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Oracle Database Environment Testing (For Oracle DBAs)

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ABSTRACT

Oracle database DBA is a different process with the organized collection of information treated as a unit. It stores collect and retrieve all the information used by database users. As no data definition language requires the change of the database having structure, properly defines objects, operates and integrity rules and that conforms to the relational configuration is called relational database. Database with information system is a storing system and processing information. DBMS is software that controls the storage the control over the storage, organization and retrieves data. Kernel code is a query language that controls all the memory and storage for DBMS that enables the application to access the data.

Keywords: Oracle DBMS, Software Management, Structures, Queries, Testing, Database Environment

I. INTRODUCTION

A database is an accumulation of data that is sorted out with the goal that it can be effectively gotten to, overseen and updated.Data is composed into lines, sections, and tables, and it is filed to make it simpler to discover applicable data. Information gets refreshed, extended and erased as new data is included. Databases process workloads to make and refresh themselves, questioning the information they contain and running applications against it. PC databases ordinarily contain totals of information records or documents, for example, deals exchanges, item indexes and inventories, and client profiles. Ordinarily, a database administrator furnishes clients with the capacity to control read/compose get to, determine report age and break down utilization. A few databases offer ACID(atomicity, consistency, segregation, and sturdiness) consistence to ensure that information is reliable and that exchanges are finished. Databases are common in substantial centralized server frameworks but at the same time are available in littler conveyed workstations and midrange frameworks, for example, IBM's AS/400 and PCs.

Development of databases

Databases have developed since their origin in the 1960s, start with various leveled and system databases, through the 1980s with protest arranged databases, and today with SQL and NoSQL databases and cloud databases.

In one view, databases can be grouped by content sort: bibliographic, full content, numeric and pictures. In figuring, databases are infrequently ordered by their authoritative approach. There are various sorts of databases, going from the most predominant approach, the social database, to a disseminated database, cloud database or NoSQL database.

Social database

A social database, concocted by E.F. Codd at IBM in 1970, is a forbidden database in which information is characterized with the goal that it can be revamped and gotten to in various distinctive ways.

Social databases are comprised of an arrangement of tables with information that fits into a predefined class. Each table has no less than one information classification in a section, and each line has a specific

information occasion for the classifications which are characterized in the segments.

The Structured Query Language (SQL) is the standard client and application program interface for a social database. Social databases are anything but difficult to expand, and another information class can be included after the first database creation without requiring that you change all the current applications.

Circulated database

An appropriated database is a database in which parts of the database are put away in numerous physical areas, and in which preparing is scattered or reproduced among various focuses in a system.

Appropriated databases can be homogeneous or heterogeneous. All the physical areas in a homogeneous dispersed database framework have the same hidden equipment and run the same working frameworks and database applications. The equipment, working frameworks or database applications in a heterogeneous appropriated database might be diverse at every one of the areas.

Cloud database

A cloud database is a database that has been streamlined or worked for a virtualized domain, either in a crossover cloud, open cloud or private cloud. Cloud databases give advantages, for example, the capacity to pay for capacity limit and transmission capacity on a for every client premise, and they give versatility on request, alongside high accessibility.

A cloud database additionally gives endeavors the chance to help business applications in a product as-a-benefit arrangement.

No SQL database

No SQL databases are valuable for substantial arrangements of appropriated information.

No SQL databases are viable for enormous information execution issues that social databases aren't worked to explain. They are best when an association must break down expansive pieces of unstructured information or information that are put away on different virtual servers in the cloud.

Protest arranged database

Things made utilizing object-arranged programming dialects are frequently put away in social databases, yet protest situated databases are appropriate for those things.

A protest arranged database is sorted out around objects instead of activities, and information as opposed to rationale. For instance, a sight and sound record in a social database can be a determinable information question, instead of an alphanumeric esteem.

Diagram database

A diagram arranged database, or chart database, is a kind of NoSQL database that utilizations diagram hypothesis to store, guide and inquiry connections. Chart databases are fundamentally accumulations of hubs and edges, where every hub speaks to a substance, and each edge speaks to an association between hubs.

Diagram databases are developing in notoriety for dissecting interconnections. For instance, organizations may utilize a chart database to mine information about clients from online networking.

Getting to the database: DBMS and RDBMS

A database administration framework (DBMS) is a sort of programming that enables you to characterize, control, recover and oversee information put away in a database.

