IBM Power Systems for Oracle Business Intelligence

Robust systems for Oracle Business Intelligence

Incorporates IBM Power™ Systems and System Storage™ products into the Oracle Business Intelligence Reference Architecture

Innovative POWER7™ processors with TurboCore for maximum database performance

Provides repeatable, balanced building blocks for scaling out or scaling up of the Oracle Business Intelligence Solution

Reduces the complexity and risk of deployments

Power your planet

New POWER7™ processor-based systems represent a true leap forward to more intelligent systems that minimize complexity, automate processes, and reduce energy consumption, downtime and other operational costs. On a smarter planet these are the only benchmarks that matter. Featuring an innovative multi-core, 45 nanometer design, running at speeds of over 4.1 GHz, with up to 8-cores per socket, and four threads per core, POWER7 systems combined with IBM systems software, middleware and storage deliver unprecedented performance for both transactional and throughput computing.

Only IBM builds systems and systems software together, from the ground up

A totally integrated approach to the design, development, and testing of each and every Power® server ensures the resiliency required for today’s IT infrastructure. All POWER7 server models include innovative reliability, availability and serviceability features that help you avoid unplanned downtime. And, with Capacity on Demand, Hot-Node Add and Hot-Memory Add—Power Systems™ enterprise servers ensure you can keep your most important applications available, even as you add capacity to handle new business demands. Power Systems are also optimized with the ability to securely run multiple applications on AIX®, IBM i and Linux® operating systems on a single server—so you can manage fewer systems with lower cost and higher utilization. No longer do you need to manage complex and energy inefficient server farms with each server dedicated to a single application or operating environment. Now you can consolidate workloads and significantly reduce costs throughout your infrastructure, while dramatically improving your ability to meet changing processing demands.
Power Systems software™ options enable you to manage both physical and virtual environments, including the capability to control data center energy usage and orchestrate processing resources to better meet business goals. And, Power solutions are designed to provide you with a roadmap to continuous availability of mission-critical applications—even when an expected or unexpected interruption occurs.

**Power is effortlessly balancing hundreds of workloads**

POWER7 processor-based systems—the first generation of systems built for a smarter planet—offer balanced systems designs that automatically optimize workload performance and capacity at either a system or virtual machine level. Features include:

- TurboCore for maximum per core performance for databases
- MaxCore for incredible parallelization and high capacity throughput
- Intelligent threading technology to utilize more threads when workloads benefit
- Intelligent Cache technology to optimize cache utilization, flowing it from core to core
- Intelligent Energy to maximize performance dynamically when thermal conditions allow

**Power is virtualization without limits**

As businesses look for ways to maximize their IT infrastructure investment returns, they turn to PowerVM™ virtualization to consolidate multiple workloads onto fewer systems—increasing server utilization and reducing cost. PowerVM provides a secure and scalable virtualization environment for AIX, IBM i and Linux applications built upon the advanced RAS features and leading performance of the Power Systems platform.

PowerVM offers Micro-Partitioning™ with the ability to run up to 10 partitions per processor core, and dynamically move processor, memory, and I/O resources between partitions to support changing workload requirements. PowerVM Live Partition Mobility enables active partitions to be moved between servers, virtually eliminating planned downtime. Live partition mobility can also be used to upgrade workloads between POWER6® and POWER7 processor-based servers without an application outage. VMControl™ complements PowerVM by providing automated virtualization management that minimizes time to provision virtual machine images and enables management of system pools. With POWER7, PowerVM and VMControl virtualization software will support up to 1,000 virtual machines on a single system, providing massive consolidation capability for exceptional costs savings.

**Power is management with automation**

With platform management technologies on Power Systems, businesses not only get a complete picture of their systems and how well they are operating, but also the tools to deploy, optimize and maintain these systems at maximum effectiveness and efficiency. The result is optimized workload performance, energy efficiency and cost control. On Power Systems, server virtualization management is integrated with network and storage management for complete resource control.
IBM System Director Editions for Power are sized for every data center. It’s now simpler than ever for a single operator to manage both physical assets and virtual resources. With IBM Systems Director for platform management and Tivoli for enterprise service management solutions, Power Systems offer a unified systems management solution that can improve service delivery. VMControl provides automated virtualization management and minimizes the time it takes to provision virtual images and manages system pools.

