

## **Microsoft SQL Server and Oracle® Database:**

### **A Comparative Study on Total Cost of Administration (TCA)**

A case study on the comparative costs of database administration for two of the premier enterprise relational database management systems.

*An Alinean White Paper  
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<b>EXECUTIVE SUMMARY .....</b>	<b>1</b>
Key Results .....	1
<b>STUDY METHODOLOGY AND GOALS .....</b>	<b>2</b>
Participant Profile: .....	2
Database Profiles:.....	2
Number of Databases per Company .....	3
Average Users per Database .....	3
Database Function – Workload Application .....	3
Database Availability .....	4
<b>STUDY RESULTS .....</b>	<b>4</b>
Key Ratios .....	4
Database Administrator Salaries .....	5
DBA Training .....	6
Financial Assessment .....	6
Key Task Findings .....	7
<b>CONCLUSION .....</b>	<b>8</b>
<b>ABOUT ALINEAN .....</b>	<b>8</b>

## EXECUTIVE SUMMARY

As platforms continue to evolve in the technology industry, a central concern for IT executives is implementing the right systems to maximize the return on their investments. Since labor costs dominate most IT budgets, selecting platforms with lower implementation and on-going management costs can significantly improve overall IT efficiency, and allow for the reallocation of resources from basic maintenance and operations to more innovative functions. In this paper, Alinean, an independent IT value analyst firm, examines the Total Cost of Administration (TCA) for two of the industry's leading database management offerings from Microsoft Corp. and Oracle®.

This paper discusses the findings of a recent study Alinean conducted by researching the actual costs and efforts required for one hundred organizations to manage these two database management systems. Alinean conducted in-depth interviews with 100 Directors of Database Administration and Senior level Database Administrators regarding their database environments, user populations, and database administration activities.

The survey results reveal that overall, Microsoft SQL Server required significantly less effort to install and maintain, than Oracle Database. Study participants reported that on average a Database Administrator (DBA) could manage over 30 Microsoft SQL Server databases, while Oracle Database implementations required one DBA per 10 databases. Factoring in slightly higher average salaries for Oracle DBAs, the corresponding annual cost for administration for these two databases comes out to \$2,847 per year per database for Microsoft SQL Server and \$10,206 per year per database for Oracle Database; over a 350% difference in annual costs per database.

### Key Results

Measure	Microsoft	Oracle
Average number of databases per company	107	87
Average number of users per database	328	716
Mission critical databases	66.1%	63.8%
Transaction-based databases	55.7%	60.3%
Decision-support databases	44.3%	39.7%
Databases supported per DBA	31.2	9.9
Users supported per DBA	6,784	5,567
Annual TCA per database	\$2,847	\$10,206
Annual TCA per database user	\$13.09	\$18.15

*Table 1: Key Study Findings reveal that Microsoft SQL Server has a TCA advantage over Oracle Database.*

This study focused on the key cost factor of administrators per database. In addition to this central measure, readers should consider that there are several other factors, which were beyond the scope of this study, which could influence their total database management costs. Software licensing, server hardware costs and management utilities typically consume 40% or more of any database management project's costs. Meanwhile, change costs for application integration or migration can be 20-30% of total project costs. Also, factors such as database size, complexity and transaction load, can impact overall administrative effort and costs. While TCA per database should be a major consideration in selecting a database platform, it should not be the only consideration.

## STUDY METHODOLOGY AND GOALS

This study was conducted by directly surveying one hundred (100) Directors of Database Administration and Senior Database Administrators (DBAs) from a wide variety of organizations representing fourteen different industries, and ranging from smaller companies with fewer than 300 employees to some of the world's largest companies with over 100,000 employees.

The participants were asked a series of questions regarding their database infrastructures and use, including the number of database servers installed, the average size of each database, and the number of users supported per database. Participants were also asked many detailed questions regarding the overall level of effort required by database administrators to support the Microsoft SQL Server and Oracle Database servers, as well as the average time allocations for several key operational functions.

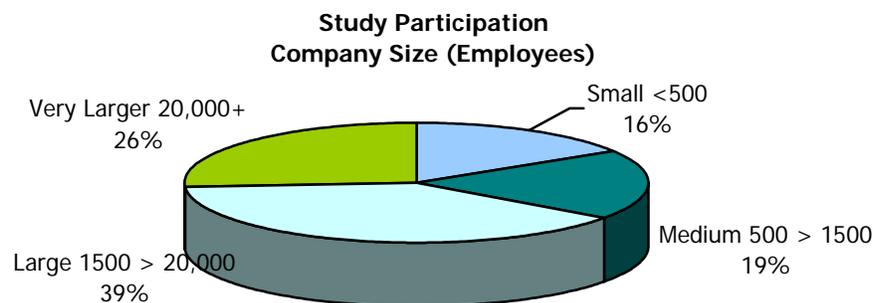
### Participant Profile:

Participants from a wide variety of industries were represented in the study. Overall, fourteen distinct industry groups were included in the study, with the largest representation coming from Banking and Financial Services and Manufacturing, each contributing 14 survey entries. Healthcare, Insurance and Government were also primary contributors with 11 participants from each of these industries.

