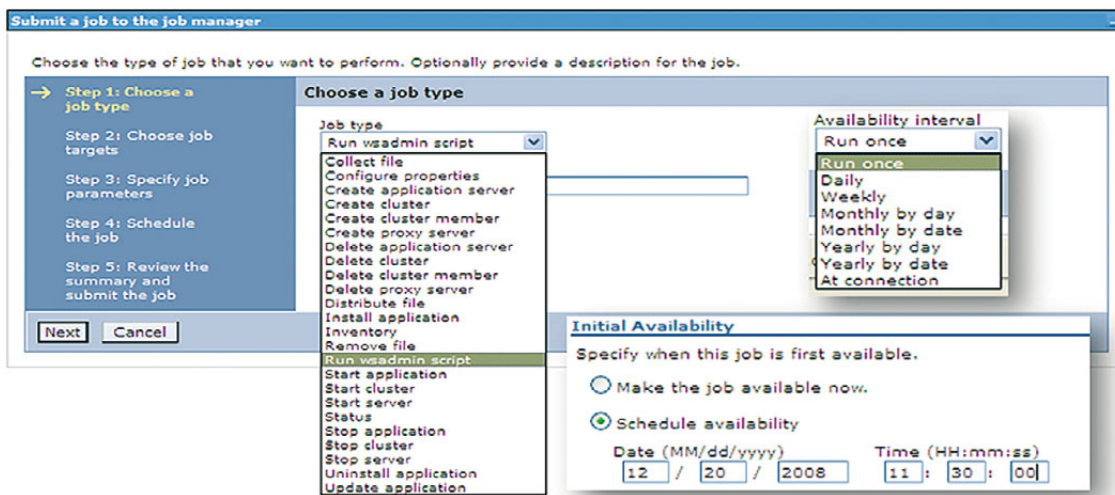


Figure 6: Sample screen capture of the WAS Job Manager

This WebSphere function can reduce off-hours work required by administrators and can also be used to avoid potentially expensive site visits at remote offices. **WebLogic Server does not have a comparable function.** Here are several scenarios where the WebSphere job manager would be useful:

Branch office environment

A business has a thousand stores geographically dispersed across a continent. Each store contains either a few application servers, or a small network deployment cell consisting of two or three machines. Each store is managed locally for daily operations. However, each store is also connected to the data center at the company headquarters, potentially thousands of miles away. Some connections to the headquarters site are at modem speeds. The headquarters site uses the job manager to periodically submit administrative jobs for the stores.

Environment consisting of hundreds of application servers

An administrator sets up hundreds of low-cost machines running identical clones of an application server. Each application server node is registered with the job manager. The administrator uses the job manager to aggregate administration commands across all the application servers, for example, to create a new server, or to install or update an application.

Environment consisting of dozens of deployment manager cells

An administrator sets up hundreds of application servers, which are divided into 30 different groups. Each group is configured within a cell. The cells are geographically distributed over five regions, consisting of three to seven cells per region. Each cell is used to support one to fifteen member institutions, with a total of 230 institutions supported. Each cell contains approximately 30 applications, each running on a highly available cluster of two (for failover purposes) resulting in a total of 1800 application servers. The administrator uses the job manager to aggregate administration commands across all the cells, for example, to start and stop servers, or to install or update an application.

Managing Oracle WebLogic Server in these kinds of environments may become difficult without investing significant resources to build a custom, home-grown management framework to obtain capabilities similar to what IBM provide out-of-the-box. WebSphere Application Server supports additional capabilities to enable efficient management—some of these capabilities are missing in WebLogic Server.

These are just a few examples of how IBM innovation has out-paced Oracle:

- WebSphere Application Server Network Deployment allows management of a mixed version environment from a single administrative console (that is, v6, v7 and v8 in the same cell). **Oracle does not. If you need to do an upgrade with WebLogic, it has to be all or nothing approach.**
- WebSphere Application Server provides an Installation Factory to speed up installation and update of multiple servers with similar configurations, including user applications. **Installing and configuring WebLogic Server takes multiple steps**, including base product install, installing appropriate updates, installing emergency fixes, configuring WebLogic domains, configuring the environment, installing applications, and more. For multi-machine environments, this is tedious and prone to errors. With the IBM Installation Factory for WebSphere Application Server, installing and configuring WebSphere Application Server requires just one step.
- The WebSphere Application Server Administrative GUI provides a “Performance Tuning Advisor”. It monitors the workload of the production system and makes recommendations for the administrator on how to change the system configurations to improve performance by tuning JDBC and JMS connection pools, threads, memory size, cache sizes and much more. The best practices for performance tuning over many years are thus codified in this tool (as can be seen in the Figure 7) and are made available to all WebSphere administrators. **WebLogic only tunes thread pool size and does not provide the extensive tuning adviser shown in Figure 7.**

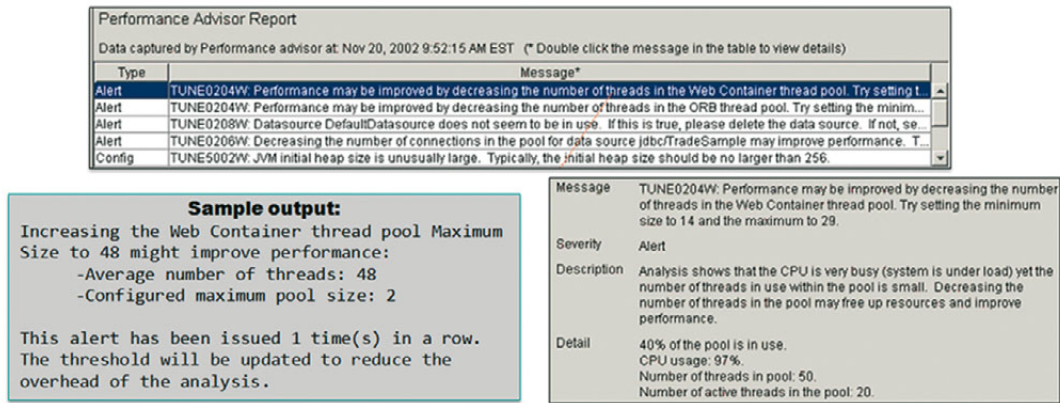


Figure 7: WebLogic only tunes thread pool size and does not provide the extensive tuning adviser available in WebSphere.

- WebSphere Application Server supports dynamic application profiles for controlling transaction locking and isolation levels “on the fly.” IBM recognizes that different client requests are likely to impose vastly different demands upon the downstream resources. Distributed components which are hosted by WebSphere Application Server dynamically receive instructions at runtime concerning how to access data. The same component can behave differently, depending on the application that calls it. This means that strategies about concurrency, update intent, use of collections, and pre-populating the component state and data buffers can be carefully optimized to each application’s needs without impacting the application source code or requiring redeployment.

Oracle WebLogic Server does not offer these capabilities and treats all client requests in the same manner.

Server resources, resource managers, resource adapters, and so on—all take action on behalf of one client’s request in the same fashion as they do any other. Custom coding is required to optimize performance with Oracle WebLogic Server.

Standards support

Since 2007, IBM has adopted a new release strategy for WebSphere Application Server. Instead of forcing our customers into full server upgrades when we add new functions, we now package these new functions as Feature Packs available at no cost to all WebSphere Application Server customers. They can be added to the product without impacting existing applications.

Think of these as Eclipse “plugins.” Existing applications should not be impacted and retested as usually is the case with the full server upgrades. This approach allows IBM to innovate quickly and deliver valuable, new functions to those customers who need them. Below is a description of the Feature Packs available for WebSphere Application Server v7. Please note that some of these became core components of v8.