**Power is resiliency without downtime**

Power Systems solutions benefit from decades of IBM experience in designing and deploying high availability hardware and software. PowerHA™ System Mirror disk clustering solutions are available to help keep your systems—and your business—running 24x7x365. PowerHA SystemMirror for AIX and IBM i Editions are datacenter and multisite resiliency solutions designed to help protect critical business applications from outages: planned or unplanned.

**Power is dynamic energy optimization**

Power Systems energy management solutions monitor and control energy usage to help you manage energy efficiency in your data center. Each Power server has EnergyScale™ technology built into the POWER7 processor. Through consolidation and virtualization with PowerVM, businesses have realized dramatic energy savings. And, with IBM Systems Director Active Energy Manager™, you can identify trends in your energy usage and thermal profile, turn off processor cores or limit the energy draw across one or a group of Power servers, and track environmental data from applications used to monitor air conditioning units, Uninterruptible Power Supplies and Intelligent Power Distribution Units.

**IBM System Storage**

Disk storage is a critical element in an Oracle Business Intelligence environment. IBM Storage solutions provide the capabilities needed to help organizations reduce cost and mitigate risks while managing continued information growth and service level demands. Dynamic environments, such as Oracle Business Intelligence, require scalable, always-on information services delivered by a robust information infrastructure foundation.

**IBM Systems for Oracle Business Intelligence**

The term Oracle Business Intelligence (BI) describes a set of technology and application products from Oracle Corporation that provide the necessary tools to collect, access and analyze information about enterprises. Several products are included in the Oracle BI product set, such as Oracle BI Enterprise Edition, Oracle BI Standard Edition, Oracle Warehouse Builder, Oracle Essbase, and so on. For a complete list and description of the products, see the Oracle’s Web site at: www.oracle.com/BI
In this document we will be focusing primarily on Oracle BI Enterprise Edition, sometimes referred to as Oracle BIEE or OBIEE. This product is based on a product called Siebel Analytics, developed and sold by Siebel Corporation. Siebel was acquired by Oracle in 2006. Oracle BIEE is a comprehensive set of tools that can be used to analyze enterprise information, providing the business decision-making capabilities. Oracle Business Intelligence Enterprise Edition software includes a set of analytic applications such as interactive dashboards, full ad hoc queries and analysis, proactive intelligence delivery and alerts. It also includes Business Intelligence Infrastructure, which integrates with any data source, extraction, transformation and load (ETL) tool. This comprehensive set of products is designed to enable insight-driven actions and intelligent client interactions and as such, these solutions are tailored to the unique client analytic needs.

The key elements of the reference architecture are:

- **The software architecture**, which defines the overall structure and relationships among the key functional elements of the data warehouse, the Infrastructure software and BI Server repository
- **The systems architecture**, which defines a proven approach ensuring a balanced set of system resources are in place to deliver expected performance based on the primary drivers of data warehouse performance, including computer power, network bandwidth, and storage capacity and bandwidth

The software architecture is made up of three primary components or groups. The first group consists of the components of the data warehouse. These include the relational database (Oracle’s latest Enterprise Edition release with Partition Management), storage management (Oracle Automatic Storage Management product for logical volume management of the database objects) and ETL functions (Oracle Warehouse Builder).
The second group within the software architecture consists of the infrastructure including administration and management (Oracle Enterprise Manager), cluster control (Oracle Real Application Clusters [RAC]), as well as hardware (IBM Power Systems servers) and storage (IBM System Storage offerings).

The third software architecture group consists of the BI Server repository (Oracle BI Enterprise Edition) and the individual applications that the client uses to access the data warehouse. These applications can be specific Oracle applications or third-party tools from other vendors.

**IBM Power Systems platform for Oracle Business Intelligence**

Business intelligence systems are at the heart of most businesses. Performance and scalability are critical because of the amount of the data and the complexity of the analysis of this data. Business intelligence throughput depends heavily on the design and implementation of processor 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 enterprise data systems require servers and storage devices that can support the very high performance requirements.

