IBM Power Systems for Oracle Database 11g

IBM Power Systems servers and blades – the smart choice for your Oracle Database projects

Fostering smart innovation through the IBM and Oracle alliance

Delivering new services faster via joint IBM and Oracle testing, planning, and support

Delivering proven POWER7 performance for Oracle Database workloads

Delivering higher quality services with PowerHA and AIX – IBM’s market leading, open standards-based UNIX operating system

Providing scaling choices - vertically with Oracle Database or horizontally with Oracle Database and Oracle RAC (Real Application Clusters)

Exploiting superior economics with PowerVM virtualization

Performance redefined

Everyone knows what ‘performance’ meant for IT in the past. Built on the foundation of IBM POWER7® processor technology, IBM Power Systems™ servers and blades continue to excel and extend industry leadership in these traditional benchmarks of performance for UNIX® applications based on Oracle Database.

But the IT landscape is evolving rapidly. And, as processes become more inter-related and complex, IT is being called upon to solve challenging new problems and measure them in new ways. Today’s IT projects must be measured against business performance with emphasis on higher service levels and delivering results in a more cost effective manner. IBM has the systems, AIX® operating system, and expertise to help clients implement Oracle Database projects that make their IT an enabler of innovation and a catalyst for business change.
Deliver services faster, with higher quality and superior economics

Today's IT performance means delivering services faster, with higher quality and with superior economics. The emerging measures of IT performance are around agility and the ability to help the business capitalize on new opportunities. IT is expected to do more with less and find the lowest cost solutions possible. New measurements focus on building an infrastructure that can support rapid changes in business volume and manage business risk more effectively—all while providing higher service levels to users.

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.

Power architecture

Today’s businesses require a new approach to process the vast amount of data created from connected devices and their users. This “big data” must be analyzed and insights delivered in real-time to be effective. Systems must be optimized to each unique workload to deliver maximum competitive advantage.

POWER7 processors provide the foundation for designing workload optimized systems in conjunction with software and expert domain knowledge. To achieve maximum performance, POWER7 processor-based systems are designed with workload optimizing technologies. For example, Intelligent Threads technology dynamically switches the processor threading mode to deliver optimal performance for different workloads. TurboCore mode also offers the option to optimize the system for frequency and cache utilization delivering the maximum per core performance for database and transaction workloads.

Power is virtualization without limits

Businesses use virtualization not only to reduce the costs and maximize their IT infrastructure investments, but also to provide more flexibility, higher application availability and improve response time to business needs. The unique capabilities of PowerVM™ virtualization are enabling businesses to achieve extremely high levels of sustained utilization—80 percent to 90 percent in some cases—while delivering greater flexibility in deploying your virtual machines—all built upon the advanced resiliency features and uncompromising 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—no matter what size of partition you are running—virtually eliminating application downtime for planned systems maintenance. Live partition mobility can also be used to upgrade workloads between POWER6® and POWER7 processor-based servers without an application outage.

**IBM AIX 7.1**
AIX 7 is an open-standards-based UNIX OS that is designed to comply with the Open Group’s Single UNIX Specification Version 4. The latest version of AIX, version 7, is binary compatible with previous versions of the AIX operating system, including AIX 6™, AIX 5L™ and even earlier versions of AIX. This means that applications that ran on earlier versions will continue to run on AIX 7—guaranteed¹.

AIX 7 expands vertical scalability to support partitions with 256 processor cores and 1024 threads to handle the largest workloads. To support higher performance for large workloads, AIX 7 will also include new Terabyte segment support which leverages memory management capabilities of POWER7 processors designed to improve memory performance.

AIX 7 also includes many new enhancements for virtualization, clustering, security administration, and system manageability. To find out about the many new enhancements in AIX 7 please visit the web site shown in the “For more information” section near the end of this document.