Definition - What does Oracle Database (Oracle DB) mean?

Oracle database (Oracle DB) is a relational database management system (RDBMS) from the Oracle Corporation. Originally developed in 1977 by Lawrence Ellison and other developers, Oracle DB is

one of the most trusted and widely-used relational database engines.

The system is built around a relational database framework in which data objects may be directly accessed by users (or an application front end) through structured query language (SQL). Oracle is a fully scalable relational database architecture and is often used by global enterprises, which manage and process data across wide and local area networks. The Oracle database has its own network component to allow communications across networks.

Oracle DB is also known as Oracle RDBMS and, sometimes, just Oracle.

Techopedia explains Oracle Database (Oracle DB)

Oracle DB rivals Microsoft's SQL Server in the enterprise database market. There are other database offerings, but most of these commands a tiny market share compared to Oracle DB and SQL Server. Fortunately, the structures of Oracle DB and SQL Server are quite similar, which is a benefit when learning database administration.

Oracle DB runs on most major platforms, including Windows, UNIX, Linux and Mac OS. Different software versions are available, based on requirements and budget. Oracle DB editions are hierarchically broken down as follows:

- ✓ Enterprise Edition: Offers all features, including superior performance and security, and is the most robust
- ✓ Standard Edition: Contains base functionality for users that do not require Enterprise Edition's robust package
- ✓ Express Edition (XE): The lightweight, free and limited Windows and Linux edition
- ✓ Oracle Lite: For mobile devices

A key feature of Oracle is that its architecture is split between the logical and the physical. This structure means that for large-scale distributed computing, also known as grid computing, the data location is irrelevant and transparent to the user, allowing for a more modular physical structure that can be added to and altered without affecting the activity of the database, its data or users. The sharing of resources in this way allows for very flexible data networks whose capacity can be adjusted up or down to suit demand, without degradation of service. It also allows for a robust system to be devised as there is no single point at which a failure can bring down the database, as the networked schema of the storage resources means that any failure would be local only.

Oracle Database is the market-leader and preferred database for hundreds of thousands of businesses as well as for application developers and database administrators worldwide. Over the years, enterprises have come to rely on the Oracle database to provide unparalleled performance and reliability. In Oracle Database 10g, Oracle delivered a self-managing database with breakthrough manageability that dramatically increased IT productivity and reduced management costs. In Oracle Database 11g, Oracle added capabilities to perform database testing using production workloads as well as the ability to monitor database queries automatically. Oracle is ready to raise the bar once again with the release of Oracle Database 12c. The built-in features of Oracle Database 12c cater to data center environments that are rapidly evolving and continuously changing to keep up with the demands of continuous consolidation and cloud computing. In addition, building on its industry-leading self-managing capabilities, Oracle Database 12c has made significant advances in the areas of manageability, testing, and secure test data management and fault diagnostics that address many of the top challenges facing businesses today. Oracle Enterprise Manager is Oracle's integrated enterprise IT management product line and provides the industry's first complete cloud lifecycle management solution. Oracle Database 12c along with Oracle Enterprise Manager Cloud Control 12c allows organizations to

adopt new technologies quickly while minimizing risk. Oracle Enterprise Manager's business-driven IT management capabilities allow you to quickly set up, manage and support enterprise clouds and traditional IT environments from applications to disk.

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everal procedures are available to test a database in aspects of load, stress, I/0, and performance.

Performance of the database is dependent on several features such as the memory, processing speed, I/O subsystem, CPU, hardware, file system, hardware and applications that make contact with the database. The excellence of a database's performance and it's not being subjective to risks of vulnerabilities is dependent on the fine-tuning of the above-mentioned parameters.

Typically an organization has User Acceptance testing, Development testing, and Quality testing environments:

Stability

System increased locking activities and data consistency workload when data volume expands in data access, the transaction requires increased as well. Basically, if the workload is doubled then the system uses twice as many system resources. Due to conflict within the system, the resource usage might exceed twice the original workload.

1. Database Statistic

When examining database presentation in any of these scopes, just observe the changes in the statistic data changes over the extent. in particular, focus on the difference between the cumulative values of a statistic at the start and the end of the period. Database statistics provide information about the type of database load and the resources being used by the database. To effectively measure database performance, statistics must be available. Oracle Database generates many types of cumulative statistics for the system, sessions, segments, services, and individual SQL statements.

