IBM Systems for Oracle Data Warehousing

*Increase Performance and Flexibility of your Oracle® Database Warehouse with IBM Systems*

Rick A. Kearns  
Solutions Consultant  
Oracle on IBM Systems

Marty Carangelo  
Manager IOCC  
Advanced Technical Support
Agenda

- Data Warehouse Requirement for IT Infrastructure
- IBM System p Solutions for Data Warehousing
- IBM System x Solutions for Data Warehousing
- IBM Optimized Warehouse Offerings
IT Challenges Shared by IBM and Oracle Customers

IT flexible and responsive to business changes

IT represents good value for money

IT becomes a business enabler
Oracle and IBM
The Technology Relationship
www.Oracle.com/IBM

Did You Know?

- Long History working together
  - Oracle: 20+ years
  - PeopleSoft: 17 years
  - JD Edwards: 28 years
  - Siebel: 9 years

- 20,000 + joint application customers

- Oracle is #1 database for UNIX servers
- Oracle is #1 database for Linux servers
- Strong affinity for Oracle on IBM Systems
  - IBM System p is #1 UNIX server for 11 consecutive quarters
  - IBM System x is #1 x86 high-end server (8-socket and above)


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Function

Data Sources
- Enterprise
- Unstructured
- Informational
- External

Data Integration
- Extraction
- Transforms
- Load / Apply
- Synchronize
- Transport / Messaging
- Information Integrity

Data Repositories
- Operational Data Stores
- Data Warehouses
- Data Marts
- Staging Areas
- Metadata

Analytics
- Collaboration
- Query & Reporting
- Data Mining
- Modeling
- Scorecard
- Visualization
- Embedded Analytics

Access
- Business Applications
  - Web Browser
  - Portals
  - Devices
  - Web Services

Product
- Oracle Informatica
- SAS
- Business Objects
- IBM

- Oracle
- Siebel Analytics
- Hyperion / SAS
- Business Objects
- Cognos
- Microstrategy
Product to Node Design

Informatica
SAS
Business Objects

Oracle

SAS
Siebel Analytics
Hyperion
Business Objects
Microstrategy
Cognos

 Informatica
SAS
Business Objects

Oracle

SAS
Siebel Analytics
Hyperion
Business Objects
Microstrategy
Cognos

DS4000/8000
System p/x
ETL Block

DS4000/8000
System p/x
DW Block

DS4000/8000
System p/x
Application Block

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Typical Data Warehouse

ETL

End Users

DS4000/8000

System p
System x

System p
System x

System p
System x

System p
System x

SAN

Interconnect

DS4000/8000

System p
System x

System p
System x

System p
System x

SAN

DW

DW
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IBM was the fastest growing UNIX vendor in 2007, growing 9 percent year-to-year and capturing 34.1% revenue share for Q407 according to Gartner.
Oracle Certifies for the O/S. Once certified all Power servers running the O/S are certified.
System p Technology Value To Oracle Customers

- **More Performance per Core and per System**
  - Results in smaller hardware configurations that deliver the same performance – hardware and facility cost savings
  - Saves on software costs when software is licensed by the core

- **Virtualization Technology**
  - Allows one physical server to run multiple logical/virtual servers
  - Allows customer to chose when and how to use vertical and horizontal scaling
  - Without IBM Virtualization, the only choices were horizontal scaling or buying large systems that were under utilized in order to allow growth or to absorb capacity spikes

- **Increased Utilization**
  - Do more work with fewer processors
  - Better return on investment
  - Saves on hardware and software costs

- **Roadmap**
  - We own our entire chip and system roadmap, development, and production
  - Our chips and systems are designed synergistically – development of each is done with the needs and requirements of the other taken into consideration
  - We deliver a vertically integrated solution that provides industry leading business value to our customers.
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### 4+ Socket System x Rack Servers for 2008

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Sample Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>x3755</td>
<td>Cost Optimized, Entry/Mid-Tier Applications and DB</td>
<td>ERP, CRM, Small or RAC Database, Graphics Rendering</td>
</tr>
<tr>
<td>x3850 M2</td>
<td>Compact Mid-tier Applications &amp; Small DB</td>
<td>ERP Application Logic, CRM, RAC Database, SCON, Collaboration</td>
</tr>
<tr>
<td>x3950 M2</td>
<td>Scalable Database, Server Consolidation &amp; Mission Critical Apps</td>
<td>Large SMP Database, 2-Tier ERP, CRM, SCON</td>
</tr>
</tbody>
</table>
**X³ Chipset evolves to the new eX⁴**