Oracle introduced similar approach that they call Server Extensions. However, there are number of capabilities and APIs that WebSphere provides over and above standard JEE programming model that are **not available** in WebLogic:

- WebSphere Application Server includes “out-of-the-box” support for SIP (Session Initiation Protocol). **With Oracle, you have to purchase a separate Oracle Communications Converged Application Server at significant additional cost.** Customers must also perform separate installation and maintenance of this additional Oracle product, creating unnecessary complexity and runtime and administrative overhead.
- WebSphere Application Server also provides “out-of-the-box” support Portlet API (JSR 268). **With Oracle, you must purchase Oracle WebCenter Suite at the cost of \$125,000 per processor core** to get Portlet support. Use of Oracle WebCenter also adds significant overhead and complexity to the relatively simple, pure, application server configuration.
- Additionally, the WebSphere Application Server Feature Pack for Communications Enabled Applications (CEA) helps developers add co-browsing and communications capabilities to their applications, without requiring detailed knowledge of SIP. **Oracle provides no similar capability.**
- The WebSphere Application Server Web 2.0 and Mobile Feature Pack use standards-based technologies to help developers create more interactive desktop and mobile applications. Standards-based technologies, including Ajax, REST Web services, and Dojo, are used to simplify and speed the addition of rich desktop and mobile user interfaces to WebSphere Application Server applications. A large collection of core services are also included, including new “skins” for a variety of mobile platforms (for example, Blackberry, iPhone, Android), and innovative user interface widgets to improve the user experience. **Oracle delivers mobile client capability for WebLogic via its Application Development Framework (ADF) Mobile Client at an additional cost of \$250 per processor core.**
- The WebSphere Application Server Feature Pack for Dynamic Scripting can help enterprise IT to address situational application needs by providing a web-oriented programming model focused on agility through the use of Web 2.0 and dynamic scripting technologies. The Feature Pack for Dynamic Scripting delivers the PHP and Groovy dynamic script languages and an innovative Web 2.0 programming model (AJAX, REST, Atom, JSON, and RSS). **Oracle does not provide a similar capability. Those customers who wish to have support for their scripting applications on WebLogic will have to invest in third-party products.**
- The WebSphere Application Server Feature Pack for XML delivers technology that enables adoption of key XML standards and principles, including XSLT 2.0, XPath 2.0 and XQuery 1.0. These new and updated W3C XML standards offer application developers advanced capabilities for building XML applications. Some of the benefits delivered in these standards include:
 - Simpler XML application development and improved developer productivity
 - Improved ability to query large amounts of data stored in XML outside of a database with XQuery 1.0
 - Improved XML-application performance through new features
 - Improved XML-application reliability with new support for XML schema-aware processing and validation
- **Oracle WebLogic supports an older version of the XSLT and XPath with all of the ease of use and performance issues associated with those older less mature and less flexible specifications.** Customers who wish to use the latest versions of these standards with WebLogic need to invest in third-party products or upgrade to a more expensive Oracle SOA Suite at the price of \$102,500 per processor core.

Feature Packs for Batch Applications and OSGi are described later in this paper.

Intelligent management

IBM provides intelligent management and application virtualization capability in our WebSphere Virtual Enterprise product. This helps improve the efficiency of the operations staff, reduce hardware and software costs, and maintain higher qualities of service. In 2010, Oracle started adding some capabilities in this area, and provides only very limited functionality. Let's consider the differences between IBM and Oracle in the area of intelligent management.

WebSphere Virtual Enterprise provides virtualization at the application level. In addition, it can be combined with server virtualization (for example, VMware, Xen, z/VM® and PowerVM™) to take full advantage of the strengths of both approaches to lower operational and energy costs, and manage your enterprise applications and SOA environment. WebSphere Virtual Enterprise began in 2003 (formerly known as WebSphere eXtended Deployment) and today it has successful customers and mission-critical deployments around the world, including companies such as IBM, Nationwide, Max NY Life and others.

Initially, Oracle promoted the WebLogic Operations Control product for application virtualization. However, in June 2010, Oracle shipped WebLogic Suite Virtualization Option (OWLSVO) and no longer offers the WebLogic Operations Control product. OWLSVO is the replacement to the unsuccessful and discontinued BEA WebLogic Virtual Edition. OWLSVO allows WebLogic Server to run directly on the Oracle VM hypervisor without the need for a guest operating system.

This is done with JRockit Virtual Edition which is a JVM that works with hypervisor software to provide a set of operating system features (such as TCP/IP, hardware device interaction, file I/O, and process scheduling). IBM doesn't believe that a JVM implementation of system level services can be more efficient than a proven Linux kernel (or AIX® or Solaris, for that matter).

Furthermore, customers should consider the availability of the skills and tools needed to troubleshoot and secure this kind of "one-off" environment. Oracle claims performance benefits for this "native" configuration. But IBM believes that any theoretical "performance gains" will be far outweighed by the additional skills and home-grown tools which will be needed for this rigid, non-standard approach. Not to mention that the list price for this product is \$45,000 per CPU, multiplied by the number of cores on the socket, multiplied by the Oracle core-factor. Despite all the marketing claims, Oracle has never published performance benchmarks with this product.

Oracle WebLogic Suite and its Oracle WebLogic Suite Virtualization Option have a number of limitations compared to the IBM WebSphere Virtual Enterprise:

- WebSphere Virtual Enterprise supports IBM WebSphere Application Server, Process Server, Service Registry and Repository, ESB, Portal, and Commerce. Oracle virtualization offerings are limited to the WebLogic Server only with **no support** for Oracle BPM, ESB, Portal, or other platform products.

- Oracle lacks support for robust application edition management. WebLogic Server allows **only two versions** of the same application to coexist for a short time of transition. WebSphere Virtual Enterprise makes it possible for **virtually an unlimited number** of application editions to coexist indefinitely with the ability to revert back or forward to a certain version, at any time. WebSphere Virtual Enterprise supports interruption-free application rollout, testing and coexistence within the same administrative domain. This can greatly reduce hardware requirements and complexity of upgrades.
- Unlike Oracle, WebSphere Virtual Enterprise has the ability to prioritize requests based on administrator-defined rules to adjust server response times according to Service Level Agreements (SLA) and application priority. These rules can use information about the protocol, application version, URI, cookie, client IP, time of day, SLA, form data, and many other system, session and request parameters. Request prioritization and routing are not provided by Oracle. WebLogic Server and its add-ons **cannot** throttle requests according to SLAs between the HTTP server, load balancer and application server. WebSphere Virtual Enterprise can throttle and prioritize HTTP, JMS and IIOP requests. Oracle WebLogic Server can only do **limited prioritization** of HTTP requests within a boundary of a single application server JVM.
- The WebSphere Virtual Enterprise request prioritization and throttling with SLA monitoring can also be applied to non-IBM products. For example, WebSphere Virtual Enterprise can perform these functions to improve the quality of service for PHP servers, .NET, Apache Tomcat, JBoss, Geronimo, WebSphere Application Server Community Edition, WebLogic Server and other web and application servers communicating over HTTP or HTTPS protocols. Oracle **does not provide** such capability.
- WebSphere Virtual Enterprise supports many operating systems, including Red Hat Linux, SuSe Linux, AIX, HP-UX, Solaris, zOS, iOS, Windows, RedFlag as well as different machine architectures, including x86, x86-64, POWER, SPARC, Itanium, System z. Oracle Virtualization option **only supports** native Oracle VM on the x86 architecture.
- Unlike Oracle products, WebSphere Virtual Enterprise can dynamically provision and start or stop new instances of application server JVMs in the cloud built with different Operating Systems or hypervisors. This is called “Dynamic clustering” and provides the ability to meet Service Level Agreements when multiple applications compete for resources. WebSphere Virtual Enterprise can dynamically stop less important applications and start new instances of more important ones. The boundaries of the dynamic cluster for any particular application within a cloud can be computed “on-the-fly” based on the rules defined by the system administrator.
- WebSphere Virtual Enterprise performs proactive application and server health management, detects issues (memory leaks, storm drains, connection errors, response time deviation, and so on) and takes actions to correct them. The declarative nature of WebSphere Virtual Enterprise health management allows administrators to improve infrastructure reliability, helping to reduce potential downtimes. Oracle **does not provide** similar capabilities.
- Oracle WebLogic Suite Virtualization Option and Oracle Virtual Assembly Builder **do not support** non-Oracle virtualization software. The only supported hypervisor is Oracle VM. In contrast, WebSphere Virtual Enterprise integrates well with VMware, PowerVM, z/VM and can support application server deployments running **in any other** virtualized environment, including KVM, Microsoft Hyper-V and Xen.