The foundation of the Oracle Business Intelligence Enterprise Edition platform is the BI server that is designed to be highly scalable, optimizing concurrency and parallelism. The BI server is central to all of the business processes that require information, including dashboards, ad hoc queries, intelligent interaction capabilities, enterprise and production reporting, financial reporting, OLAP analysis, data mining, and other Web service-based applications.

For improved performance, the BI server should have on-demand processor and memory capabilities, and the database management system must be able to dynamically reconfigure its resources to accommodate possible shifts in processing. To process large volumes of data quickly, the database management system must be able to support parallel, large-table-full-table scans for data warehouse aggregation.

IBM Power Systems servers and IBM System Storage offerings provide the features that are ideal for the balanced design of business intelligence applications. With terabytes of information to aggregate and summarize, BI deployments could be I/O-bound. Businesses should choose servers that have memory and processors capable of driving the required disk throughput. This is the essence of the “balanced design.” The latest Power Systems POWER7 processor-based servers have unprecedented processor capability and I/O bandwidth.
Large cache sizes can be very important for the performance of Oracle data warehouses and therefore it is advisable to use processors with the largest available L1 and L2 caches. Oracle data warehouse systems make use of the L1 and L2 caches when sorting and when short queries are heavily used. In addition, large queries to the data warehouse tend to generate heavy sequential read operations which may cause heavy disk I/O. A well designed BI solution should be architected to handle both of these types of workloads.

In addition to I/O bandwidth and raw processor speed, Oracle Business Intelligence Enterprise Edition on a Power Systems platform also benefits strongly from the advanced scalability and partitioning functions of the server and operating system. Partitioning regulates resource consumption, enabling the significant variations in BI workload to result in cost reductions. Partitioning also allows installations to deploy test and development environments in a simple and efficient manner.

### Table 1. Power 770 peak bandwidth estimates

<table>
<thead>
<tr>
<th>Memory</th>
<th>Bandwidth</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1 (data) cache</td>
<td>168 GB/sec</td>
</tr>
<tr>
<td>L2 cache</td>
<td>168 GB/sec</td>
</tr>
<tr>
<td>L3 cache</td>
<td>112 GB/sec</td>
</tr>
<tr>
<td>System Memory 4x enclosures</td>
<td>136 GB/sec</td>
</tr>
<tr>
<td>Inter-node / buses (4 enclosures)</td>
<td>236 GB/sec</td>
</tr>
<tr>
<td>Intra-node / buses (4 enclosures)</td>
<td>473 GB/sec</td>
</tr>
<tr>
<td>Internal GX bus 1 and 2: 4x enclosures</td>
<td>19 GB/sec</td>
</tr>
<tr>
<td></td>
<td>78 GB/sec</td>
</tr>
<tr>
<td>External GX bus 1 and 2: 4x enclosures</td>
<td>39 GB/sec</td>
</tr>
<tr>
<td></td>
<td>157 GB/sec</td>
</tr>
<tr>
<td>Total I/O bandwidth (four enclosures)</td>
<td>236 GB/sec</td>
</tr>
</tbody>
</table>

Figure 2 and Table 1 provide an overview of the peak bandwidth available with the Power 770 server.
IBM Power Systems servers show world-class scalability, in part inspired by technology advances in the mainframe environment. The Power Systems platform provides this scalability using wider, faster buses and a flat memory model. In addition, the AIX operating system has been enhanced to reduce lock contention and to provide advanced thread scheduling.

Oracle BI deployments are typically mission-critical applications in today's commercial environment. Server failure and downtime are not only inconvenient but also highly costly in terms of lost revenue and opportunity. Power Systems servers offer unmatched reliability features built upon 40 years of innovation in design of large systems. The Power Systems platform provides these high-reliability features to Oracle BI applications through technologies such as First Failure Data Capture (FFDC), Dynamic Processor Deallocation and Processor Instruction Retry.