**Diagram Description:**
- **IA-32e Proc:**
  - 2.5 GT/s
  - IB: 2 x12
  - 667 MT/s
- **SP:**
  - 3 x8
  - 3.2 GT/s
- **SMI II:**
  - 333 MT/s
- **x64 Proc:**
  - 2.5 GT/s
  - IB: 2 x12
  - 1066 MT/s
- **SP:**
  - 3 x8
  - 5.2 GT/s
- **South Bridge I/F:**
- **Flash I/F:**
- **LPC I/F:**
- **DDR2/3 Memory DIMMS:**
- **Scalable Virtual L4 cache:**
  - 533 MT/s
x3950 M2 Provides Unique Flexibility...

**TODAY**

x3950 M2
Four Chassis 16-proc
Up to 1TB Memory

**TOMORROW***

* Requires 3 additional operating system licenses and the purchase of Real Application Clusters (RAC) licenses from Oracle.

...in a move to RAC.
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IBM Oracle International Competency Center

A presentation for the New York City Metro Oracle Users Group

Marty Carangelo
Manager IBM International Oracle Competency Center
cmarty@us.ibm.com
**Mission:** IBM maintains on-site presence to further strategic planning, development, enablement, marketing and sales support activities with the ISV. Provide technical pre-sales solution support for Oracle applications and technology with IBM platforms including: PeopleSoft, JD Edwards, Siebel, EBS, and others.

- **On-Site Resources**
  - IBM Hardware and Software Brand Experts
  - Technology Managers
  - Solutions Sales
  - Project Managers

- **Labs**
  - Located at Oracle and IBM
  - Benchmarking/Sizing tests
  - Redbooks and Whitepapers

- **Sizing Tools**
  - Creation and ownership of worldwide sizing tools and processes
  - Support the Techline resources

- **Technical Sales Support**
  - IBM Technical Sales
  - Business Partners
  - On-site briefings

- **Third level support when necessary**

- • provide worldwide solution technical mkt info & sizing meth to differentiate IBM/ISV solutions
- • provide a visible on-site presence to the ISV, customers & prospects
- • to provide technical deliverables for IBM/ISV go to market plans
- • to help drive IBM/ISV revenue
- • develop & deliver ISV specific technical sales education for IBM partners & IBM community
- • provide 3rd level technical sales support to IBM personnel on IBM/ISV related questions
How to size Oracle Applications with IBM hardware

Step 1 - Download the Sizing Questionnaire from the Web
www.ibm.com/erp/sizing

Step 2 – Certified Business Partners and IBM Specialists assist in completing

Refine if necessary

Step 3 – E-mail completed Questionnaire to the IBM Sizing Center

Step 4 – Sizing estimate is returned from Sizing Center

Direct Questions of how to obtain IBM Hardware Sizing information for Oracle Applications to 800-426-0222 or 888-426-5525 option 6 Or ibmoracl@us.ibm.com
What is a Sizing?  *(Accuracy vs Precision)*

A sizing is an estimation that includes a workload from a provider other than IBM. IBM is not responsible for the accuracy of the data contained in such a workload. Any reliance by you on the third party workload is at your sole risk and will not create any liability or obligation for IBM. If you have any questions or are unsatisfied with the third party workload information, you should contact the third party provider.

The system resources quoted to you in any sizing related communications are sufficient only for the workload(s) estimated. Other factors may require additional resources (e.g. additional non-estimated workloads, minimum configurations for RAID, allowance for growth, workspace, etc).

The information provided to you in any sizing related communications are provided by International Business Machines Corporation (IBM) as a service to you and may be used for informational purposes only.

Use of any sizing related communications is restricted to the purpose of helping you predict a possible IBM eServer model processor, memory and disk resources for a given workload. All representations of processor utilization, throughput, response time, memory, disk, and other performance data in the sizing communications are estimates and averages based on certain assumptions and conditions. No representation is made that these throughputs and their corresponding response times or other performance data will be accurate or achieved in any given IBM eServer installation environment. They are based on specific configurations and run time environments. Customer results will vary. Any configuration recommended by the sizing information communicated should be tested and verified.