Caching

In the area of data caching, both IBM and Oracle offer first-class products with a good track record. IBM has developed its WebSphere eXtreme Scale product in-house and has a number of high-profile customers using the product in mission-critical applications for several years. Oracle acquired a company called Tangosol and rebranded their product as Oracle Coherence.

The Coherence product has been around longer than the IBM WXS product, but both have good reputations in the market. Both products have a very comprehensive set of features, including Java APIs, REST, .NET support, automatic replication of data across multiple cache servers, high availability and failover, monitoring and reporting capabilities and more.

There are some differences between IBM WXS and Oracle Coherence. **One of the WXS advantages is the Disk Off-load or Disk Snapshot support**, which enables faster restoration of the grid post failure or maintenance. The alternative is

to do the grid data replication over the network. The disk snapshot is stored locally on every machine running with container JVMs.

Another WXS advantage is lower cost. The current WXS list price is \$148 per PVU while the current Oracle Coherence Grid Edition list price is \$25,000 per processor core. This translates into more than 50 percent savings for IBM customers.

Figure 8 provides an illustration of the cost difference between IBM WXS and Oracle Coherence for a four machine configuration, where each machine has two Intel® Xeon® X5570 sockets, quad core each and each machine runs VMware hypervisor so that only half the cores on each machine are used to run the caching software. Please note that, in case of Oracle, this makes **no difference**, as licenses must be procured for all cores on each machine.

IBM				Oracle					
	# of machines	Total # of PVUs	List price (1 PVU)	Sub-total		# of machines	Total # of cores	List price	Sub-total
WebSphere eXtreme Scale	4	1120	\$148	\$165,760	Oracle Coherence Grid Edition	4	32	\$25,000	\$400,000
Subtotal - license (list price):				\$165,760	Subtotal - license (list price):				\$400,000
Support for year 1:				\$0	Support for year 1:				\$88,000
Support for years 2-5:				\$132,608	Support for years 2-5:				\$352,000
Subtotal for support years 1-5:				\$132,608	Subtotal for support years 1-5:				\$440,000
Total:				\$298,368	Total:				\$840,000

Figure 8: Comparing the list prices of sample WebSphere and WebLogic systems

Cost differences between IBM WXS and Oracle Coherence

While the software version of the stack provides choices for the deployment platform and the operating system, the appliance form factor offers significant advantages over traditional

software. The IBM WebSphere DataPower® XC10 Appliance allows business applications to process billions of transactions per day with efficiency and near-linear scalability. It is designed to work in heterogeneous environments across application server platforms and virtualization environments.

Table 1 is a comparison of the IBM XC10 appliance and software-based solutions such as the Oracle Coherence.


Steps to be taken	IBM XC10 caching appliance	Software-based solution (such as Oracle Coherence)
Find floor space, unpack hardware, plug-in power, networking	 <p>20 minutes</p>	Minutes or hours
Basic setup (IP address, etc.)	10 minutes	n/a
Download approved version of (1) OS, (2) cache software, (3) JVM, (4) database, (5) management pack and (6) other prerequisite software	n/a	Hours or days
Procure software licensing for (1) OS, (2) DBMS, (3) cache, (4) other prereqs	n/a	Days or weeks
Install OS	n/a	1+ hour
Secure, configure and tune OS	n/a	Hours or days
Install and secure Oracle Database for the Oracle Enterprise Manager	n/a	Hours or days
Oracle Enterprise Manager Pack for Oracle Coherence installation	n/a	Hours or days
Install JVM, cache software and all patches	n/a	Hours or days
Configure and tune JVM, cache software	n/a	Hours or days
Deploy applications	30 minutes	30 minutes
Regular maintenance of OS, JVM, database and the cache software	n/a	Days
Ongoing application monitoring, maintenance and troubleshooting	Simple	Complex
Total time to run application test	1 hour	Few days, weeks or months

Table 1: Comparison of the setup time and complexity between the IBM XC10 appliance and software-based solution.

Not only is the IBM XC10 appliance is easy to set up, but it also integrates easily with the IBM DataPower XI50 appliance as a side cache, provides drop-in HTTPSession cache for WebSphere Application Server and can be used by any Java application or via REST interface. Oracle Coherence can be used for WebLogic HTTPSession cache and also by Java applications and via REST interface.

While software caching might be more flexible and highly customizable, many customers found that IBM XC10 caching appliance provides a very compelling value and delivers faster time to market with significantly lower total cost of ownership. In those cases when customers need additional flexibility, IBM's WebSphere eXtreme Scale offers great performance and capabilities comparable and, in some cases, superior to those of Oracle Coherence.

Table 2 is a comparison between the total cost of ownership of the IBM XC10 and the Oracle Coherence. The comparison assumes a labor rate of \$150 per hour and a dual-socket, six-core server for Oracle Coherence server.

Costs	IBM XC10 caching appliance	Oracle Coherence
Staffing	Appliance administrator	1) Hardware specialist 2) OS administrator 3) Networking specialist 4) Coherence administrator with JVM and other high end skills 5) Oracle Enterprise Manager (OEM) administrator 6) Oracle DB admin (if OEM is used)
Setup	About one hour of one person's time	Days or weeks of time of different skills
Performance	Low cost per transaction (tens of thousands of requests, per second, per appliance)	Depends on the hardware choice
Licensing	\$0	1) Oracle Coherence Grid Edition—\$25,000 per processor core 2) OEM Pack for Coherence (\$10,000) 3) Oracle DB (\$50,000+ per core) 4) Operating System (\$2,500+)
Hardware	~\$100,000 plus ~\$90,000 for support plus \$25,000 for cooling and power	Slightly lower cost for hardware, compared to IBM XC10 appliance
Average TCO over five	~ \$220K	~\$1,000,000

Table 2: Comparison of the Total Cost of Ownership between IBM XC10 and Oracle Coherence.

Private cloud support

Annual IT operational costs continue to increase, with labor commanding an ever-increasing share. For example, an IBM internal study, the IBM Internal Consolidation Project, of its own distributed infrastructure showed labor to be more than 60 percent of the total operational cost in the first year. While industry analysts estimate labor costs can be as high as 80 percent of overall data center costs⁴. As a result, many customers are turning to private clouds, implementing such technologies as virtualization and consolidation, standardized workloads, and automation by way of self-service provisioning, in an effort to reduce these costs.

According to the same IBM Internal Consolidation study, the IBM Workload Deployer can reduce software labor hours by up to 80 percent compared to manual deployment⁵. The task of deploying a software stack as a virtual machine image onto a virtualized server has historically been a highly labor-intensive task. For instance, one has to first deploy and configure the operating system, along with all requisite patches. After that, the administrator has to install and configure the application

server and all its constituent components (for example, HTTP server) as well as patches and other fixes. For applications requiring a database, that becomes yet another piece of middle-ware that must be installed and configured. Then there is the application itself. Collectively, deploying and testing a complete application manually can require days or weeks to accomplish, depending upon its overall complexity. In a private cloud environment, this kind of turnaround is untenable.

