



## IBM System x and IBM System Storage for the Oracle Optimized Warehouse Initiative

*IBM System x3755 and System Storage DS3400 deliver high-performance solution for Oracle Optimized Warehouse Reference Configurations*

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**Robust support for the Oracle® Optimized Warehouse with unique IBM System x™ Xcelerated Memory Technology™ and IBM System Storage™ solutions**

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**Tested and validated configurations from 1 TB to 12 TB in 3 TB building blocks**

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**Reference configurations for reliably scaling an Oracle Optimized Warehouse**

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**Reduced complexity and risk of Oracle Optimized Warehouse deployments**

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### **IBM and the Oracle Optimized Warehouse Initiative**

The Oracle Optimized Warehouse Initiative enables implementation of optimized data warehousing solutions that combine the high performance and scalability of the Oracle Database with hardware platforms such as the IBM System x and IBM System Storage products.

### **IBM System x**

The IBM System x platform provides outstanding availability and systems management capabilities that help better manage and provision your computing resources, for a responsive IT environment that can grow with your business. By investing in innovation, bringing mainframe-inspired technologies to the AMD Opteron processor-based market and providing exceptional systems management offerings, these rack-optimized System x servers are gaining momentum with Oracle customers who seek proven performance balanced with availability, manageability and flexibility in an affordable offering.

System x servers are built on proven technology supported by IBM services that help keep you running smoothly—providing peace of mind so you can concentrate on your business. Through a combination of state-of-the-art technologies and intuitive management tools, System x servers help you control your IT with fewer resources—helping save you time and money.



System x servers come with an outstanding set of system management tools, led by IBM® Director. From the beginning, System x hardware has included built-in capabilities that help to make it exceptionally easy to manage. Innovative technology helps prevent most outages from occurring and can allow the server to continue to be productive should certain malfunctions occur. Self-healing, self-protecting features effectively shift the burden from your IT staff to the server itself. These features come standard across System x servers, yet many of our competitors continue to charge extra for these “standard” capabilities.

The System x line of servers is comprised of many different models, including the System x3755, a four-socket 4U rack-optimized server designed to run complex workloads such as those found in a data warehouse environment. The IBM System x3755 provides breakthrough performance for High Performance Computing applications with Xcelerated Memory Technology function. Delivering up to 15 percent faster access to data, the x3755 provides customers with flexibility in configurations without having to sacrifice performance. Optimized to run at full speed, the x3755 excels in high-speed memory access demanded by scientific and technical computing applications. It supports high-performance, dual-core 64-bit AMD Opteron processors (up to 3.2 GHz) and can run 32-bit and 64-bit applications simultaneously, providing headroom and investment protection.

### **IBM System x reliability and availability**

Oracle data warehouse deployments are typically mission-critical applications in today's commercial environment. Server failure and downtime are not only inconvenient but also costly in terms of lost revenue and opportunity. Through continuous technology innovation, IBM System x servers offer very high reliability built upon 40 years of experience in the design of large systems, often pulling in proven technology from the other IBM server brands, such as IBM Power™ Systems. The System x platform provides high reliability to Oracle Warehouse applications through technologies such as ChipKill™ memory, Light Path Diagnostics, Predictive Failure Analysis®, multiple fans, dual power sources and the ability to use two separate memory banks to help ensure memory access should one bank of dual inline memory modules (DIMMs) fail.

### **Integrated systems management**

IBM Director, our industry-leading hardware management solution, is an open, integrated suite of software tools that provide a consistent, single point of management and automation. IBM Director forms the foundation for the management of your hardware systems, can be extended for additional capability and can integrate with and complement higher-level systems management offerings.

IBM Director also offers tools that can address IT challenges beyond IT management. The cost of power continues to grow each year, and many predict that this cost will exceed the cost of the servers themselves. To help with this problem, IBM developed IBM® Systems Director Active Energy Manager™, a tool to help you monitor and manage the energy your System x servers are really using. Now you have the ability to monitor your servers compared to their power usage rating to help conserve power in your racks and to estimate your future power requirements so you can budget for it.

IBM Director is augmented with system management extensions such as Predictive Failure Analysis, Remote Supervisor Adapter and Light Path Diagnostics. Together, they help constitute one of the best system management offerings in the market, making the System x platform the clear AMD Opteron processor-based choice for Oracle Optimized Warehouse solutions.

## **IBM System Storage**

Disk storage is a critical element in an Oracle data warehouse environment. The IBM System Storage DS3400 offers the opportunity to meet the demands of data expansion, data availability and flexibility in a simple, affordable disk system. Built with 4 Gbps Fibre Channel interface technology, the DS3400 offers good performance characteristics. You can get 1600 MBps burst throughput from cache with SAS drives and 800 MBps with SATA drives. In addition, the DS3400 gives a sustained disk-read throughput of 925 MBps with SAS drives and 380 MBps with SATA drives.