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Positioning of Pre-Sales Sizing

- Pre-Sales Sizing
- Capacity Planning
- Testing

Cost

Accuracy
Important considerations when Sizing Non-OLTP Databases

Database Workloads

Workloads & Options
1. Select database workloads to estimate.
   - Generic Non-OLTP
   - N/A

2. Choose the system hardware type desired.
   - Power System
   - Modular System

3. Choose the optional hardware options desired.
   - Limit Models
   - Adjust CPU or memory weight factor
Important considerations when Sizing Non-OLTP Databases

Database Workloads

Hardware Options

1. Enter the target CPU utilization for the server(s)

2. Adjust the CPU weight factor as desired for the overall workload.

3. Adjust the Memory weight factor as desired for the overall workload.
Important considerations when Sizing Non-OLTP Databases

Database Workloads

1. What **DB and version** will be used for this workload?
2. How many DB Nodes are **to be used** for this workload?
3. How many extra **HA Nodes** do you wish to configure?
4. Size of the **raw data** of the database:
5. Default **size unit** for DB
6. Percent of database **active**:
7. Default **disk expansion factor**?
8. Please choose one of the **scenarios** for sizing:
   - Queries only
   - ETL/Batch only
   - Concurrent (Both)
## Important considerations when Sizing Non-OLTP Databases

### ETL/Batch

<table>
<thead>
<tr>
<th>Transform</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Time required for transforms</td>
<td>2 Hours</td>
</tr>
<tr>
<td>2. Input Volume (MB)</td>
<td>100 MB</td>
</tr>
<tr>
<td>3. Input row length</td>
<td>300 Bytes</td>
</tr>
<tr>
<td>4. Output row length</td>
<td>100 Bytes</td>
</tr>
<tr>
<td>5. Transform Complexity</td>
<td>1</td>
</tr>
</tbody>
</table>

### Loads (Insert Selects)

<table>
<thead>
<tr>
<th>Load</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. Time required for loading</td>
<td>2 Hours</td>
</tr>
<tr>
<td>7. Number of secondary indexes</td>
<td>2</td>
</tr>
</tbody>
</table>

### Aggregates

<table>
<thead>
<tr>
<th>Aggregate</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. Time required for aggregation</td>
<td>2 Hours</td>
</tr>
<tr>
<td>9. Number of aggregates</td>
<td>2</td>
</tr>
<tr>
<td>10. Avg aggregate size</td>
<td>0.1 GB</td>
</tr>
<tr>
<td>11. Number of secondary indexes per aggregate</td>
<td>0</td>
</tr>
<tr>
<td>12. Average row size in summary tables</td>
<td>100</td>
</tr>
<tr>
<td>13. Percent of active data to extract</td>
<td>100 %</td>
</tr>
</tbody>
</table>
Important considerations when Sizing Non-OLTP Databases

Database Workloads

non-OLTP
1. Peak vs off peak ratio
2. Percent of data touched by simple queries.
3. Percent of data touched by medium queries.
4. Percent of data touched by complex queries.

5. Query Groups
   - Active Users
   - Queries per user per day
   - Length of online day
   - Query mix
     - Simple 50%
     - Medium 30%
     - Complex 20%

Add Query Group
Reasons for Sizing Inaccuracies – (Marty’s Fab 5)

- **Reporting / General Batch Processing**
  - It is up to the users which batch jobs they submit, when they submit them and how many of all kinds they run. It is very difficult for the customer or IBM, to predict these usage patterns. Non-OLTP usually has a smaller number of users but the queries they generate are much more resource intensive. They access larger amounts of data and perform intensive function against this data.

- **Ad-Hoc Nature of Non-OLTP Workloads**
  - Queries, as in ad hoc queries, are especially difficult to size. The ultimate question is how do you size something (Ad-hoc) defined as a process defined for specific or immediate purpose often improvised or impromptu. Just the fact that you don’t know what will be asked, how often and what will be looked for makes this a difficult, no-win, scenario.