Represented industries include:

- Aerospace and Defense
- Banking and Financial Services
- Construction and Engineering
- Education
- Government
- Healthcare
- High Technology (Hardware & Software)
- Insurance
- Manufacturing
- Media and Entertainment
- Retail
- Service Provider / Professional Services
- Telecommunications
- Transportation

Participation was also spread evenly amongst small, medium, large and very large organizations, with an average company size of 34,400 employees.



### Database Profiles:

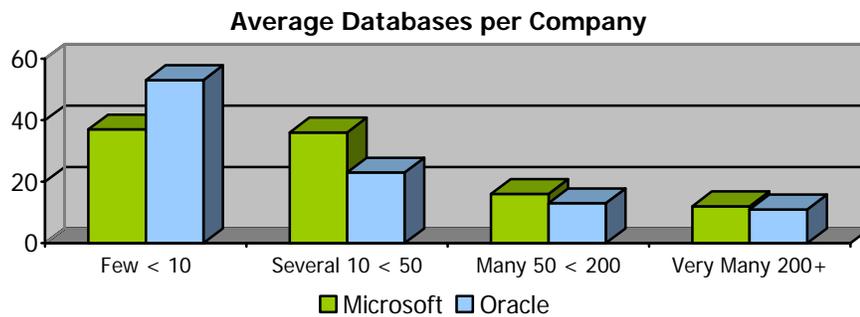
The majority of participants selected for the study, as a desired criteria, supported both Microsoft SQL Server and Oracle Databases within their enterprises, and were knowledgeable regarding both database environments and the work effort required to implement and manage both database platforms.

Alinean surveyed installed bases of both solutions including current and prior versions: for Microsoft, this included SQL Server 2000 and 2005, for Oracle this included Oracle Database 9i and 10g. The analysis focused on the latest versions, but legacy version information was collected for analysis and trending.

In assessing the effort required to manage the two database systems it was important to understand if the database systems were being used to support similar workloads. To help address this issue we compared the relative sizes of the databases, the number of users supported by the databases, the mix between transaction systems and decision support applications, and the percentage of use for mission critical applications.

### Number of Databases per Company

The first factor we examined was the number of production database servers supported in each organization. The responses reflected a fairly diverse study pool with the number of production servers ranging from a few to over a thousand for some of the larger organizations. The distributions were fairly similar for the two database systems, with the one exception that slightly over half (53%) of the organizations had ten or less production Oracle Database servers. On average organizations had more Microsoft SQL Server production servers than Oracle Database; 107 Microsoft databases verses 87 Oracle databases per organization, a ratio of 1.23 to 1.

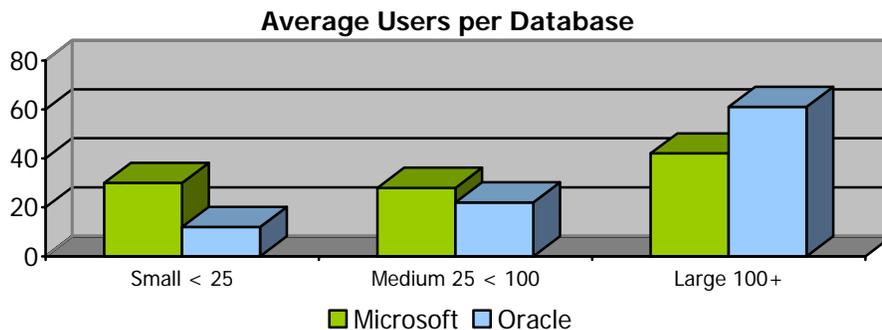


### Average Users per Database

We also examined how many users were accessing each of the respective databases. Based on the survey results there again was a significant difference between the utilization of the two database platforms.

On average there were twice as many users per server for the Oracle Databases as the Microsoft SQL Server databases; 716 average users per Oracle database, verses 328 users per Microsoft database.

While the users for the Microsoft SQL Server databases were fairly evenly split between small, medium and large populations, the majority (61%) of the Oracle Databases supported over 100 users.