The IBM Workload Deployer (See Figure 9) is specifically designed to address this problem. Available as a hardware appliance, it leverages 10+ years of best practices in WebSphere Application Server deployments and encapsulates them into predefined, customizable images that can be dispensed to a variety of hypervisors used in virtualized servers. Its use of scripting and automation techniques greatly reduces the labor required to perform deployment tasks. IBM Workload Deployer works very well with WebSphere Virtual Enterprise and both can provide significant value to WebSphere customers. This is supported with the “Intelligent Management” pack for IBM Workload Deployer.

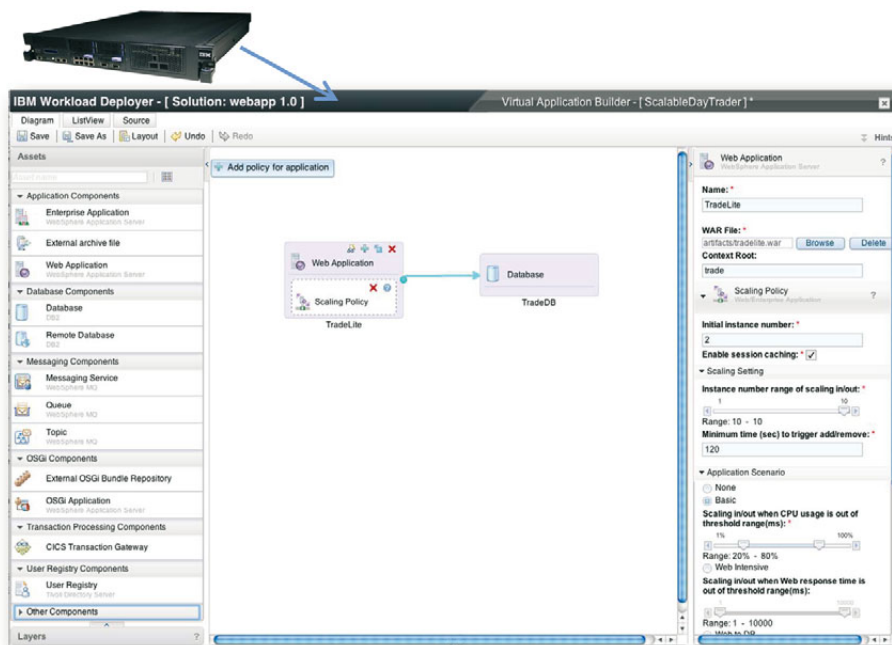


Figure 9: IBM Workload Deployer v3—basic, single application server, single DB server set up in the pattern designer

In June 2010, Oracle announced the Oracle Virtual Assembly Builder. This product provides provisioning of the virtual appliances into the Oracle VM environment. Other than overall lack of product maturity, there are number of significant limitations with this new Oracle Virtual Assembly Builder product. Some of which include:

- Consider the appliance form factor and the ease of use with the IBM Workload Deployer versus the labor-intensive process of installing, configuring and securing Oracle Virtual Assembly Builder. The differences in time to production between appliance- and software-based solutions are usually an order of magnitude.
- IBM Workload Deployer (formerly known as WebSphere Cloudburst Appliance) has been available since 2008 and has hundreds of successful production deployments with companies such as IBM, ABSA, Sears, Nationwide, Kaiser Permanente, BSKyB, Haddon Hill Group, Lowes, Kroger, Aetna, South California Edison, and many others. In contrast, the Oracle Virtual Assembly Builder product was shipped in June 2010 and its track record is unknown at the time of this writing.
- IBM Workload Deployer supports major virtualization platforms, including VMware (x86 platform), PowerVM (POWER6® and POWER7 platform) and z/VM (IBM System z® platform). IBM will add more hypervisors to the supported list in the future. The market share of these hypervisors is well over 80 percent. At the same time, Oracle Virtual Assembly Builder only supports Oracle VM on x86 platform. The market share for Oracle VM is in single-digit numbers. Oracle has not announced intent to support non-Oracle hypervisors.
- IBM Workload Deployer supports provisioning of various versions of SuSe Linux, RHEL, AIX, z/VM and will support more operating systems in the future. Oracle Virtual Assembly Builder supports Oracle Enterprise Linux and Oracle JRockit Virtual Edition. Oracle has not announced any plans for additional OS support for the future.
- IBM Workload Deployer allows one to design and deploy patterns consisting of WebSphere Application Server, WebSphere Virtual Enterprise (via the Intelligent Management Pack), IBM HTTP Server, WebSphere Extreme Scale, WebSphere Portal, WebSphere Process Server and ESB, WebSphere Message Broker, WebSphere MQ, WebSphere Business Monitor, WebSphere Content Manager, and DB2, with more products on the roadmap and the ability to add almost any third-party software/application via scripting packages. Oracle Virtual Assembly Builder support is limited to WebLogic Server, Oracle Coherence, Oracle DB (single instance) and Oracle HTTP server.
- IBM Workload Deployer is built on the IBM DataPower platform with a high degree of security being a major design objective. It appears that the release of the Oracle Virtual Assembly Builder v11.1.1 is not production ready as it has security issues as identified in the Oracle documentation⁶:

“This release of Oracle Virtual Assembly Builder is a Developer-centric release (versus an Enterprise release) from a security perspective...In this release, users cannot replace the self-signed root certificate created by default by Oracle Virtual Assembly Builder with their own production-quality certificates...The communication between Oracle Virtual Assembly Builder and the Oracle VM Server when Oracle VM Server retrieves templates is not secure. If sensitive data has been introspected, then it might be visible to an attacker who has access to the network. The attacker might be able to access that sensitive data in the template.”

- IBM Workload Deployer provides a self-service portal with a Web 2.0 interface so that authorized users can create new patterns, deploy instances, generate reports on the usage of the software, remove instances and more. Oracle Virtual Assembly Builder does **not** provide similar capabilities and forces users to contact system administrators the “old-fashioned” way. System administrators execute deployment commands on behalf of the end users.
- IBM Workload Deployer has the ability to define automatic scaling policy for applications. With this policy, new virtual images will be created and added (or removed) to the dynamic cluster if current application topology is not able to meet the predefined SLA—all without administrator involvement. Oracle does **not** offer a similar capability.
- IBM Workload Deployer can also patch existing, running systems. Oracle Virtual Assembly Builder cannot patch existing systems.
- There are many other advantages of IBM Workload Deployer over Oracle Virtual Assembly Builder, including, but not limited to virtual machine mobility, admin REST support, user and roles management, import and export, usage tracking for billing, license tracking for compliance, SNMP, Tivoli integration, automated firmware updates, powerful configuration editor, pre-built scripting packages, role based security, ease of use, performance, flexibility, ability to capture and convert existing application topologies into templates, and more.