1.1 Time Model Statistics

Time model statistics use the time to identify quantitative effects of specific actions performed on the database, such as login operations and parsing. The most important time model statistic is database time. This statistic represents the total time spent in database calls for foreground sessions and is an indicator of the total instance workload. DB time is measured cumulatively from the time of instance gets started and is managed by summation the central processing unit all foreground sessions not waiting for idle wait events.

1.2 DBA Server Process

DBA consist of a dedicated server process in which only one user process and other server allows multiple user processes which enables server process to handle the request of user processes connected to an instance and allows other committed server processes and by setting more than one initialization parameters user must specifically configure and enables shared server

1.3 Shared Server Process

A virtual circuit is part of shared memory and is bound by the dispatcher for client database connection requests and replies and also supports multiple client connections. Initially, in a shared server configuration client user processes connects to a dispatcher.The approach of the virtual circuit that attempt to retrieve another one from the client dispatcher.

II. SQUARES

A database square is the most minimal unit of capacity in the Oracle database. The measure of a 3D square is a particular number of bytes of capacity inside a given tablespace inside the database. A pulley is generally a variety of the working framework square size to encourage proficient circle I/O. The default piece measure is set by the Oracle statement parameter DB_BLOCK_SIZE. Upwards of four other piece sizes might be determined for

different tablespaces in the database, in spite of the fact that the stops in the SYSTEM, SYSAUX.

Also, any impermanent tablespaces must be of the size DB_BLOCK_SIZE. The default square size is 8K and all Oracle testing is performed utilizing 8K pieces. Prophet best practices recommend utilizing an 8K square size for all tablespaces unless there is a convincing motivation to use an alternate size. One cause could be that the normal column length of a table is 20K. In this way, you may like to utilize 32K pieces, essentially you ought to completely test to find out if there is an execution pick up.

The degree is the following phase of sensible gathering in the database. A degree comprises of pro or more database piece. When you extend a database protest, the space added to the question is distributed as an expansion. Fragments The following layer of legitimate gathering in a database is the section. An area is a gathering of degrees that shape a database question that Oracle regards as a unit, for example, a board or record.

Information Segment Every table in the database lives in a solitary information portion, comprising of at least one degrees; Oracle assigns in excess of one area of a table on the off chance that it is an apportioned table or a bunched table. Apportioned and grouped tables are examined therefore in this part. Information fragments incorporate LOB (vast protest) sections that store LOB information referenced by a LOB locator segment in a table portion (if the LOB isn't put away inline on the board)

III. BOARD

Record Segment Each list is put away in its own particular file portion. Similarly, as with parceled tables, each segment of an apportioned record is put away in its own segment. Incorporated into this class are LOB list fragments; a table's non-LOB segments, a table's LOB section, and the LOBs' related files would all be able to dwell in their own tablespace to enhance working

Brief Segment

When a client's SQL articulation needs circle space to finish a task, for example, an arranging system that can't fit into PC stockpiling, Oracle allows an impermanent segment. Transitory fragments exist just for the length of the SQL proclamation. Rollback Segment As of Oracle 10g, inheritance rollback fragments just exist in the SYSTEM tablespace, and commonly the DBA does not request to keep up the SYSTEM rollback portion.Transitory fragments exist just for the term of the SQL explanation. Rollback Segment As of Oracle 10g, inheritance rollback sections just exist in the SYSTEM tablespace, and ordinarily, the DBA does not request to keep up the SYSTEM rollback fragment. In past Oracle discharges, a rollback section was made to safeguard the past estimations of a database DML activity on the off chance that the exchange was moved back, and to keep up the "previously" picture information to give read-predictable perspectives of table information for

Different Clients getting to the Table

Rollback portions were additionally utilized amid database recuperation for moving back uncommitted exchanges that were alive when the database example smashed or ended out of the blue. Programmed Undo Management (AUM) handles the programmed assignment and administration of rollback portions inside a fix tablespace. Inside a fix tablespace, the fix fragments are organized likewise to rollback portions, with the exception of that within data of how these areas are overseen is under control of Oracle, rather than being made out by the DBA.