- **Data Loads, Data Transformations, Aggregations.**
  - These types of processes are needed but all Non-OLTP systems but they largely depend on how many of each you want to run, how much data each of them is processing, and how often you are going to run them. Interfaces are another type of process within this group of job however interfaces may bring data into the system, as well as taking data out of the system.

- **Security.**
  - Security setup and how many cycles it takes to authenticate can cause major performance implications for the end user community. In my example a simple company birthdays report without department level security takes 30 seconds to complete for an average sized company. With security added to only allow the submitter to see their departments and no others the time to run took 35 minutes.
Reasons for Sizing Inaccuracies – (Marty’s Fab 5)

- **Customizations.**
  - Not just ad hoc queries fall into this category. Also queries submitted from query generation tools and from developers and designers. Good coders are hard to find and is usually not written with performance in mind the first time it is developed. This code can be written poorly in many formats, like SQL, java, HTML, C and all the others.

- **Application Characterization - i.e. Budgeting.**
  - An application that often is not in the Non-OLTP category that is bundled in as part of the non-oltp system because you have process the width of data in the non-oltp database. Very heavy at the app and web and also heavy on the Intel side....

- **Purge Archive Frequency.**
  - Most customers only add data to their databases and never consider archiving older data or even purging the data. In a Non-OLTP implementation this is also something to consider. A customer who has 10 years of history data in tables and never queries more than 3 to 5 years is going to be paying a huge penalty for having to process the additional 7 to 10 years of data for their jobs. This is a huge factor in the overall performance and sizing of the system.

- **Database Maintenance tasks.**
  - These are tasks such as Backups, re-organizations, storage updates, and index creations. There can be times when this maintenance has to be completed and can cause issues with the day to day operations of the system.
Learning Points

- Sizing Recommendation – Is it Gospel?
- **Accuracy vs. Precision**
- Direction is a closed-loop process
- Recommended solution can handle defined workload
  - **If your workload in reality is different may not be able to handle**
- Changes in the ISV Application will impact solution
- Changes in technology will impact solution
- Setting the correct expectations is key!
- **Testing is the KEY !!!**
  - **If you want accuracy, then test YOUR exact workload, volumes and configurations. It’s the only way.**
## IBM Systems Reference Configurations Summary

### Oracle Optimized Warehouse Initiative

**Reference Configurations**

<table>
<thead>
<tr>
<th></th>
<th>IBM System p</th>
<th>IBM System x</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Server</strong></td>
<td>p570 (Power6)</td>
<td>x3850 M2 (Intel x86)</td>
</tr>
<tr>
<td><strong>Storage</strong></td>
<td>DS4800</td>
<td>DS3400</td>
</tr>
<tr>
<td></td>
<td></td>
<td>x3755 (AMD x86)</td>
</tr>
</tbody>
</table>

**Customer Data (Raw) Size**

**SMP Scale Up Capacity per System**

**Real Application Cluster Scale Out**

**Optimized Warehouse**
IBM Systems Architecture for Oracle Optimized Warehouse
System p 570 and System Storage DS4800

Single rack building block

Rack components

Scale out building blocks: 5TB to 20 TB

Oracle Components
• Oracle Database 10g EE
• Oracle RAC
• Oracle Partitioning

p570 server
4-core, 4.7GHz POWER6

DS4800 Controller

HMC additional

SAN Switch

storage expansion drawers

5TB

3TB

1TB

DS4800 EXP810

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DS4800 Benefits for Data Warehousing

- **Scalability** to keep pace with warehouse data growth
  - To 67 TB FC, 168 TB SATA … per DS4800

- **Performance**
  - Up to 575,000 IOPS burst from cache and
  - 1500 MB/sec sequential throughput from disk
  - 4Gbps Fibre Channel technology end-to-end …
    from host server to disk … for fastest access to data

- **Data Protection** and Continuous **Availability**
  - High availability architecture with redundant, hot-swap components
  - Multiple RAID levels
  - Remote Support Manager for “call home” support
  - FlashCopy®, Volume Copy and Enhanced Remote Mirror

- **Ease of Management, Ease of Use**
  - SAN-ready, centralized storage simplifies management
  - “Anytime Administration” and “Recovery guru”

- **Low Total Cost of Ownership**
  - Investment protection throughout DS4000 Family
  - 3-year Warranty*
  - Open, non-proprietary solution
IBM Systems Architecture for Oracle Optimized Warehouse