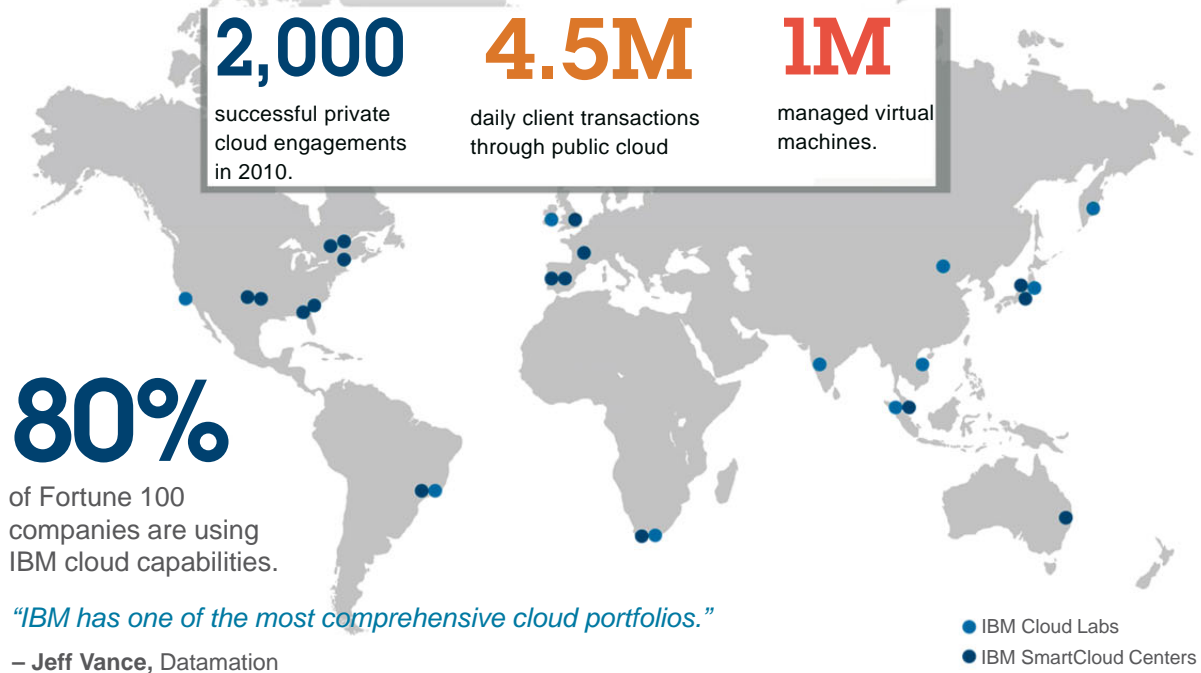
- Finally, the cost of the IBM Workload Deployer configuration is usually less than a third of the Oracle Virtual Assembly Builder topology when considering hardware and software license and support costs.
- How many companies are using Oracle VM with Oracle Enterprise Linux? Not too many. This makes Oracle Virtual Assembly Builder useless for 99 percent of the market.
- There is one other product that Oracle markets as “cloud ready.” Oracle is claiming that the Exalogic machine is a cloud appliance. **It is not.** Ask your IBM sales representative for the white paper on how **Oracle Exalogic fails to deliver cloud capabilities**⁷.

Public cloud support

IBM SmartCloud Enterprise is an IBM public cloud offering. It supports the WebSphere application infrastructure and a number of products from IBM Information Management, Lotus®, Rational® and Tivoli® brands. Oracle is once again behind IBM on this one. In October 2011, **Oracle pre-announced their intent to build public cloud offering.**

For test and development environments, IBM provides SmartCloud Enterprise public cloud—an agile cloud infrastructure as a service (IaaS) designed to provide rapid access to security-rich, enterprise-class virtual server environments, well suited for development and test activities and other dynamic workloads. Ideal for both IT and application development teams, the IBM SmartCloud delivers cloud-based services, systems and software to meet the needs of your business.

A next-generation combination of technology, expertise and reach helps you advance your cloud deployment.



For production-level workloads on a proven cloud infrastructure, IBM offers SmartCloud Enterprise+, a flexible and self-configurable cloud infrastructure owned and managed by IBM. Multiple levels of isolation and 99.9 percent availability mean you can deploy critical workloads with more confidence.

Both IBM and Oracle provide special pricing options to run their application servers on third party clouds, including Amazon EC2. For instance, IBM provides a number of products available for use on Amazon EC2, with the option

to pay for the software license “as-you-go” (that is, hourly usage) or bringing your own, existing license into the EC2 environment.

Hybrid cloud support

Slow application response time negatively impacts revenue and customer satisfaction. The impact of a one-second delay in response time can mean lost revenues, brand damage, more support calls, and increased costs. The IBM WebSphere

Application Acceleration products offer best-in-class Internet application delivery technologies with best-in-class enterprise infrastructure appliances.

These solutions provide end-to-end optimization, acceleration, security and management from the enterprise through the Internet to the user and back. IBM offers a full set of application acceleration solutions that help simplify your environment, while delivering applications fast and securely to users around the globe so that you can focus on building the applications that add value to your business.

- **WebSphere Application Accelerator for Hybrid Networks** accelerates applications hosted on a public cloud or SaaS environment to enterprise users accessing the applications from inside a firewall.
- **WebSphere Application Accelerator for Public Networks** accelerates delivery of enterprise applications behind a firewall to users across the Internet. This is the first IBM product offering from the Akamai Ready initiative and provides capabilities to help optimize, accelerate, secure, enhance and manage enterprise applications to Internet users.
- **WebSphere DataPower Edge Appliance XE82** (See Figure 10) serves as the enterprise gateway to the network to integrate with WebSphere Application Accelerator for Public and Hybrid Networks for optimal delivery of dynamic web and mobile applications across the public and hybrid Internet and provides an integrated edge-of-network traffic gateway that plans traffic consolidation, monitoring, intelligent workload cache policy management, high availability, security and transport policy enforcement, content compression, and acceleration for web application delivery.

XE82 appliance also supports application versioning, allowing versions of mission-critical web applications to be managed with minimal disruption while new versions can be partially rolled into and out of production for testing and verification, including full quiesce capabilities. The IBM XE82 appliance eliminates the need to purchase many disparate technologies from multiple vendors for application delivery and replaces several tiers in the application infrastructure with a single, purpose-built device.



Figure 10: IBM WebSphere DataPower Edge Appliance XE82

Oracle does not offer any of the capabilities mentioned above. Companies interested in optimizing the application delivery with Oracle WebLogic or SOA suite must invest in third-party products and significant development, integration, tuning and testing effort, at additional cost, to optimize the application delivery between public and private user communities.

Batch workloads

Typical batch applications process massive volumes of data and cost-efficiently return useful information generated by people and process interaction from diverse sources. Batch applications form the core of almost any business. A free add-on to IBM WebSphere Application Server, the Feature Pack for Modern Batch, provides support for a Java batch programming model, offers tools and operational controls for batch workload execution, enables development and deployment of batch applications, and allows execution of batch and OLTP workloads.

This Feature Pack is integrated with WebSphere Application Server and reduces infrastructure cost by sharing business logic with concurrent execution of batch and OLTP workloads. An integration of OLTP and batch job administration reduces operational cost. IBM feature pack for Modern Batch uses WebSphere Application Server's infrastructure capabilities to provide a platform for efficient delivery and management of

Java batch applications in addition to OLTP applications. This is accomplished by extending the existing WebSphere Java EE programming model and container services by providing a job dispatcher, a batch container and additional features specifically designed for the execution and management of batch applications.

Additionally, WebSphere Compute Grid is IBM's comprehensive batch platform. Customers who need additional qualities of service can migrate their applications developed using the feature pack for Modern Batch to WebSphere Compute Grid without making any application changes.

One of the world's largest reinsurers—a global company that insures the insurance industry—was faced with rapid growth and increased IT expenditures. The company was also using the COBOL programming language to develop mission-critical business applications.

Moving forward, the company wanted to move away from COBOL-based programming and adopt Java-based programming. Therefore, it needed to adopt a new server infrastructure to reduce costs and to run the company's new batch processing solution for Java-based programs. It adopted IBM System z10 Enterprise Class (z10 EC) servers, running the IBM z/OS® V1.10 operating system, to run their Java-based, mission-critical business processes.