### Database Function – Workload Application

In addition to examining database size and user support profiles, it is important to examine workloads and applications to see if there are significant differences in how the databases were being used within the organizations. To address this issue we asked participants about the mix in usage between transaction

based applications and decision support applications. We also asked about the percentage of databases which supported mission critical applications.

Somewhat surprisingly, when size and user support revealed significant differences, the responses did not reveal any significant differences in usage between the two database management systems. For Microsoft SQL Server, 55.7% of databases supported transaction based applications, while 44.3% of databases were for decision support applications. For Oracle Database, the split was 60.3% of databases supported transaction based applications, and 39.7% of the databases were used for decision support.

The most interesting result was that Microsoft SQL Server was being used for a higher percentage of mission critical business applications. Respondents stated that 66.1% of Microsoft SQL Server databases supported mission critical applications, while only 63.8% of Oracle Databases were classified as mission critical. While the difference in these percentages is rather small, we expected the opposite results. Clearly, participants viewed the functions supported by their Microsoft SQL Server databases just as crucial to their business operations, if not more than, those supported by their Oracle Databases.

### **Database Availability**

The final characteristic regarding use of the databases we examined was systems availability, looking for potential differences in service levels and downtime costs. We asked participants about both planned (system maintenance related) and unplanned downtime (availability).

For unplanned downtime, both databases surveyed indicated lower than anticipated availability. Participants reported an average of 30.9 hours of annual unplanned downtime per Microsoft SQL Server database, and 27.5 hours per year for Oracle Databases, yielding 99.65% and 99.69% annual availability respectively.

Although both databases performed equally on unplanned downtime outages, as analysts we expected 99.9% or higher availability. With average downtime for infrastructure databases costing as much as \$42,000 per hour in productivity losses and transaction oriented systems averaging \$400,000 per hour in transaction revenue for large organizations, downtime costs could range from \$1.2M to \$12M per year based on these availability metrics.

Planned downtime for systems maintenance showed slightly more variance, particularly surprising when comparing relative database size and usage. On average Microsoft SQL Server databases experienced 72 hours of planned downtime per year, while Oracle Databases only required 61.2 hours of planned downtime.

## **STUDY RESULTS**

### **Key Ratios**

The most important measurement in this study is the ratio of database management systems per database administrator. This measure is the most direct indication of the work effort required for the management of the two database systems. Participants consistently reported that DBAs were able to manage significantly more Microsoft SQL Server databases than Oracle Databases. On average Microsoft DBAs were able to manage 31.2 database systems per DBA, while Oracle DBAs could only manage 9.9 databases per DBA, representing slightly over a three to one advantage for the administrative requirements of the Microsoft SQL Server system.

The obvious question which follows is how much of this difference is attributed to ease of administration verses disparities in the complexity and work load of the different database systems? As indicated in the Database Profiles section above, on average the Oracle Databases supported more users than the Microsoft SQL Server databases. However, both databases supported similar applications and mission critical computing. To help address this question, we examined the further ratios of users per DBA.

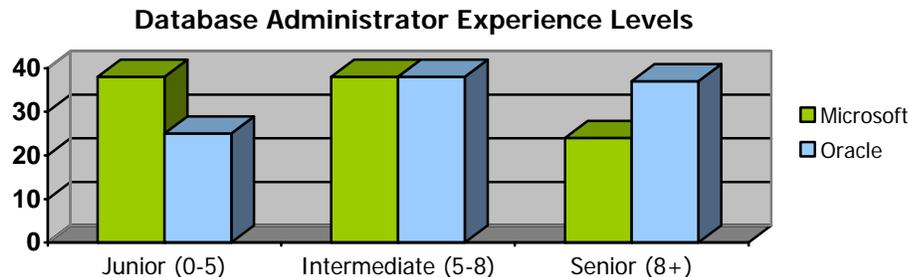
To compare the work loads of the different environments we multiplied the average database user counts times the quantity of respective databases in each organization. We then divided these total user population figures by the number of DBAs supporting the different systems in each organization. The resulting ratios revealed that on average the Microsoft DBAs supported more total users than Oracle DBAs; 6,784 users per DBA for Microsoft SQL Server versus 5,567 users per Oracle Database DBA.

### Database Administrator Salaries

In addition to the work effort required to manage the different database systems the cost of labor is a major factor in computing the total cost of administration. In this analysis we combined study responses on experience levels for the DBAs with Alinean research on salary factors and publicly available salary survey information to compute the average annual salaries for Microsoft and Oracle DBAs.