Through continuous technology innovation, Power Systems servers provide high-availability features on a scalable platform for the Oracle BI and Oracle Data Warehouse environments.

**How to size Oracle Business Intelligence Enterprise Edition**

Sizing in this document refers to the estimation of hardware resources required to support the Oracle Business Intelligence Enterprise Edition software. Given the breadth and scalability of this product, sizing is an important task and should be given careful consideration. IBM realizes the need for clients to have the means of determining the necessary hardware resources to run their business intelligence environment. Financial considerations drive the need for an accurate sizing, in addition to administrative and support concerns. IBM has a process for sizing future hardware requirements.

The process includes IBM’s sizing tool, IBM’s sizing questionnaire, sizing metrics and a sizing methodology. These are continually reviewed to provide the best possible estimate of the IBM hardware resources required to support Oracle Business Intelligence Enterprise Edition. Guidelines are derived from scalability benchmarks and sizing tests performed at various IBM and Oracle laboratories throughout the world. In addition to the laboratory tests, actual client experiences are applied to the sizing methodology.

The IBM process for sizing Oracle Business Intelligence is an iterative process in which information is gathered from the client and used to complete the sizing questionnaire. For best results, use input from various sources to complete the questionnaire, including the organization’s business experts, consultants, and other software companies’ representatives during the input validation. For example, it is important to know which type of Oracle BI clients will be implemented as well as having some idea of what types of campaigns and marketing strategies will be utilized. Once completed, the sizing questionnaire input is processed using the sizing tool and the output is reviewed by the IBM team of BI experts. These experts will recommend the appropriate IBM hardware and will assist in providing an appropriate architecture for the client’s requirements.
The IBM sizing process is used to estimate the resources required to support one or more of the following scenarios:

- New Oracle BI installations
- Additional applications for an existing Oracle BI production environment
- Migrations to new IBM hardware, such as Power Systems or System x® platforms
- Upgrades to new Oracle BI software versions

To start the sizing process, download the questionnaire from and follow the instructions on the cover page. The questionnaire provides information on what needs to be completed and where to send the completed information for processing. Please work with your local IBM account representative or IBM Business Partner in order to obtain a sizing estimate. The sizing questionnaire is available at:

ibm.com/erp/sizing

On the page that contains the sizing questionnaire, you can find instructions on how to obtain the Oracle BI Quick Sizer. This is a simplified tool that provides general sizing guidelines for the database tier only and shows possible IBM hardware configurations for running Oracle BI. It is not a substitute for the IBM sizing process described above but can be a complement, or starting point, for a high-level sizing estimate. For a complete sizing estimate for all tiers in an Oracle BI configuration, use the full IBM sizing process for Oracle BI as described above.

Another option for sizing estimation is the Siebel Fast Path Sizing Questionnaire, a tool developed by IBM with assistance from the former Siebel Corporation. It can provide a quick high-level estimate of the amount of Power Systems or System x server resources needed. This tool was widely used for quick sizing of the former Siebel Analytics product. Oracle BI EE is based on that Siebel Analytics product and includes additional enhancements. Given the breadth and scalability of Oracle BI Enterprise Edition, a client can use the Fast Path Sizing tool to get a high-level estimate of hardware resources required, and then follow up with a custom sizing in order to provide a more realistic picture of the necessary resources. This follow-up also gives the client an opportunity to interact with an IBM expert in assisting with the architectural needs of the product.
Summary
One of the major areas of concern for business is the effort involved in architecting, developing and deploying Oracle Business Intelligence solutions around ETL and analytic applications. With the IBM Power Systems platform, high resource utilization reduces the number of machines needed, and greater flexibility increases the productivity of developers and testers.

The IBM and Oracle alliance
Since 1986, IBM and Oracle have partnered to create smart, serious innovation that's helping to shift the world. More than 140,000 joint clients benefit from the strength and stability of the Oracle and IBM alliance, which offers technology, applications, services, and hardware solutions that mitigate risk, boost efficiency, and lower total cost of ownership.

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 who 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.

For more information
To explore other Power Systems, Storage Systems and Oracle Business Intelligence 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

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