The company implemented IBM WebSphere Compute Grid software to enable the entry, execution and management of Java-based, batch jobs. This Service Oriented Architecture (SOA) solution is based on sharing business services across batch and online transaction processing (OLTP) domains. While their OLTP workloads evolved from CICS/Cobol to J2EE and WebSphere, their batch workloads remained unchanged, creating separate code streams and duplicating efforts for development/test/operations.

The WebSphere Compute Grid allow the reinsurer to evolve their batch infrastructure using new technologies, but more importantly to streamline the code and their business and development processes, where there is little duplication across the different execution styles (bulk data-access optimizations when in batch; on-demand caching when in OLTP).

Oracle does not provide batch processing capability.

Those customers who need to run batch workloads need to invest in third party products and infrastructure to run their batch separately from the OLTP workloads.

OSGi

The WebSphere Feature Pack for OSGi Applications and Java Persistence API 2.0 made WebSphere Application Server v7 the first full JEE application server that exposed the OSGi Enterprise programming model to customers. This means developers can build applications that take advantage of the modularity, dynamic life cycle and versioning of the OSGi service platform, facilitating the sharing of libraries, component re-use, and dynamic application update and extension. This reduces complexity, and provides the greatest flexibility to maintain and evolve an application after its first release.

OSGi applications support is now part of the core WebSphere Application Server v8, complementary to the Java EE programming model and aims to enable the use of familiar Java EE technologies—for building web UI components, accessing resources, using container managed transactions and security—as well as familiar WebSphere administrative tasks for application deployment and management. The OSGi in WebSphere Application Server brings the modularity, dynamism and versioning of the OSGi service platform to enterprise web application developers.

OSGi allows developers to resolve the “Java classpath issue” by replacing the monolithic, hierarchical, class-loading architecture. With OSGi developers now can take advantage of class sharing and visibility driven by declarative dependencies—not by class loader hierarchies. See Figure 11.

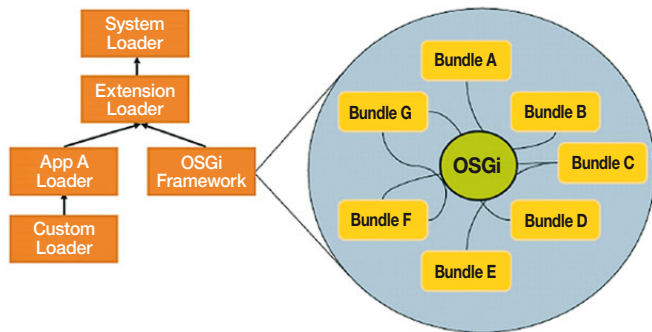


Figure 11: OSGi extends the classic class loader in WebSphere. Oracle WebLogic Server 11g does not offer OSGi support for user applications.

The added bonus is the versioning system—so that multiple versions of OSGi bundles can live concurrently within the same JVM and different versions of the same bundle can be active and used by different OSGi modules. OSGi applications in WebSphere can also take advantage of the fully dynamic service model, life cycle event notifications and dynamic application updates allowing to avoid additional downtime when parts of the application gets redeployed.

One of the IBM customers—a leading e-commerce payments management company—needed to address the challenges posed by their monolithic application that had grown over the years.

Most of the application was in a single, large deployment artifact that was complex to deploy and expensive to test. Added to that was the fact that most of the code rarely changed and yet the entire application would need to be regression tested and redeployed—no matter how small the change.

This company chose to fully exploit OSGi provided by WebSphere Application Server in their new application architecture. OSGi modularity has enabled them to split the application into self-contained pieces, each with a specific function, to enable better cross-site collaboration as team responsibilities can be aligned along module boundaries. The local SOA services model of OSGi enabled flexible module integration and removed the need for static JNDI lookups. The dynamic OSGi life cycle enabled them to update and extend their application without the need for an application restart.

Oracle WebLogic Server 11g does not offer OSGi support for user applications.

Platforms and OS support

IBM certifies WebSphere Application Server on more platforms, operating systems and databases than any other vendor. Almost all of the platforms supported by WebSphere Application Server are generally available on the first day of the general availability (GA) release, while Oracle tends to delay support for certain platforms (AIX, SuSe, and so on). Sometimes, it takes Oracle more than a year after an initial GA release of a product to support their usual set of platforms listed in the Table 3. **Note:** Oracle announced that Itanium support will be discontinued for future product releases. (TBD) Furthermore, Table 4 compares database support in WebSphere versus WebLogic.

Processor	Operating System	WebSphere Application Server 8.0	WebLogic Server 11g
x86	Red Hat Enterprise Linux 5	✓	✓
	Red Hat Enterprise Linux 6	✓	
	SuSe Linux ES 10, 11	✓	✓
	Oracle Enterprise Linux 4, 5		✓
	Asianux Server 3	✓	
	Windows XP/Vista/2003/2008/7	✓	✓
	HPUX 11i (Itanium)	✓	
	Solaris 10	✓	✓
RISC	Red Hat Ent. Linux 5, 6	✓	
	SuSe Linux ES 10, 11	✓	
	IBM i 6.x, 7.x	✓	
	AIX 6.1, 7.1	✓	✓
	HPUX 11i (PA-RISC)	✓	
	Solaris 10 (SPARC)	✓	✓
System z	z/OS v1.7-v1.11	✓	
	Red Hat Ent. Linux 6	✓	
	Red Hat Ent. Linux 5	✓	✓
	SuSe Linux ES 10, 11	✓	✓

Table 3: Operating system support for WebSphere Application Server versus WebLogic.

Note: Oracle announced that Itanium support will be discontinued for future product releases.

Database	WebSphere Application Server 8.0	WebLogic Server 11g
Oracle 10g, 11g	✓	✓
Microsoft SQL 2005, 2008	✓	✓
Sybase 15.x	✓	✓
DB2 9.x	✓	✓
DB2 for iSeries 5.x, 6.x	✓	
DB2 for z/OS 8.x, 9.x	✓	
IBM WS II Advanced 8.x, 9.x	✓	
IBM Informix DS 11.x	✓	
IMS 8, 9 on z/OS	✓	
Apache Derby 10.5	✓	
PointBase 5		✓
MySQL 5		No XA

Table 4: Database support for WebSphere Application Server versus WebLogic.

License and support costs

IBM WebSphere Application Server license and support costs are lower than Oracle WebLogic Server and IBM terms and conditions allow greater flexibility during deployment. The license terms and conditions discussed below apply in general to all IBM versus Oracle software products, not just to the application server (except where specific examples use prices):

- Per CPU license cost of WebLogic Server can be up to 35 percent higher than WebSphere Application Server (WebLogic list price is \$25,000 versus WebSphere \$18,400—depending on the processor architecture and hardware platform). See example of a price comparison in Table 5.
- IBM software support is 20 percent of the license cost versus Oracle software support being 22 percent of the license.

- IBM software comes with first year of support **included with the initial license**. For Oracle software, the first year of support is 22 percent **additional** over the license cost.
- IBM support cost is calculated based on the entitled PPA price and IBM automatically discounts support at the same rate as license costs. Oracle customers must negotiate to get a discount on support, and it typically grows back to 22 percent of the **list** price via four percent per year automatic “cost of living” increases.
- WebSphere Application Server includes the HTTP server that can be installed on separate hardware with no additional licensing costs. Oracle requires **ALL** WebLogic components to be installed on one machine. (Otherwise, additional licenses must be purchased.)

- At no additional cost, WebSphere Application Server Network Deployment includes the IBM Tivoli LDAP server, a caching and load balancer called Edge Services and the DB2 database for HTTPSession data. Oracle customers have to buy Cisco or another load balancer, as well as pay extra for the database and LDAP servers.
- Oracle charges the full license cost for “warm” backup servers while IBM provides it at no extra charge. The warm backup server is the one installed and running, ready to accept the workload, but is not handling transactions. On the other hand, a hot server simply operates as normal.
- Oracle charges **full license costs** for “cold” backup servers in a disaster recovery setup and when total failover is longer than 10 days in a calendar year. There is **no charge** for cold backup licenses with IBM WebSphere.