Several salary surveys have consistently revealed that on average Oracle DBAs are paid slightly higher than Microsoft DBAs. In our analysis we used publicly available data from PayScale for the base salaries of Senior Database Administrators. According to PayScale the average salary for Senior Oracle Certified Professional (OCP) DBAs is \$88,000 per year. PayScale reports the average Senior Microsoft Certified Database Administrator salary at \$82,500.

Responses to our survey revealed that in addition to differences in pay scales for DBAs of the two databases, there were also differences in experience levels of the respective DBAs. We asked study participants to identify the number of Microsoft and Oracle DBAs in their organizations with Junior (0-5 years), Intermediate (5-8 years) and Senior (8+ years) levels of experience. Chart 4 shows that only one fourth of the Microsoft DBAs were classified as Senior DBAs with over eight years of experience. Meanwhile, only one fourth of the Oracle DBAs were classified as Junior DBAs with less than five years of experience. Using median experience levels for the different classifications (2.5 years for Junior, 6.5 years for Intermediate, and 11 years for Senior) the average experience level for Microsoft DBAs was 6.1 years and 7.2 years for Oracle DBAs.



To calculate the average salaries for the Microsoft and Oracle DBAs we subtracted 4% for each year of experience less than the average experience of the Senior DBAs.

*For Microsoft DBAs the calculation was:*  $\$82,500 - (11 - 6.1 \text{ years}) * 4\%$  or  $\$82,500 - \$16,170 = \$66,330$

*For Oracle DBAs the calculation was:*  $\$88,000 - (11 - 7.2 \text{ years}) * 4\%$  or  $\$88,000 - \$13,376 = \$74,624$

Finally, to compute the average total burdened salary for the DBAs of the respective databases, we multiplied these base salaries times the average burden rate of 26% for US employees. This burden rate reflects the total cost of the employee, including benefit packages, paid time off, taxes and insurance. The resulting salaries used in cost estimates for the analysis are \$83,576 for Microsoft DBAs and \$94,026 for Oracle DBAs.

## DBA Training

In addition to direct compensation, another significant employee expense for high skilled professions in the technology industry is on-going education. We asked study participants for the annual training costs per DBA, and the annual hours devoted to training. Participants reported slightly higher costs and time commitments for the Oracle DBAs than for Microsoft DBAs. On average Microsoft DBAs spent 52.2 hours per year in dedicated database administration training classes, at an annual cost of \$5,236 per DBA. Oracle DBAs spent more time and effort on training with 63.1 hours in classes, at a cost of \$7,016 per DBA.

## Financial Assessment

To compute the Total Cost of Administration (TCA) for the different database management systems we divided the total annual cost per DBA by the average number of databases managed per DBA. Table 2 shows these calculations for the respective databases.

Database	Average Burdened DBA Salary	Annual Training Cost per DBA	Total Annual Cost per DBA	Databases per DBA	Total Cost of Administration per Database
Microsoft	\$83,576	\$5,236	\$88,812	31.2	\$2,847
Oracle	\$94,026	\$7,016	\$101,042	9.9	\$10,206

Table 2: Total Cost of Administration (TCA)

In addition to the straight cost per database we also examined the administrative costs on per user basis to account for the differences in user populations of the two databases. On a per user basis the respective costs were much closer, with Microsoft SQL Server still showing a slight advantage.

Database	Total Annual Cost per DBA	Users per DBA	TCA per User
Microsoft	\$88,812	6,784	\$13.09
Oracle	\$101,042	5,567	\$18.15

Table 3: Total Cost of Administration (TCA)

## Key Task Findings

In addition to overall metrics of databases per DBA, we also examined time allocation for key database administration tasks. We asked participants for the total time of all their DBAs allocated to the various administration tasks on a weekly basis. We then divided the responses by the number of Microsoft SQL Server and Oracle Databases for the organization to derive the average task times per database per week.

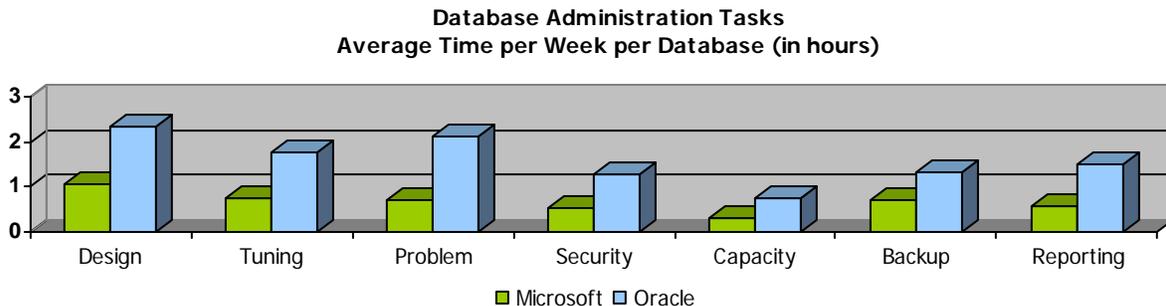
The operations we examined included:

