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MANAGEABILITY COMPARISON: ORACLE DATABASE 10G AND ORACLE 9I DATABASE

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ABSTRACT: *In this paper we performed a basic and common DBA tasks on the two products and measured the time taken and the steps required to complete each task, to assess their relative manageability. The time taken to complete the tasks was then weighted according to their frequency of use in a typical DBA workday to arrive at an overall time savings percentage.*

KEY WORD: *manageability comparison, software application, management system*

1. OVERVIEW OF ORACLE BUSINESS INTELLIGENCE SOLUTIONS

Oracle Database 10 g is the first designed for grid computing, reducing IT costs by automating management and clustering servers to dynamically allocate resources. Editorial reviews applaud Oracle's manageability, scalability, and value.

Information management systems today play an increasingly strategic role for businesses. We can exploit now the wealth of data your business collects every day to enable Corporate Performance Management and gain competitive advantage. Oracle Business Intelligence solutions deliver the right information at the right time, so you can make the right operational, tactical and strategic decisions.

Effective management of such systems, therefore, is vital to business success. With the cost of day-to-day operation and management of such systems easily outstripping their initial acquisition costs, it has become progressively more important for businesses to have systems that are easy to manage and maintain. Besides this cost of ownership factor, manageability also has serious ramifications for the availability, reliability, and maintainability of a system.

With human error accounting for more than 50% of unscheduled downtime, any system that is simple and easy to use is less likely to encounter human errors and hence will be more immune from harm that such errors can cause. For all these reasons, it is no surprise that Oracle has taken significant steps to greatly enhance the manageability of its product by making it more self-managing, more proactive, and less complex.

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Oracle Database 10g is the latest release of Oracle database software which contains a number of new features and functionalities designed to make businesses more productive.

In this study, we will analyze the manageability improvement from Oracle9i to Oracle 10g and will attempt to establish a quantitative measure for the manageability differential between the two releases. This will give Oracle customers an objective basis for calculating management cost savings due to Oracle Database 10g and allow them to ascertain the business benefits of upgrading to this new release.

The tasks performed in this study covered the following four categories:

- Installation and Simple “Out-of-Box” Setup,
- Day-to-Day Database Administration,
- Backup & Recovery, and
- Performance Diagnostics & Tuning.

The study showed that Oracle 10g made tremendous gains in manageability. The main findings of the study are summarized below:

- Oracle 10g database administrators require 50% less time than Oracle9i to perform the basic management tasks included in this study.
- Oracle 10g needed 57% fewer administrative steps than Oracle9i to complete the same DBA workload.

As the results show, compared to Oracle9i, Oracle Database 10g reduces management complexity by half and therefore, makes the administrators twice as productive. This has huge cost savings implications for businesses, not only due to greater DBA productivity, but also due to the fact that increased automation in Oracle Database 10g reduces the chances of human errors leading to higher system availability and lower training and management costs.

Oracle 10g manageability features responsible for advances made over Oracle9i covered a wide range of areas, with the most remarkable improvements coming in the performance diagnostics and tuning category. With DBA’s spending nearly a third of their time doing performance diagnostics and tuning related functions, the new automatic diagnostic and tuning engine of Oracle 10g, i.e., ADDM and SQL Tuning Advisor, completely transform the way these functions are performed and were the biggest factors responsible for making Oracle 10g easier to manage. Other areas of noteworthy improvements for Oracle 10g were software installation & configuration, space management, and human error recovery.

The study clearly demonstrates the huge leap taken by Oracle 10g over Oracle9i in the area of manageability. DBA’s can significantly lower their workload and improve the availability and reliability of their system by simply adopting Oracle 10g. With Oracle 10g, businesses can expect to lower the cost of management and improve quality of service for their users.

2. METHODOLOGY OF MEASURING OR COMPARING EASE-OF-USE OR MANAGEABILITY

As there no exists standard method of measuring or comparing ease-of-use or manageability, we have used the approach employed by a similar study conducted by Rauch Associates comparing Oracle9i Database with IBM DB21. We performed a set of basic and common administrative tasks that reasonably represent a typical DBA's workload on both Oracle9i and Oracle10g, and measured them on a common set of metrics to gauge their relative manageability. The metrics used were:

- Time: Total time that a DBA spends in carrying out the task.
- Steps: Number of steps required to complete the task.

The time metric is used to ascertain the relative management efficiency of the two products.

The quicker a DBA can complete a task, the more efficient and productive he/she will be.

It should be noted that the time metric above represents DBA time and not necessarily task completion time, since the goal is to determine DBA time savings. For example, for certain tasks such as the backup database task, the time required to setup a regularly scheduled backup job by the DBA is measured and not the actual backup time, since actual backups normally happen unsupervised at off-peak hours when the DBA could be, and normally is, doing other things.

Hence, the time savings in this task comes from simplification of backup management and this is what has been measured in the study.

The second metric, steps, is used to determine and quantify relative complexity of the two releases. This, in our opinion, is a reasonable way of quantifying complexity as it would be difficult to refute the contention that if one product requires its users to perform significantly greater number of discrete steps to complete an identical task than its counterpart, then the former is more difficult to use and hence, more complex than the latter.

Once measured, these metrics were used to perform a comparative manageability analysis of the two products. However, before interpreting these results, it was recognized that not all of the tasks in the workload are performed with equal frequency. For example, software installation is not done as often database backup. To realistically account for this, a weighted average was used to weigh each set of tasks according to their typical degree of use. A survey of database administrators was used to determine the appropriate weights for the tasks. This weighted time was then used to compare the overall relative manageability of Oracle9i and Oracle 10g.