- Oracle does not provide special licensing when partitioning using VMware, KVM or other hypervisor software (except for Oracle VM). Customers must pay for the entire set of CPUs—no matter how few are actually running the workload. With IBM Sub-Capacity Licensing **you only pay for what you use**. For example, if you have six sockets in the server and run a virtual machine with the Java workload on one socket, with WebSphere Application Server you only pay for one license, but with Oracle you’d **pay for six** WebLogic Server licenses.
- Oracle customers must purchase WebSphere MQ Extended Transactional Client licenses to be able to communicate with remote WebSphere MQ servers with XA protocol (distributed transactions). This may add up to \$7,100 per processor to the cost of WebLogic Server. This functionality is provided by WebSphere Application Server, WebSphere Process Server and WebSphere ESB products **at no cost**, “out-of-the-box.”

IBM product				Oracle product									
	# of machines in hot cluster	Total # of PVUs	List price (100 PVU)	Sub-total		# of machines in hot cluster	# of Warm backup licenses	# of DR licenses	# of Cold Backup licenses	# of partitioning licenses	Total # of licenses	List price	Sub-total
WebSphere Application Server ND	4	2240	\$18,400	\$412,160	WebLogic Server Enterprise Edition	4	2	2	2	10	20	\$25,000	\$2,000,000
WebSphere Edge Cache (free with WAS ND)	2	1120	\$0	\$0	Oracle Web Cache (Oracle Web Tier)	2	1	1	1	6	10	\$5,000	\$200,000
WebSphere Edge WLM (free with WAS ND)	2	1120	\$0	\$0	3rd party load balancer (hw based)	2	1	1	1	4	4	\$10,000	\$160,000
DB2 UDB EE (free with WAS ND for session r)	2	1120	\$0	\$0	Oracle DB Enterprise (for session replication)	2	0	1	1	4	8	\$47,500	\$1,520,000
IBM HTTP Server (free with WAS ND)	2	1120	\$0	\$0	Oracle HTTP Server (Oracle Web Tier)	2	1	1	1	5	10	\$5,000	\$200,000
Tivoli Directory (free with WAS ND)	2	1120	\$0	\$0	Oracle Directory Services	2	1	1	1	5	10	\$35,000	\$1,400,000
Included	2	1120	\$0	\$0	WebSphere MQ Extended Transact. Client	2	1	1	1	2	2	\$7,100	\$56,800
				Subtotal - license (list price): \$412,160									Subtotal - license (list price): \$5,536,800
				Support for year 1: \$0									Support for year 1: \$1,218,096
				Support for years 2-5: \$329,728									Support for years 2-5: \$4,872,384
				Subtotal for support years 1-5: \$329,728									Subtotal for support years 1-5: \$6,090,480
				Subtotal - license (discounted): \$412,160									Subtotal - license (discounted): \$5,536,800
				Total: \$741,888									Total: \$11,627,280

Table 5: License and support cost over five years for IBM versus Oracle for a medium-size application server configuration.

Consider the configuration shown in Figure 12. **Note:** For simplicity, the virtualized and backup servers are not shown.

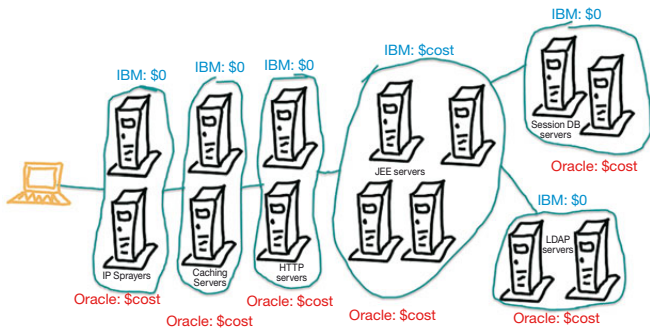
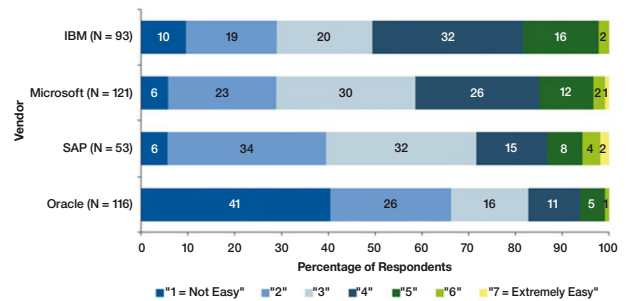


Figure 12: Configuration comparison of IBM and Oracle. Note: For simplicity of drawing, the virtualized and backup servers are not shown on the diagram.

The resulting cost difference, depending on your environment, could be very significant as illustrated in Table 5. (Table 5 assumes four machines for Application Server, two Nehalem CPUs per machine, four cores per socket, 50 percent machine virtualization.)

The prices in Table 5 do not reflect any vendor discounts. To obtain discounts from the list price, customers always negotiate with their vendors. According to industry analysis, this is yet another area where IBM leads the market. Look at this (See Figure 13.) Gartner report published in August 2009,

ID Number G00170207 titled, “How Flexible IBM, Microsoft, Oracle and SAP Have Been With Software Customers During the Economic Downturn.” According to the Gartner analysis, IBM is more flexible with its licensing, pricing and is willing to work to meet our client requirements more so than other major vendors in the market.



Total number of survey respondents: 230

Figure 13: The results of a survey in which participants were asked to, “Rate the vendors your organization has had negotiations with in the past 12 months in terms of ease of negotiation?”

TCO comparison for IBM WebSphere versus Oracle WebLogic

Table 6 summarizes the differences in TCO based on the bundled components and functions provided by respective products as well as their performance, manageability and virtualization capabilities.

Components and functions	WebSphere Application Server Network Deployment 8.0	WebLogic Server 11g
Runtime performance	Best in the industry	5% - 50% slower than WAS
Flexible mgmt for large deployments	Robust framework	No -> Extra admin cost
Manage mixed versions in a single cell	Robust admin tooling	No -> Extra admin cost
Manage DataPower and HTTPD in admin GUI	Productive admin tooling	No -> Extra admin cost
SOAP & page fragment cache w/ replication	Faster performance	No -> Extra admin cost
Eclipse toolkit for the Jython admin scripts	Productive admin tooling	No -> Extra admin cost
Cloud and virtualization capabilities	HVE, WVE, IBM Workload Deployer	Limited -> Extra admin cost
WS MQ Extended Transactional Client	Included	No -> Purchase WSMQ
Production HTTP server included	Included	No -> Purchase Oracle Web Tier
DBMS for session persistence included	Included	No -> Purchase Oracle DBMS
Production LDAP included	Included	No -> Purchase Oracle Directory
Edge components included (caching, IP sprayer)	Included	No -> Purchase Oracle Web Tier
SIP support	Included for free in WAS	No -> Purchase Oracle CCAS
Portlet API (JSR 286), WSRP 2.0	Included for free in WAS	No -> Purchase Oracle WebCenter
Native z/OS, Linux on Power	Supported	No -> Not supported
Communication enabled applications	Click to call, Co-browsing	No -> Build your own
Hypervisor pricing (VMware, KVM, XEN, and so on)	Pay only for CPU cores used	Pay for all CPUs in a server
Warm backup, cold backup (>10 days)	Free	Purchase full license
Cold disaster recovery site	Free	Purchase full license
Support cost	1st year is free, 20% thereafter	22% per year + 4% YTY increases

Table 6: Total cost of ownership comparison for WebSphere Application Server and WebLogic

Investment protection and product roadmap

Over the past 11 years, IBM has delivered a solid, market-leading application infrastructure platform based on a single runtime—WebSphere Application Server. At the same time, Oracle has changed their Java EE application server code five times, finally throwing out everything they had acquired and

build themselves and replacing it with BEA WebLogic Server. Oracle customers often have to wonder and guess as to which product is strategic? What is the roadmap? Which version of Fusion should they believe in now, and in the future? Figure 14 compares the track records of IBM and Oracle with regard to application server implementation.

