

SWOT Analysis of the Oracle standard and MS-SQL server Technologies

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Abstract— In the last few years the use of the Internet has experienced an exponential growth and the World Wide Web has become the main instrument for information sharing. Every organization has information that it must store and manage to meet its requirements and shared globalize with web. A database is an organized collection of information treated as a unit. The purpose of a database is to collect, store, and retrieve related information for use by database applications.

In this paper, I have compared different version of Oracle and SQL Server technologies. Herein I analyze and articulate the conflicting details of the Oracle and SQL Server technologies (Oracle 9i,10g,11g and SQL Server7,2000,2005,2008).

Keywords-Oracle, MS-SQL Server, SWOT

I. INTRODUCTION

A). Oracle

Oracle is a relational database management system from Oracle Inc. Oracle database helps in achieving reliable, flexible, secured and cost effective way to manage information and applications. Oracle offers high performance and scalability, because all computing resources can be flexibly allocated to applications as needed.

In oracle the logical and physical structures are separate and thus this helps in data independence i.e., physical storage of data can be managed without affecting the access to logical storage structures. Oracle is a major database which along with its added features passes the ACID test, which is important in insuring the integrity of data. Oracle is very much suited for enterprise computing and large database applications.

Oracle Memory Structures

Oracle uses memory to store information such as the following:

- Program code
- Information about a connected session, even if it is not currently active
- Information needed during program execution (for example, the current state of a query from which rows are being fetched)
- Information that is shared and communicated among Oracle processes (for example, locking information)

- Cached data that is also permanently stored on peripheral memory (for example, data blocks and redo log entries)

The basic memory structures associated with Oracle include:

1. Program Global Areas (PGA), which is private to each server and background process; there is one PGA for each process.
2. System Global Area (SGA), which is shared by all server and background processes.

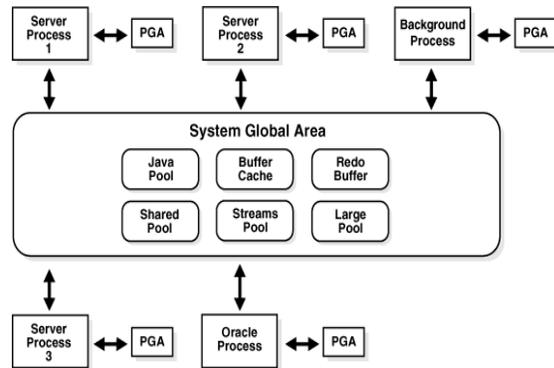


Figure 1 - Oracle Memory Structures (Source: www.oracle.com)

B).MS- SQL Server

SQL Server is a relational database management system which is part of the Microsoft family of servers. SQL Server was designed for client/server use and is accessed by applications using SQL. It runs on Windows NT version 4.0 or higher. SQL Server supports symmetric multiprocessing hardware, ODBC, OLE DB, and major open standard communications protocols. It has Internet integration, data replication, transaction management and data warehousing features. The main role of an SQL Server in a web-based architecture is to store and manage the data required by the authorized web applications. To be able to access data from a database, a user must pass through two authentication phases. The first phase is performed by the SQL Server and the other by the database management system.

Figure 2 illustrates the address space architecture of an instance of SQL Server 2008 R2. When you fire up a SQL Server instance, two main areas are allocated: the code area and memory pool area. The code area is mostly static executable code of the SQL Server kernel; SQL Server .NET Library DLLs; Open Data Services code; the stack space; and a variable code area that contains distributed query OLE DB providers, OLE automation objects, and extended stored procedures as they are needed by user requests.

The memory pool area of SQL Server is the most dynamically changing part of an instance. There is another system database called a resource database that is present in each SQL Server instance. This read-only database contains system objects that are included with SQL Server. System objects are physically persisted in the resource database, but they logically appear in the system schema of every database and provide the results to system-level information such as server properties and object definitions.