Tasks covering all the key DBA functions were performed. The tasks were grouped in the following four categories:

- Installation and Simple "Out-of-Box" Setup,
- Day-to-Day Database Administration,

- Backup & Recovery, and
- Performance Diagnostics & Tuning.

The tasks were performed on two separate machines, one for each product, with identical parameters. The hardware and software details are as follows:

• **Hardware Platform**

- Dell single-CPU box with Intel Pentium processor, 1.7 GHz.
- Memory: 512 MB RAM
- Operating System: Windows 2000 (version 5.00.2195), Service Pack 4

• **Software**

- ✓ **Oracle9i**
 - Oracle9i Database Release 2 on Windows 2000.
 - Enterprise Manager and Packs (Oracle's bundled management tool including Diagnostics Pack and Tuning Pack)
- ✓ **Oracle 10g**
 - Oracle Database 10g on Windows 2000
 - Enterprise Manager and Packs (Oracle's bundled management tool including Diagnostics Pack and Tuning Pack)

Oracle Enterprise Manager (OEM) was the main tool used to perform the tasks for both Oracle9i and Oracle 10g. As this is the management tool that comes bundled with the

Oracle database product, it was considered appropriate to use it for the purposes of this study.

3. STUDY FINDINGS

The tables below summarize the main findings of the study. As noted earlier, two metrics were measured in this study, time and steps needed to complete each task. The first metric, time to complete task, was measured to compare relative efficiency of the two products.

The other significant improvement in the performance diagnostics and tuning category in Oracle 10g was due to the new SQL Tuning Advisor feature. This feature automates all the steps required for tuning SQL statements and gives comprehensive tuning advice, along with the exact commands for implementing the advice. A user only needs to run the advisor and then accept its recommendations to comprehensively tune SQL statements in Oracle 10g. In addition, Oracle 10g provides infrastructure for tuning multiple SQL statements together in one step using SQL Tuning Sets. In our study we only tuned a single SQL statement; hence this functionality difference between Oracle9i and Oracle 10g, which is very useful for real world environments, was not highlighted. The actual advantage of Oracle 10g in SQL tuning, therefore, is much more than what is revealed in the study results.

Table 1 shows the time comparison between Oracle9i and Oracle 10g. The time taken to complete the tasks has been aggregated by task category in order to show the

advantage one product has over the other for the different categories. The timings shown are the actual timings measured in the study and have not been weighted to reflect DBA workload savings.

	Installation & "Out-of-Box" Setup	Day-to-Day Database Administration	Backup & Recovery	Performance Diagnostics & Tuning	Total
Oracle9i	45	35	46	19	147
Oracle 10g	29	13	17	5	64
Oracle 10g Time Savings	36%	63%	63%	74%	56%
Remarks	Oracle 10g took 36% less time to complete install and simple "out-of-box" setup.	Oracle 10g took 63% less time to ongoing day-to-day administration tasks.	Oracle 10g took 63% less time to complete backup and recovery tasks.	Oracle 10g took 74% less time to complete performance diagnostics & tuning tasks.	Oracle 10g overall took 56% less time to complete all the tasks.

Table 1: Task Time (minutes) Comparison by Category

Another area where Oracle 10g has made performance tuning very easy compared to Oracle9i is in memory management. With Automatic Shared Memory Tuning DBA's no longer need to tune individual memory pools of the SGA. Just like with Automatic SQL

Execution Memory Tuning feature introduced on Oracle9i, users simply specify an SGA target size and the database automatically adjusts the sizes of the various memory pools as needed. This new Oracle 10g feature makes memory tuning a very simple exercise for

DBA's, as they only need to be concerned with 2 memory parameters (as compared to 6 for Oracle9i) whose optimal value is proactively recommended by ADDM. Thus, all a DBA has to do in Oracle 10g is to make sure that the value of the 2 memory parameters are in line with ADDM recommendations.

The last area of improvement in this category is the automation of query optimizer statistics collection in Oracle 10g. As a result, DBA's no longer have to identify objects with stale or missing statistics by regularly monitoring objects to see if they had undergone sufficient DML activity to warrant regeneration of statistics, and then collect statistics on them as needed. This task has now been entirely automated in Oracle 10g and the database itself determines what objects need new statistics and then collects them on a regular basis without requiring any user input.

These are main areas of improvement in Oracle 10g that are responsible for the considerable manageability difference between Oracle9i and Oracle 10g. The improvements are not confined to a single area but are comprehensive and cover all the major areas where DBA's spend most of their time. This across-the-board improvement in

Oracle 10g is aptly reflected in the study by the huge margins by which Oracle 10g outperforms Oracle9i.

CONCLUSIONS

Oracle 10g represents a giant step forward from Oracle9i in making the database easier to use and manage. The key factors behind Oracle 10g's superior manageability are its new intelligent self-managing infrastructure that provides proactive, self-monitoring and diagnostic capabilities, and the increased automation of many manual but vital DBA tasks such as SQL and memory tuning, space management, and performance diagnostics. Oracle 10g is the first truly self-managing database that is intelligent, automatic, adaptive, and proactive.

The study clearly demonstrates and quantifies the manageability advances made by Oracle Database 10g. Oracle Database 10g reduces the DBA management workload by more than half and the management complexity by the same factor relative to Oracle9i. This translates into more productive DBA's, more reliable systems, and significant cost savings for businesses.

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