- » Database design time
- » Database tuning
- » Problem diagnosis and resolution
- » Security administration
- » Capacity planning
- » Backup and recovery
- » Reporting

The results of the task time analysis are very consistent with the overall ratio of databases per DBA. On average DBAs spent a little less than half as much time performing routine operations on Microsoft SQL Server databases as they did on Oracle Database. Total average weekly time for the specified tasks was 11.3 hours per week per database for Oracle Database, and 4.7 hours per week per database for Microsoft SQL Server.

The difference between task times for the two database systems was rather consistent with DBAs spending about 40% more time on Oracle Database for each operation. The largest exception to this trend was in the area of Problem Diagnosis and Resolution, where DBAs spent nearly twice as much time per week resolving issues with the Oracle Database systems as they did the Microsoft SQL Server databases.

Since database management systems are an essential component for almost all mission critical transaction and decision support systems, this last metric of Problem Diagnosis and Resolution time could be crucial in its impact on overall systems availability and time to recovery.



Besides common weekly administrative tasks, we also examined the task times for the special operations of database installations and upgrades. Participants were asked for the total time required to install, configure, load and verify both new database installations, as well as database upgrades. Again, participants consistently responded that Microsoft SQL Server 2005 took less time to perform these tasks than Oracle Database. The average installation time for a Microsoft SQL Server database was 15.1 hours, while the average time for Oracle Database was 24.8 hours. The average upgrade time for Microsoft SQL Server, was 23.2 hours, while the average time for Oracle Database was 35.2 hours.

## CONCLUSION

As IT managers seek to reduce complexity and improve the efficiency of their IT organizations, this study reveals that Microsoft SQL Server has several administration advantages over its Oracle Database rival with respect to the effort required to manage the database environment and the Total Cost of Administration (TCA). According to study participants, Microsoft DBAs were able to manage three times as many physical databases as their Oracle DBA counterparts. This significant discrepancy in required management effort, combined with slightly lower average annual costs per Microsoft DBA yielded an astonishing \$7,360 lower Total Cost of Administration per database for Microsoft SQL Server compared to Oracle Database; over a 350% difference.

In addition to the overall measure of databases per DBA, the study showed that Microsoft SQL Server consistently required less effort than Oracle Database for every administrative task measured, including system installation, upgrades, database design, tuning, problem diagnosis and resolution, security administration, capacity planning, backup and recovery, and reporting.

Although the administration cost per server is probably the best overall measure of manageability, readers should not overlook the fact that our participants were generally using Oracle Database for larger databases with more users per database. Recent advances in server technologies along with integration and optimization commitments by Microsoft to enterprise application providers, such as SAP may help close this gap between Microsoft and Oracle for use in larger databases supporting more users. The new Intel Itanium 2 processors used in HP Integrity servers for example now match or exceed the traditional processing power of RISC technology, historically the dominant platform for UNIX open systems applications. This increased scalability along with a lower administrative cost should increase consideration for Microsoft SQL Server 2005 by IT managers looking to improve their return on IT spending.

## ABOUT ALINEAN

Since 1994, the Alinean team has been the pioneering builder of tools to help quantify and improve the ROI and TCO of IT investments. Alinean was named for the Spanish word for "Align", matching the Alinean mission as the leading developer of analytical tools to help IT vendors, consultants and IT executives align IT investments with business strategies.

The Alinean team has over a decade of experience in the practical development and application of ROI and TCO methodologies, models and tools to optimizing IT investment decision making. In 1994, the Alinean team formed Interpose, the original pioneers of ROI tools, developing analytical software for over 50 major IT vendors and consulting companies worldwide, and creating the industry standard TCO Manager and TCO Analyst software. Interpose was sold to Gartner in 1998, where the team continued their developments and marketing of ROI and TCO software tools. The original team reunited to form Alinean in 2001, once again becoming the leading pioneers and developers of ROI sales and analytical tools. Current customers include leading IT solution providers such as HP, IBM, Dell, Intel, Symantec, NetIQ, EMC, SAP, Oracle, SBC, and Microsoft, as well as leading consultancies and Global 1000 companies.

Additional information about Alinean and helpful ROI educational resources can be found at <http://www.alinean.com>.