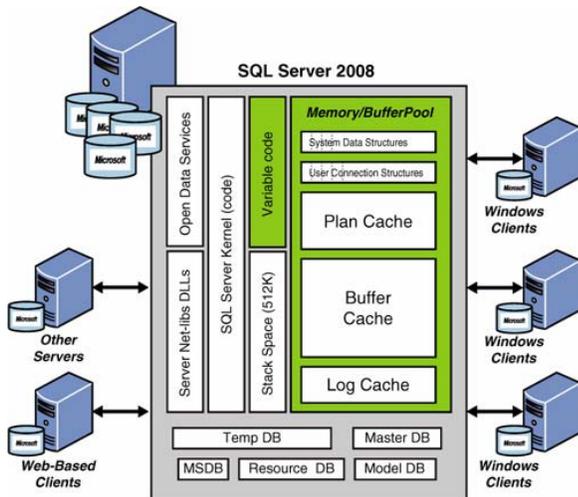


Figure 2 : SQL Server 2008 instance architecture.

(Source: www.programming4.us)

These databases, tempdb has the most significance for performance because it is the heart of all internal tables, indexing, sorting, grouping, and other worktable activity for the entire SQL Server instance.

By default, SQL Server tries to keep the amount of virtual memory allocations on a computer at 4MB to 10MB less than the physical memory available. The rest of the memory pool area is divided into procedure cache, data cache (buffer cache), and log cache. SQL Server actively adjusts these for optimal performance. Previously, the system administrator had to do all this manually. Many of the configurable options directly relate to optimizing this address space. There is a caching framework that utilizes internal and external clocks to determine how the caches are managed.

II. COMPARISON BETWEEN ORACLE AND MS SQL SERVER

A). Database Security

SQL Server and Oracle security is that access to a SQL Server database is a two-step process. At the instance level, the server maintains a list of user accounts called logins. Logins are accounts that have been granted permission to connect to the instance. A SQL Server login can be a local Windows or Active Directory account. It can also be something totally independent of Windows: the DBA can create a username and assign it a password from within SQL Server. In the first case, the login mapped to an AD account is known as a trusted account. In the latter case, the login is said to be non-trusted.

For Oracle, there is no concept of trusted and non-trusted accounts. A normal user account in Oracle is created only once. Unlike SQL Server, Oracle does not map operating system accounts to database accounts.

B). Database Management Tools

In SQL Server to managing database instances was known as Enterprise Manager. It allows a DBA to centrally administer SQL Server instances running across the network. Using the tool, the DBA can “register” SQL Server instances, look at the properties of those instances and change them, run jobs, execute codes against databases or create user accounts. The tool can be installed on the server and can be also installed as a standalone client application on the DBA’s workstation.

For Oracle, DBAs have been using a web-based user interface from version 10g. Incidentally, this tool is also known as the Enterprise Manager. Since it is accessible via a web browser, no client tool requires to be installed; all the DBA needs is a browser to access the web site exposed by the server. Enterprise Manager in Oracle 10g and 11g comes in two types. a. Enterprise Manager Database Control. b. Enterprise Manager Grid Control

Enterprise Manager Database Control:

It has installed by default on the server where Oracle is running. Database Control allows the administration of a single instance of Oracle database.

Enterprise Manager Grid Control:

It requires a separate installation and some extra set up procedures. With Grid Control, the DBA is able to manage multiple databases and other applications such as the Oracle Application Server. This is similar to having multiple SQL Server instances registered in the SSMS. Using the Enterprise Manager Database Control or the Grid Control, DBAs can create, drop and modify Oracle tablespaces, user accounts, and monitor performance.

C) Error Log vs. Alert Log

SQL Server maintains a running log of its operations. This log includes information about the start-up and recovery events, user actions, backups, configuration changes, invalid login attempts, errors, warnings etc. Every time the SQL service starts up, a new log file is created. This log file is known as the SQL Server Error Log.

The error log is a prime source of information for DBAs troubleshooting incidents. By default SQL Server keeps the last six log files in a rolling fashion with the oldest one being deleted first. The current error log file is named ERRORLOG (without any extension) while the one before it is named ERRORLOG.1, the one before that is ERRORLOG.2 and so on.

Oracle's equivalent of SQL Server Error Log is the Alert Log file. Alert Log contains information about database start-up and shutdowns, instance recovery, configuration changes, internal database errors, initialization parameter values etc.

Unlike the SQL error log, the Oracle alert log does not create a new file every time the instance is restarted. In fact Oracle maintains only one Alert Log file which can grow quite big as information is accumulated over time.