**System x3755 (or x3850M2) and System Storage DS3400**

**Single rack building block**

- Rack components
  - DS3400 Controller
  - DS3400 Controller
  - SAN Switch
  - x3755 server (8-core)
  - DS3400 EXP3000
  - 3TB
  - 1TB
  - Storage expansion drawers

**Scale out building blocks: 3TB to 12 TB**

- 12TB
- 9TB
- 6TB
- 3TB

**Oracle Components**
- Oracle Database 10g EE
- Oracle RAC
- Oracle Partitioning
IBM System Storage DS3400 Overview

- Direct attach or SAN solution
- External storage solution for System x & BladeCenters
- Two auto-negotiating 4-Gbps host ports per controller
- Suited for building new SANs or extending existing 1-Gbps or 2-Gbps SANs
- 2U, 19” enclosure with 3.5” SAS drives
  - Expandable up to 3 EXP3000s for a total of 48 drives
  - 14.4TB max capacity 300GB SAS
- Managed by DS3000 Storage Manager
Oracle Optimized DW Competitive Comparisons

IBM System x - Optimized Warehouse
- 1/3 TB
- 1/3/5 TB
- 1/3/5 TB

IBM System p - Optimized Warehouse
- 6 TB
- 10 TB
- 15 TB
- 20 TB

HP - Optimized Warehouse
- 1-4 TB

DELL / EMC - Optimized Warehouse
- 1 TB
- 2 TB
- 3 TB
- 4 TB

SUN - Optimized Warehouse
- 10 TB
IBM System p and System x & IBM System Storage™ … the right systems for data warehousing

Lower your warehouse TCO by reducing:

- Maintenance costs
- Software licensing costs
- Electrical and cooling costs
- Downtime costs throughout your enterprise

Increase the operational efficiency of the warehouse through:

- Improvement of resource utilization
- Ability to quickly add new services to grow the warehouse on demand
- Delivery of high levels of availability, response time and security to meet business productivity requirements
Thank you.
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IBM benchmark results can be found in the IBM Power Systems Performance Report at http://www.ibm.com/systems/p/hardware/system_perf.html.

All performance measurements were made with AIX or AIX 5L operating systems unless otherwise indicated to have used Linux. For new and upgraded systems, AIX Version 4.3, AIX 5L or AIX 6 were used. All other systems used previous versions of AIX. The SPEC CPU2006, SPEC2000, LINPACK, and Technical Computing benchmarks were compiled using IBM's high performance C, C++, and FORTRAN compilers for AIX 5L and Linux. For new and upgraded systems, the latest versions of these compilers were used: XL C Enterprise Edition V7.0 for AIX, XL C/C++ Enterprise Edition V7.0 for AIX, XL FORTRAN Enterprise Edition V9.1 for AIX, XL C/C++ Advanced Edition V7.0 for Linux, and XL FORTRAN Advanced Edition V9.1 for Linux. The SPEC CPU95 (retired in 2000) tests used preprocessors, KAP 3.2 for FORTRAN and KAP/C 1.4.2 from Kuck & Associates and VAST-2 v4.01X8 from Pacific-Sierra Research. The preprocessors were purchased separately from these vendors. Other software packages like IBM ESSL for AIX, MASS for AIX and Kazushige Goto's BLAS Library for Linux were also used in some benchmarks.

For a definition/explanation of each benchmark and the full list of detailed results, visit the Web site of the benchmark consortium or benchmark vendor.

TPC http://www.tpc.org
SPEC http://www.spec.org
Pro/E http://www.proe.com
GPC http://www.spec.org/gpc
NotesBench http://www.notesbench.org
VolanoMark http://www.volano.com
STREAM http://www.cs.virginia.edu/stream/
SAP http://www.sap.com/benchmark/
Oracle Applications http://www.oracle.com/apps_benchmarks/
PeopleSoft - To get information on PeopleSoft benchmarks, contact PeopleSoft directly
Baan http://www.ssaqglobal.com
Veritest http://www.veritest.com/clients/reports
Fluent http://www.fluent.com/software/fluent/index.htm
TOP500 Supercomputers http://www.top500.org/
Ideas International http://www.ideasinternational.com/benchmark/bench.html
Storage Performance Council http://www.storageperformance.org/results

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