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Adoption of database technology: A comparative study

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Abstract
Database now a days, has become an essential part for keeping any records secured and privatized In earlier we had least databases with unique features with their own. But as the era rises on, numerous databases came into existence. Among those Microsoft SQL server versions and Oracle database became the best but on the counterpart they have a war among themselves too. Each has some unique features and drawbacks. Hence, this white paper discusses that which database server Oracle or Microsoft SQL server is better in different aspects. It studies the working and response of both the databases in different realms. This paper is divided into four main parts. The first part discusses the security issues of oracle and Microsoft SQL server. The second discusses the comparative cost study which includes administration cost also. Third discusses the platform dependency of each of the database that which is more platform supportive, next highlights the performance issues in both the databases which includes scalability, reliability and availability of Oracle RAC and Microsoft SQL server. Performance comparison is also represented in tabular form. In each section, comparison between these two databases is done. In last section, it consists conclusion drawn analyzing all the data.
Keywords*:* Security comparison, Cost comparison, Platform dependency, Performance comparison

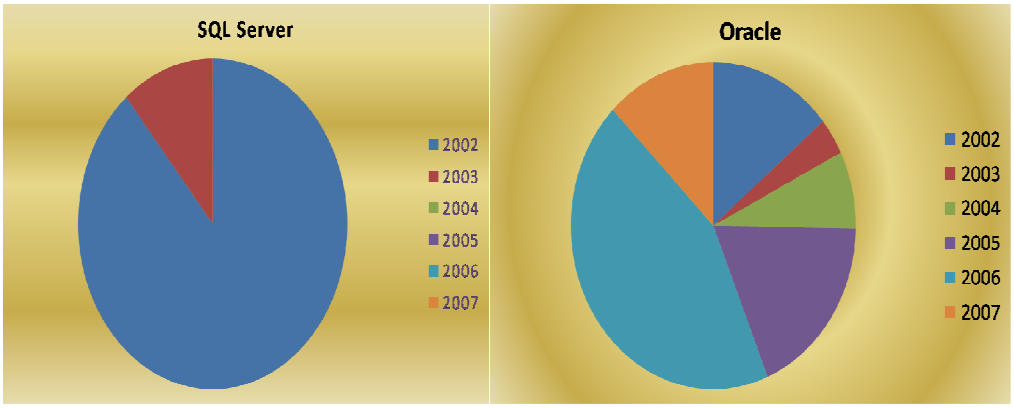
I. INTRODUCTION

Oracle OR Microsoft? The favorite topic of researchers to research upon and set up a conclusion examining all the scenarios. Often media is keen to find which Database server is better oracle or Microsoft SQL. Oracle and Microsoft are always fighting for the top spot in database wars. A few years back it was very simple, if you had mainframes and IBM hardware DB2 was the database, if you had UNIX like operating systems, Oracle was the database and if you had Windows operating system, SQL Server was the database. However, over the years, each database has grown in capabilities and the lines are blurred now. Hence it has become difficult to decide which database is the best to use. Since both the databases are good in some or the other aspects, this paper compares the working efficiency of both the databases in different issues like performance, platforms, SAP implementation, security and cost.

II.SECURITY ISSUE

Database servers are the main information repository for any organization. The security of the database is given the highest priority and no compromise should be done in case of database security since the most sensitive data is stored in these databases only. Hence, this section will compare the posture of Oracle's RDBMS and Microsoft SQL server on the basis of security flaws.

On the basis of work and experiments done by the researchers, it can be seen that oracle database is less secured than Microsoft SQL server. The Oracle database has recorded the most number of security vulnerabilities of any of the major database platforms over the last eight years. Oracle had more than six times as many reported security flaws as SQL Server during the same time span[1].On the analysis done by the various researchers, it was found that oracle is weaker in security patching also. Based on the analysis done by the researchers, the following chart illustrates the published security vulnerabilities for Oracle database and Microsoft SQL Server from the government body NIST National Vulnerability Database [2].



Oracle database has more security vulnerabilities (CVE) than Microsoft SQL server [2]

From the above charts it can be concluded that the Microsoft SQL server is much more secured than Oracle RDBMS. Since 2002, Oracle is being proved to have larger security flaws in comparison to that of Microsoft SQL.
One of the major reasons of more security vulnerabilities in Oracle database is that Oracle can be run on multiple platforms which are slower and harder for all patches and support .On the other hand, Microsoft SQL server can be run only on a single operating system which is proved to be easier and faster for all patches and support.

III.COST ISSUE

The main advantage of Microsoft SQL server over Oracle database is its low cost of installation, cost of training, deployment cost etc. It is assumed that the Development Application Tool used is the same in both the products. The cost reflects the financial impact on applications' users' environment [3].The Microsoft SQL runs on one platform only i.e. Windows, hence, persists less cost than Oracle database which can be run multiple platforms like UNIX, LINUX and hence possess more features.
The cost comparison is done on the basis of:

A. Training cost

In order to maintain the Oracle environment, it is essential for the user to be trained in the realm of Oracle. Oracle recommends development organizations have a minimum of one Oracle Certified Database Administrator (DBA). DBA Professional Certification consists of Introduction to Oracle, DBA Fundamentals I and II, PL/SQL and Database Tuning. Total training time is 20 days at a cost of $10,000.
While on the other hand, the total cost of Microsoft SQL training is $8,000.