D) Client Connectivity

Client connectivity is another area where there are similarities and differences between the two platforms. SQL Server connectivity can be achieved by creating ODBC connections and installing the required OLE DB drivers on the client PC. When you create ODBC connections in the client PC, you have to specify the server name, connection mode (Windows or mixed) and optionally provide a username and password.

In Oracle, client connectivity is also achieved by installing the Oracle client tools. To accept client connections, Oracle also needs to have its listener service running at the server end. And just like you can use aliases for SQL Server instances, Oracle also has the option of creating a service name for an instance and using it from the client end.

E) Database Query Tools

Before the release of SQL Server 2005, database developers used the Query Analyzer for writing ad-hoc queries or scripts for creating stored procedures, views or functions. Query Analyzer was a separate client tool that could be invoked from the Enterprise Manager. From SQL Server 2005, the Management Studio incorporates the query window side-by-side with the Object Explorer pane. With integrated Visual Studio interface, it is now possible to take advantage of version control systems or debugging facilities for SQL scripts. SQL Server now also comes with another development tool called the Business Intelligence Development Studio (BIDS). This tool is primarily used for creating Analysis Service, Integration Service or Reporting Service solutions.

Traditionally, Oracle did not have such development tools bundled with it. The only query tool that always shipped with Oracle was SQL*Plus. SQL*Plus is a notepad style command line query editor. Most experienced DBAs still use SQL*Plus for quick database administration tasks. Although it is a powerful utility with its own command set, writing and debugging SQL scripts with it has not been very easy.

F) Performance comparison

It is very difficult to make the performance comparison between SQL Server and Oracle Database. So, I take SQL Server2000 and Oracle 9i for this comparison.

You can use both of these RDBMS to build stable and efficient system. However, it is possible to define the typical transactions, which used in inventory control systems, reservation systems and banking systems. After defining these typical transactions, it is possible to run them under the different database management systems.

G) Features comparison

Both SQL Server 2000 and Oracle 9i Database support the ANSI SQL-92 entry level and do not support the ANSI SQL-92 intermediate level. In the Features comparison section of this article I want to make the brief comparison of the Transact-SQL with PL/SQL and show some SQL Server 2000 and Oracle 9i Database limits.

H) T-SQL vs PL/SQL

The language of SQL supported by Microsoft SQL Server 2000 is called Transact-SQL (T-SQL). The language of SQL supported by Oracle 9i Database is called PL/SQL. PL/SQL is more powerful language than T-SQL. This is the brief comparison of PL/SQL and T-SQL:

Attributes	PL/SQL	Transact-SQL
Indexes	B-Tree indexes, Bitmap indexes, Partitioned indexes, Function-based indexes, Domain indexes	B-Tree indexes only
Tables	Relational tables, Object tables, Temporary tables, Partitioned tables, External tables, Index organized tables	Relational tables, Temporary tables
Triggers	BEFORE triggers, AFTER triggers, INSTEAD OF triggers, Database Event triggers	AFTER triggers, INSTEAD OF triggers
Procedures	PL/SQL statements, Java methods, third-generation language (3GL) routines	T-SQL statements
Arrays	Supported	Not Supported

Table 1: Comparison of SQL Server2000 and Oracle 9i Features (Source: www.mssqlcity.com)

I) SQL Server 2000 and Oracle 9i limits

Here you can find some SQL Server 2000 and Oracle 9i Database limits:

Attributes	SQL Server 2000	Oracle 9i
database name length	128	8
column name length	128	30
index name length	128	30
table name length	128	30
view name length	128	30
stored procedure name length	128	30
max columns per index	16	32
max char() size	8000	2000
max varchar() size	8000	4000
max columns per table	1024	1000
max table row length	8036	255000
max query size	16777216	16777216
recursive subqueries	40	64

Table 2: Comparison of SQL Server and Oracle 9i limits

III. COMMON DIFFERENCE BETWEEN ORACLE AND SQL SERVER

- Transaction control: In Oracle EVERYTHING is a transaction and it is not permanent until you COMMIT. In SQL Server, there is (by default) no transaction control.
- MVCC: In SQL Server will allow dirty reads, and writes can block reads in MS SQL (Again, it's configurable but the default in SQL Server is for performance and not read consistency, unlike Oracle where read consistency is default and unbendable.
- When you setup an Oracle server, you tend to have one database with many "users/schemas", and tablespaces that are shared by all your users. SQL Server has separate databases that do not share disk files.
- SQL Server uses "logins" to give you access to the SQL Server instance and each database has "users" that map to a login to get individual access to the tables and views etc.