The DS3000 Storage Manager is designed for easy deployment and management of the DS3400 even by unseasoned, non-storage administrators. Because you do not have to sacrifice function for affordability, the DS3400 storage system offers powerful capabilities such as dual-active RAID controller and multiple RAID levels for a very high degree of data protection. The disk storage system enables copy and disaster recovery features such as FlashCopy® and Volume Copy that can be enabled when required by the application.

With function and availability features that come standard and a price point that does not strain the budget, the DS3400 is a simple choice for data warehousing environments based on System x servers. Other storage products require the purchase of expensive options even for basic storage configuration. The DS3400 is a ready-to-use solution that will satisfy the majority of storage needs. It helps reduce total cost of ownership through its low price point and a 3-year warranty on parts and labor.

## **IBM Systems support for the Oracle Optimized Warehouse Initiative**

IBM Systems support for the Oracle Optimized Warehouse Initiative enables clients to quickly and easily implement Oracle data warehouse solutions. The initiative includes reference configurations and Oracle Optimized Warehouses built from industry-leading components such as the IBM System x, Power Systems and System Storage products.

- IBM Systems and the Oracle Optimized Warehouses provide validated and easy-to-deploy data warehouse solutions.
- IBM Systems-based reference configurations for the Oracle Optimized Warehouse provide a high degree of flexibility and choice to help design your data warehousing infrastructure.

## **Oracle Optimized Warehouses**

Oracle Optimized Warehouses deliver validated and tested configurations for data warehousing solutions. The solution described in this brochure was jointly architected by IBM and Oracle, providing a higher level of quality assurance and performance. The combinations marry the enterprise-class capabilities of Oracle Database Enterprise Edition and Oracle Real Application Clusters (RAC) with validated hardware configurations optimized for data warehousing. Oracle Optimized Warehouses are designed for rapid implementation and can quickly provide you with a highly available, scalable and secure data warehousing solution.



## Oracle Optimized Warehouse Reference Configurations

Oracle Optimized Warehouse Reference Configurations are balanced systems designed for Oracle-based data warehouse solutions deployed to a variety of operating systems and platforms. The design specifies the hardware model, number of nodes, number of processors per node and amount of memory, and also defines storage, I/O, and networking configurations. These designs are optimized for predetermined data warehouse workloads and capacities. By leveraging reference configurations suited for different usage profiles, you can select the one that best suits your specific price, performance and availability requirements. The wide variety of platform choice enables you to easily integrate the right configuration into your existing IT infrastructure and utilize reference configurations as low-risk, implementation starting points.

### Oracle Optimized Warehouse Reference Configurations on IBM System x and System Storage

The Oracle Optimized Warehouse Reference Configurations implemented on IBM technology takes the guesswork out of implementing an Oracle data warehouse in a clustered environment. These solutions provide customers with a validated alternative of IBM System x3755 servers and IBM System Storage DS3400 storage modules with Oracle Database 10g and Oracle Real Application Clusters configured for a real-world data warehouse environment.

An Oracle Optimized Warehouse Reference Configuration implemented on IBM technology has the ease of use of a data warehouse appliance; simply hook it up to power, plug in the network and start loading data. The architecture provides the business user with a high-performance query engine that offers all of Oracle's strengths, which alternative appliances might not provide, including:

- Support for the full breadth of data warehouse applications, from data marts to operational data stores and enterprise data warehouses
- Enterprise-ready security
- 24x7 availability with integrated backup and recovery
- Complete integration and interoperability with business applications

An Oracle Optimized Warehouse Reference Configuration implemented on IBM technology allows business intelligence users to focus on data analysis and mining and alleviates the traditional IT management overheads. It doesn't matter what techniques are required to sift through the vast quantities of data; be it brute force I/O, complicated rollups, aggregations or statistical functions, a reference configuration implemented on IBM technology platforms has the flexibility to meet all these challenges.

### IBM Systems offerings deliver high performance for business-critical applications

Business intelligence and data warehouse systems are at the heart of most businesses. Performance and scalability are critical because of the amount of the data involved and the complexity of the analysis of this data. Business intelligence throughput depends heavily on the design and implementation of processor, memory and disk I/O technologies. Business intelligence applications tend to be very I/O intensive because they can potentially read many terabytes of information.

As a result, these systems require a balanced configuration of servers and storage devices that can support the very high performance requirements in a consistent fashion. The foundation of the IBM Oracle Optimized Warehouse Reference Configurations is balanced 3 TB data warehouse building blocks, built on IBM System x technology, the IBM System Storage DS3400, Oracle Database 10g R2, Oracle Real Application Clusters and Oracle Automatic Storage Manager.

System x servers and System Storage products provide the features that are ideal for designing balanced business intelligence (BI) applications. With terabytes of information to aggregate and summarize, most BI deployments can be I/O-bound. Businesses should choose servers that have memory and CPUs capable of driving the required disk throughput. The latest IBM System x servers deliver powerful processor capability and I/O bandwidth.