**Oracle Database 11g**
Oracle Database 11g Release 2 is now available on the AIX operating system, including AIX 7. This latest release includes a broad range of new features and enhancements to help customers lower their IT costs and meet users’ demanding service level agreements. For example, with Oracle Active Data Guard customers can use their standby database to offload production workloads and improve performance in their production environment. Oracle Advanced Compression enables customers to compress both active and read only data, delivering compression rates of 2-4X across all types of data and applications while improving query performance. Oracle Database 11g also offers developers a choice of development tools including Oracle Application Express and Oracle SQL Developer. These development tools help streamline database application development and takes full advantage of key features such as Client Side Caching, XML processing and the storing and retrieving of unstructured files. In addition, a new Java™ just-in-time compiler to run database Java procedures faster without the need for a third-party compiler is also part of the enhancements for application development.

For a complete list of Oracle Database 11g features and enhancements please visit the links in the “For more information” section at the end of this document.
Oracle Database 11g on IBM Power Systems

Oracle Database 11g Release 2 is available on AIX versions 5.3, 6.1, and 7.1. Table 1 shows the AIX operating system levels that are supported by Oracle Database 11g Release 2. AIX 5.3, 6.1 and 7.1 each support POWER7 processors and some previous generations of the POWER® processor family.

<table>
<thead>
<tr>
<th>Oracle Database</th>
<th>AIX operating system level</th>
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<tbody>
<tr>
<td>11g Release 2</td>
<td>AIX 5.3 TL09</td>
</tr>
<tr>
<td>11g Release 2</td>
<td>AIX 6.1 TL02</td>
</tr>
<tr>
<td>11g Release 2</td>
<td>AIX 7.1 TL0</td>
</tr>
</tbody>
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Table 1: Supported levels of AIX for Oracle Database 11g Release 2

AIX and Oracle Database 11g

Oracle Database 11g is fully tested and supported to take advantage of several important features of AIX running on POWER7 processor-based servers, including:

- Execution in a PowerVM micro-partition
  - Partition size can be matched to workloads to 1/10 of a processor.
  - Processor power can be shared between partitions.
  - Capping feature allows control of usage to match a designated maximum capacity for the partition.
  - Oracle Database is fully supported with PowerVM micro-partitioning and treats these as hard partitions for licensing.

- 64 KB page size support
  - No system configuration changes are needed to enable 64 KB pages.
  - Oracle System Global Area (SGA) code was modified to take advantage of 64 KB pages.

- Use of XL C/C++ V8 compiler
  - Special compiler optimizations for POWER processors can provide improved performance.

- Exploitation of POWER7 simultaneous multi-threading (SMT)
  - One physical processor can simultaneously dispatch up to four threads.
  - SMT improves performance of an Oracle OLTP workload.
  - This feature does not affect physical processor-based licensing.

- Use of PowerVM Virtual Input Output Server (VIOS)
  - VIOS is an exclusive virtualization feature of PowerVM for Power Systems servers.
  - VIOS is fully supported in an Oracle RAC environment with Oracle Automatic Storage Management (ASM).
  - Ethernet and SCSI devices are fully supported with the VIOS.

- Up to 256 POWER7 cores and up to 1024 POWER7 threads per single database image
  - AIX 7.1 adds support for 64 to 256 cores and up to 1024 threads for one single image, this feature is supported with Oracle Database 11g.

For current status of the IBM Power Systems features supported by Oracle, including some described above, please consult with Oracle Corporation or with the IBM Oracle International Competency Center at ibmoracle@us.ibm.com.
Scale right with Oracle Database 11g and Oracle Real Application Clusters

Oracle Database 11g with Oracle RAC run packaged or custom applications in a parallel database environment that takes advantage of the processing power of multiple interconnected computers, operating as cluster. In an Oracle RAC environment, all nodes run concurrent Oracle Database instances and process transactions against shared data on the database. If a clustered server fails, Oracle Database continues running on the remaining servers. This standard Oracle RAC characteristic, combined with the superb reliability characteristics of the IBM Power Systems platform, makes this combination an excellent choice for customers looking for a highly available operating environment.

Uniquely suited for Oracle RAC implementations, the IBM Power Systems family offers you the flexibility of scaling out and scaling up within a single Oracle RAC implementation. Infrastructures that scale out rely on many smaller servers where capacity is increased by adding servers. Scaling up relies on fewer servers that can be upgraded with more processors to add capacity. Power Systems servers offer the flexibility to scale out with smaller servers for smaller workloads and scale up and out with fewer larger servers for larger workloads helping to deliver services faster based on your business need.