- TSQL is similar to PL/SQL, but (in my opinion) less powerful. You may need to simplify your SQL to get it to work as well as you'd expect in Oracle.
- The SQL Server Management Studio (2008 SP1) is fantastic.
- SQL Server does not have packages. This might start off as a bonus (PL/SQL packages can be a PITA) but eventually you'll start to get a big nest of similarly named stored procedures in the database and you'll wish there was a way you could organise and group them better.

IV. SWOT ANALYSIS OF ORACLE AND SQL SERVER

Table 3 below presents the key elements of a comparison and SWOT Analysis between the Oracle and MS SQL SERVER standards as they converge to Latest Technology systems.

This comparison focuses mainly on the Database aspects of the new trend and technology of these three standards.

Conclusion

It is not correct that SQL Server is better than Oracle or vice versa. Both products can be used to build stable and efficient system and the stability and effectiveness of your applications and databases. But SQL Server has some advantages in comparison with Oracle and vice versa.

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SWOT	MS SQL Server	Oracle
Strength	<p>If you perform a select query with no target, the results are automatically returned to the client. you can easily make scripts that perform lookups and display multiple recordsets.</p> <p>Easier client connectivity setup. less confusion about what drivers to use, apart from JDBC. Crystal Reports can call SQL Server stored procedures, where you tend to be forced into a view with Oracle.</p> <p>SQL Server Management Studio is much better than SQL*Plus or SQL Developer. Because it just displays any returned recordsets, data retrieval procedures are very easy to test.</p>	<p>A better transaction system with packages, Cursor For Loops.</p> <p>Oracle runs on many platform.</p> <p>Much lower overhead for cursors and BEFORE triggers, FOR EACH ROW triggers.</p>
Weakness	<p>SQL Server only runs on Windows.</p> <p>The Domino effect occurs when the performance or status of one virtual machine affects other virtual machines. Resource limitations (usually regarding I/O) need to be set for each virtual machine so that when one virtual machine is not working as expected, it will not have an impact on other virtual machines.</p> <p>Triggers execute invisible to client-application application. They are not visible or can be traced in debugging code. It is hard to follow their logic as it they can be fired before or after the database insert/update happens.</p>	<p>A little work has to be done to produce a graph.</p> <p>You still need a method for performance tuning & analysis.</p> <p>Analysis of performance puts extra load on the database.</p>
Opportunity	<p>Flash-based interactive training with step-by-step narration Full screen for easy viewing and player controls for navigation.</p> <p>Amazing eLearning can provide you with the best computer-based training solutions for whichever Microsoft Server programs you wish to learn. This computer-based training solution enables you to learn in a simulated environment.</p> <p>Production environments can benefit from virtualization because multiple existing physical servers that are under-utilized can possibly be combined into a single server.</p>	<p>The transactional results are not visible to other transacts until the transaction is finished.</p> <p>Databases goes from one valid state to another valid state.</p> <p>Results of a transaction have permanence. Oracle continues to acquire other competing companies that accel specific areas to improve on its products. That is another major advantage.</p>

Threats	<p>While virtualization has many benefits, it is not the right solution for every case. For very high throughput applications and database applications that must be highly scalable, virtualization may not be the best choice.</p> <p>A common issue with SQL Server virtualization solutions is that performance may degrade when you move the SQL Server from Physical to Virtual.</p> <p>Triggers run every time when the database fields are updated and it is overhead on system. It makes system run slower.</p>	<p>Need a query tool (like Toad), which can be used to copy+paste data to Excel.</p> <p>Need a graph tool like Excel.</p> <p>Takes longer to learn and not as simple. Less qualified professionals available.</p> <p>It is not good for low budget projects. Because price is high and maintenance cost also higher.</p>
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Table 3: SWOT Analysis of MS SQL Server and Oracle