### IBM System x3755 and System Storage DS3400 building blocks

IBM offers several building blocks for Oracle Optimized Data Warehouse Reference Configurations installations. The two basic building blocks are designed for 1 TB or 3 TB of data. The IBM System x3755 is the server of choice for these configurations, and the IBM DS3400 is the storage product used. These are referred to as a single-building-block configuration. An installation can have multiple building blocks, using the 3 TB configuration as a building block. Oracle Real Application Clusters is used as the cluster software to integrate this environment.

Table 1 provides details of building blocks for the Oracle Optimized Warehouse for IBM System x implementations. The building blocks described in Table 1 describe a 1 TB system and a 3 TB system.

Single-building-block reference configurations and capacities		
	Configuration One (1 TB)	Configuration Two (3 TB)
IBM System x server model	x3755	x3755
Number of servers per node	1	1
Memory per server	16 GB	32 GB
CPU type	AMD Opteron	AMD Opteron
Number of cores	4	8
IBM System Storage product	DS3400	DS3400
Disk capacity (raw / usable in TB)	4.27 / 3.74	11.4 / 9.98
Oracle software and licenses	Oracle Database Oracle RAC Oracle ASM	Oracle Database Oracle RAC Oracle ASM
Operating system	Red Hat Linux®	Red Hat Linux

Table 1. Single building blocks for the Oracle Optimized Warehouse Reference Configurations

Table 2 provides details of multiple building blocks for the Oracle Optimized Warehouse Reference Configurations for IBM System x implementations. The building blocks described in Table 2 are multiples of the 3 TB single-building-block configuration.

<b>Multiple-building-block reference configurations and capabilities</b>			
<b>Number of building blocks</b>	<b>1-building-block configuration</b>	<b>2-building-block configuration</b>	<b>4-building-block configuration</b>
Raw atomic user data	3 TB	6 TB	12 TB
Architecture	AMD Opteron	AMD Opteron	AMD Opteron
Number of servers x model	1 x IBM System x3755	1 x IBM System x3755	1 x IBM System x3755
CPU type	AMD Opteron 3.2 GHz	AMD Opteron 3.2 GHz	AMD Opteron 3.2 GHz
Total CPU cores	8	16	32
Total memory	32 GB	64 GB	128 GB
Disk capacity (total raw/usable)	11.4 / 9.98 TB	22.8 / 19.96 TB	34.2 / 29.94 TB
IBM System Storage product	DS3400	DS3400	DS3400
Oracle software	Oracle Database Oracle RAC Oracle ASM	Oracle Database Oracle RAC Oracle ASM	Oracle Database Oracle RAC Oracle ASM
Operating system	Red Hat Linux	Red Hat Linux	Red Hat Linux

Table 2. Multiple building blocks for the Oracle Optimized Warehouse Reference Configurations

## The IBM and Oracle alliance

IBM and Oracle have been working together to solve clients' business problems since 1986. The two companies have over 19 000 common installations ranging from small to very large enterprises. The combination of Oracle Warehouse expertise with IBM's comprehensive portfolio of services, optimized hardware and middleware software has helped clients reduce their total cost of ownership and mitigate risk. IBM's service organization, IBM Global Business Services, is an Oracle Certified Advantage Partner and has a proven track record with over 5000 experienced professionals that have completed over 7500 Oracle projects.

IBM and Oracle continually enhance the alliance to ensure they are helping companies respond quickly to constantly shifting market conditions and client demands. This is accomplished through the delivery of industry-specific hardware and software solutions, optimized to the client's environment. This brochure describes yet another such solution, namely the availability of Oracle's Optimized Warehouse on IBM System x and IBM System Storage products.

## Summary

One of the major areas of concern for business is the effort involved in architecting, developing and deploying complex warehouse solutions. The Oracle Optimized Warehouse Reference Configurations running on IBM System x and System Storage platforms is the best hardware choice for clients choosing to run an Oracle data warehouse.

## Disclaimer

This document reflects the understanding of the IBM Oracle International Competency Center (ICC) regarding IBM server and storage products running the Oracle Optimized Warehouse solutions. It was produced and reviewed by the members of IBM Oracle ICC and other IBM professionals.

The information in this paper is intended to provide guidance for those choosing IBM System x and IBM System Storage products to implement an Oracle Optimized Warehouse Reference Configuration environment. It discusses findings based on validation tests under laboratory conditions. As a result, these findings may not be realized in all customer environments and the implementation suggested in this paper may require additional steps, configurations and performance analysis.

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## For more information

To explore other System x platform, System Storage platform, and Oracle data warehouse solutions or to find out more about other joint solutions from IBM and Oracle, please contact an IBM sales representative at 1 866 426-9989, or visit us at:

[ibm.com/solutions/oracle](http://ibm.com/solutions/oracle)

For more information about the IBM System x products, visit:

[ibm.com/systems/x](http://ibm.com/systems/x)

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For more information about IBM System Storage product compatibility with the Oracle database, visit:

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When referring to storage capacity, GB = 1,000,000,000 bytes and TB = 1,000,000,000,000 bytes. Accessible capacity is less.

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