Sizing and capacity planning Oracle Database 11g on Power Systems

IBM has developed a proven sizing-estimation capability to aid in designing an optimal configuration for each specific Oracle Database 11g client environment. A detailed sizing estimate customized for your environment should be obtained from the IBM Techline ISV Solutions Sizing Team, accessible through your IBM or IBM Business Partner representative. You can download a questionnaire to start the sizing process from: ibm.com/erp/sizing

Power is resiliency without downtime

Power Systems solutions benefit from decades of IBM experience in designing and deploying high availability hardware and software. PowerHA® SystemMirror for AIX disk clustering solutions are available to help keep your systems—and your business—running 24x7x365.

Power is sustainable IT infrastructure

Many companies are running into floor space and energy challenges in their data center due to the explosion in data and growth in IT applications. Analysts have projected that up to 70% of large enterprise clients will face the need for major changes to their data centers in the next few years. It is becoming critical for these clients to begin to create a more sustainable and cost efficient IT infrastructure. In addition to being socially responsible, energy efficiency yields real business benefits.

The POWER7 based systems deliver extraordinary new capability to expand an enterprise's IT capability without expanding their floor space or even energy consumption. As an example the Power 795 delivers over four times the compute capacity of the Power 595 in the same space and energy envelope. POWER7 technology can potentially quadruple the capabilities of a data center without having to change the size, configuration or power and cooling infrastructure.
Power is management with automation

With IBM Systems Director 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 Storage

Disk and tape storage are critical elements of an Oracle Database environment. Designed with growth, reliability, and availability in mind, IBM System Storage® products, such as the IBM DS8000®, IBM XIV® Storage System, IBM DS5000™ series, IBM DS3000, and IBM Storwize® V7000 provide a continuum of solutions to address enterprise to business customer needs, and performance-oriented to capacity-oriented applications with Oracle Database 11g. The IBM System Storage SAN Volume Controller, an industry-leading virtualization solution, helps improve performance and simplify storage management by allowing diverse storage devices to be grouped into a common pool available to the storage area network (SAN). The new IBM Scale Out Network Attached Storage (SONAS) offers extreme scale-out capability for very large storage infrastructures requiring high availability. The IBM N series is a family of unified storage appliances supporting FC SAN, iSCSI SAN, and NFS protocols.

IBM also offers a compelling market-leading array of tape storage products to help protect Oracle data including deduplication virtual tape appliances, enterprise tape libraries, and tape drives. With IBM Tivoli® Storage Manager for Databases, these tape products are designed to provide low-cost, superior performance, and capacity attributes for data protection and unattended backup from entry-level to enterprise server environments.

Advanced copy services are delivered by the IBM FlashCopy® point-in-time copy function and are designed to help reduce application downtime through near-instantaneous internal copies of data. Whether you are using Global Mirror and Metro Mirror for the DS8000 and SAN Volume Controller, replication on the XIV, or Enhanced Remote Mirroring for the DS5000, you can get real-time remote mirroring capability for disaster recovery and backup.
For more information
To explore other Power Systems and Oracle 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

For more information about the IBM Power Systems family, visit:
ibm.com/systems/power

For more information about IBM AIX version 7.1, visit:
ibm.com/systems/power/software/aix/v71

For more information about IBM System Storage offerings, visit:
ibm.com/storage

For more information about Oracle Database, visit:
www.oracle.com/database

1 More information on the binary compatibility of AIX can be found at:
ibm.com/systems/power/software/aix/compatibility/

2 AIX 5.3 reaches end-of-support on April 30, 2012. After that date extended support is available for a fee.
This equipment is subject to FCC rules. It will comply with the appropriate FCC rules before final delivery to the buyer.

Information concerning non-IBM products was obtained from the suppliers of these products or other public sources. Questions on the capabilities of the non-IBM products should be addressed with the suppliers.

All performance information was determined in a controlled environment. Actual results may vary. Performance information is provided “AS IS” and no warranties or guarantees are expressed or implied by IBM. Buyers should consult other sources of information, including system benchmarks, to evaluate the performance of a system they are considering buying.

When referring to storage capacity, total TB equals total GB divided by 1000; accessible capacity may be less.