B. Administration cost

The administration cost defines an expense incurred in controlling and directing an organization, but not directly identifiable with financing, marketing, or production operations. The administrative cost of Oracle is comparatively higher than Microsoft SQL sever._On average, the annual cost for administration is $2,847 per year per database for Microsoft SQL Server 2005 and $10,206 per year per database for Oracle 10g[4]. In case of DBA's of Oracle and Microsoft SQL server, in the study whitepaper we see this estimation of the salaries of SQL Server vs. Oracle DBA staff:
"For Microsoft DBAs the calculation was: $66,330"
"For Oracle DBAs the calculation was: $74,624"
Also, the price of products of the databases is compared. The cost of Oracle 9i enterprise edition without OLAP and Data mining is $40,000 while that of SQL 2000, the price is $19,999.Similarly, in case of Oracle standard edition the price of Oracle 9i standard edition is $15,000 and that of SQL 2000 is $4,999[5].
From the above data, we can say that SQL Server is a feature-rich and economical choice compared to Oracle. The base product of Oracle is expensive and to add all the features that are offered by the SQL Server, it requires many more different add-ons. These extra add-ons further increase the price to make SQL Server much more affordable than Oracle [6].In common, the oracle products (standard and enterprise) cost more than that of SQL products. Below, are the prices of Oracle database and Microsoft SQL products [6].

SQL Server Standard	$7,171 per processor
SQL Server Enterprise	$27,495 per processor
Oracle Standard	$17,500 per processor
Oracle Enterprise	$47,500 per processor

Cost of oracle and Microsoft SQL products without Data mining and OLAP
More importantly, additional features are provided in Microsoft SQL enterprise edition server at NO COST strategy while in case of Oracle, the user has to pay more if he requires any additional feature like data mining or OLAP in his database. Therefore, it has been seen that SQL server is much more affordable than Oracle database. Since, installation and maintenance cost of Oracle is more than Microsoft SQL server, it is much easier to install and maintain Microsoft SQL server.

IV PLATFORM DEPENDANCY ISSUE

The major advantage and reason of oracle as the better server is that Oracle database can be accessed on different platforms like Windows, Linux, and Unix etc. On the other hand, Microsoft sql server can be run only on

windows. SQL Server is only operable on the Windows platform, a major limitation for it to be an enterprise solution. Oracle is available on multiple platforms such as Windows, all flavors of Unix from vendors such as IBM, Sun, Digital, HP, Sequent, etc. and VAX-VMS, as well as MVS. The multi-platform nature of Oracle makes it a true enterprise solution [7].

V. PERFORMANCE ISSUE

Performance of any database includes availability, maintainability and scalability. The latter is the system's ability to process more workload, with a proportional
increase in system resource usage. In other words, in a scalable system, if you
double the workload, then the system would use twice as many system resources[8].

A. *Availability*

In Oracle 10g (RAC) the benefit is that it has several nodes(at most 100) linked to the users and the database accessing single database. So, if one of the nodes fails, data can be accessed from the other nodes also. In the availability scenario, Oracle and SQL server, both, provide protection from server failure equivalently since both failover the applications on the destruction of any hardware, software, operating system etc. But when its availability of protection from storage failure, Oracle 10g RAC is weaker than Microsoft SQL server 2005.

B. *Scalability*

It includes:
Scaling up: Scaling up stands for addition of extra expensive hardware to handle higher loads[10]. In context with scaling up, Oracle and SQL server works equivalently since it is based on adding more CPUs and gets more scalable database. Oracle does not specify whether there are any limitations on the number of CPUs per node. Therefore, in theory, Oracle RAC can scale beyond 64 CPUs. However, it must be noted that Oracle has not demonstrated publicly that Oracle RAC can scale beyond 64 CPUs [9].SQL can sale the CPUs till 64.
Scaling out: Scaling out stands for distributing the load using low cost multiple servers. So the "scaling out" process of each database differs largely. Since SQL works on the concept of federated database i.e. it divides its database tables into various servers. A drawback of this approach is, to handle a query involving table1 and table6 (partitioned across two servers), SQL Server would have to hit two servers. And the more popular the tables are, more is the load on that single server[10].On the other hand, Oracle works on the concept of scale-out using Grid computing based on Real Application Clustering(RAC) as "THE SOLUTION". RAC is based on the cache-fusion technology; this is based on syncing the database cache instead of the database itself.

The following table shows differences in limits of Oracle and MS SQL Server [11]

Description	*Oracle*	*MS SQL server 6.5*	*MS SQL server 7+*
Columns per table	1000	250	1024
Row size	Unlimited	1962 bytes	8060 bytes
LONG and LONG RAW columns per row	1(must be last column)	Unlimited(16 byte pointer per)	Unlimited(16 byte pointer per)
Clustered indexes per table	1	1	1
Identifier Length	30 chars	30 chars	128 chars
Tables per SELECT	Unlimited	16	256

V. CONCLUSION

From the above analysis and information this paper concludes that both the databases, Oracle and Microsoft SQL server, are reliable on their part and both can make the system stable and efficient when used on. But taking all aspects into consideration and since, IT industries searches cost effective database, the Microsoft SQL server is the correct option. Microsoft SQL server is also easy in installation and for the maintenance. Before using any of

the databases we must go through all the aspects of both the databases. Weak patching in oracle database has made it less demanding but it overcomes the Microsoft SQL Server in platform independency. So we conclude that both the databases are reliable depending upon the vendors' prioritized needs.

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