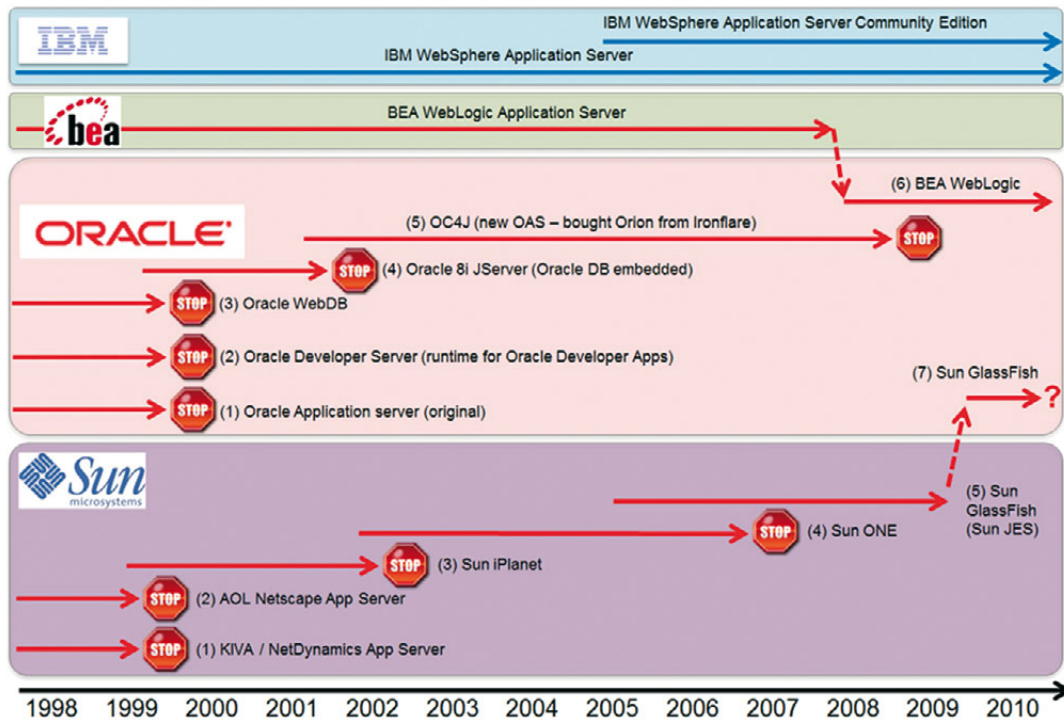


Figure 14: IBM versus Oracle historical track record with application server implementation

The benefits of moving to IBM WebSphere

First, you can save up to 57 percent on first-year licensing and support with WebSphere. Also, WebSphere enables more virtualization options such as VMware and Xen and you only pay for the cores you use when you virtualize using these technologies—which is not always true with WebLogic. So make the switch and you'll be in good company. In 2010, more than 400 WebLogic clients chose WebSphere instead. By switching to IBM WebSphere you can:

- **Protect your investments**

IBM has a long-standing commitment to preserving customers' investments. In 2011, we celebrate 11 years of WebSphere Application Server. We provide backwards compatibility for applications and runtimes, offering smooth upgrade paths and promoting reuse of existing assets.

- **Better software**

Investment protection and lower cost are compelling reasons to move to IBM platform. But remember, you get "best of breed" software. WebSphere has a number of technical advantages over competing Oracle products, including, but not limited to, better standards support, better performance, robust development tools, wide array of adapters and more.

- **Better technical support**

IBM software technical support is recognized as being higher quality than Oracle. By switching to WebSphere, you can start taking advantage of this important aspect of software ownership.

- **Lower your total cost of ownership**

IBM offers a TCO assessment for migration projects at no charge. Hundreds of customers who switched to IBM software found cost savings in the support, better performance and hardware savings as well as improved development productivity. There are many factors to consider beyond initial acquisition costs.

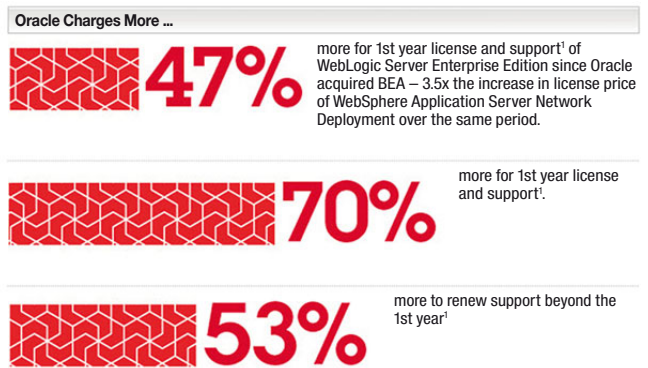


Figure 15: Migrate to WebSphere today! Why pay more—and get less?

For more information

To learn more about the process of moving from Oracle software to IBM Software and Systems, please contact your IBM marketing representative or visit the following website: <http://www-01.ibm.com/software/data/info/breakfree>

To learn more about performance tutorials and best practices for WebSphere Application Server, visit: <http://bit.ly/1Mmdpb>

To learn more about WebSphere Virtual Enterprise, visit: <http://www.ibm.com/software/webservers/appserv/extend/virtualenterprise>

To view online demos of IBM Workload Deployer, visit: <http://www.youtube.com/user/WebSphereClouds>

To learn more about IBM Application Acceleration, visit: <http://bit.ly/pmAg8o>

To learn more about IBM SmartCloud Enterprise, visit: ibm.com/services/us/igs/cloud-development/#tab:overview

IBM and our business partners have committed resources to ensuring a migration path from WebLogic Server to WebSphere Application Server and provide free migration tools and intellectual capital to assist in the process: ibm.com/developerworks/websphere/downloads/migration_toolkit.html

Additionally, IBM Global Financing can help you acquire the IT solutions that your business needs in the most cost-effective and strategic way possible. We'll partner with credit qualified clients to customize an IT financing solution to suit your business goals, enable effective cash management, and improve your total cost of ownership. IBM Global Financing is your smartest choice to fund critical IT investments and propel your business forward. For more information, visit: ibm.com/financing



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³ Sources: www.spec.org. Results current as of 11/3/11.

⁴ Source: Butler Group 2007 and <http://bit.ly/nJBjCT>

⁵ Source: IBM study <http://bit.ly/nKcNXG>

⁶ Source: http://download.oracle.com/docs/cd/E16104_01/doc.1111/e15836/toc.html

⁷ Source: The Oracle Exalogic competitive positioning white paper

¹ Cost per transaction is derived metric calculated based on the total cost of the System Under Test, including hardware and software costs over the 3 year period.

² Oracle WebLogic Server 11g and Oracle Database 11g Release 2 with Oracle Real Application Clusters and Oracle Solaris running on a four-node SPARC T4-4 cluster, each system with four SPARC T4 3GHz processors, (128 core app server, 64 core db server), 40,104.86 SPECjEnterprise2010 EjOPS vs. WebSphere Application Server V8 on IBM System x3650 M2 and DB2 on IBM BladeCenter HS22, (8 core app server, 12 core db server), 2,341.12 SPECjEnterprise2010 EjOPS.



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