Logical Database Structures

In this part, we will ignore the features of all major sensible database structures, taking up with tables and markers. Tailing, I talk about the assortment of data types we can use to delimit the segments of a board. When we make a table with sections, we can

put confinements, or limitations, on the segments of the board. One of the numerous reasons we utilize a social database administration framework (RDBMS) to deal with our information is to use the security and evaluating highlights of the Oracle database
Beginning with the Oracle Architecture 9 We'll likewise touch upon numerous other intelligent constructions that can be set by either the DBA or the client, including equivalent words, associations with outer documents, and contacts to different databases.

Tables

A table is the fundamental unit of capacity in an Oracle database. With no tables, a database has no an incentive to an activity. Independent of the kind of table, information in a table are put away in lines and segments, like how information is put away in a spreadsheet. In any case, that is the place the closeness stops.

The toughness of a database table because of the encompassing unwavering quality, trustworthiness, and versatility of the Oracle database makes a spreadsheet a poor second decision when settling on a situation to store basic information. In this part, we will go over the wide range of sorts of tables in the Oracle database and how they can meet practically every information stockpiling requirement for a foundation

In the CREATE TABLE summon, you can characterize the statement ORGANIZATION HEAP to characterize a load sorted out table, essentially on the grounds that this is the default, the condition can be forgotten. Each line of a table takes at least one segments; each pinnacle holds an information write and a length. All of Oracle adaptation 8, a section may likewise fuse a client characterized question compose, a settled table, or a VARRAY. In summation, a table can be outlined as a question table.

Outside tables were presented in Oracle9i. More or less, outside tables enable a client to get to an information source, for example, a content document, as though it was a table in the database. The metadata for the table is put away inside the Oracle information word reference, however, the substance of the table is put away remotely. The definition for an outer table contains two segments. The preeminent and most well-known part is the meaning of the table from the database client's purpose of supposition. This unquestionably seems like any common definition that you'd involvement in a CREATE TABLE articulation.

The second piece incidentally is the thing that separates an outside table from an enduring table. This is the place the mapping between the database segments and the outer information source happens—what column(s) the information component begins in, how wide the segment is, and whether the arrangement of the outside section is a character or twofold. The linguistic structure for the default character of outside table, ORACLE_ LOADER, is relatively indistinguishable to that of a control record in SQL*Loader. This is one of the upsides of outside tables; the client just has to know how to get to a standard database table to go to the outer record.

Fringe tables were presented in Oracle9i. Basically, outer tables enable a client to get to an information source, for example, a content record, as though it was a table in the database. The metadata for the table is put away inside the Oracle information word reference, however, the substance of the table is put away remotely. The definition for an outer table contains two areas. The principal and most commonplace part is the meaning of the table from the database client's purpose of feeling. This unquestionably seems like any normal definition that you'd involvement in a CREATE TABLE explanation. The second piece, in any case, is the thing that separates an outer table from an enduring table. This

is the place the mapping between the database sections and the outer information source happens—what column(s) the information component begins in, how wide the segment is, and whether the organization of the outside segment is a character or double. The language structure for the default character of the outer table, ORACLE_ LOADER, is relatively indistinguishable to that of a control record in SQL*Loader. This is one of the upsides of outside tables; the client basically has to know how to get to a standard database table to go to the outer record.

Thither are a couple of downsides, be that as it may, to utilizing outside tables. You can't make files on an outer table, and no additions, updates, or erases can be performed on outside sheets. These downsides are little when taking a gander at the benefits of utilizing outside tables for stacking local database tables, for instance, in an information stockroom condition. Bunched Tables If at least two sheets are much of the time got to together (for instance, a request table and a detail table), at that point making a grouped table may be a valuable course to advance the execution of inquiries that reference those tables.

Bunched Tables

If at least two sheets are as often as possible got to together (for instance, a request table and a detail table), at that point making a grouped table may be a gainful heading to advance the execution of inquiries that reference those tables. In case of a request table with a related detail table, the request header data could be put away in an indistinguishable piece from the correspondence channel-thing subtle element records, in this way chopping down the measure of I/O expected to recover the request and line-point data

Grouped tables likewise decrease the amount of room required to salt away the sections the two tables have in like manner, also known as a bunch key esteem. The group key esteem is additionally put away in a bunch list. The group list works much like a customary file in that it will enhance questions against the bunched tables when gotten to by the group key esteem.

In our case with social clubs and line subtle elements, the request number is just put away once, rather than repeating for each detail push.

Also, line things, the request number are just put away once, rather than repeating for each detail push. The points of interest to bunching a table are diminished if visit INSERT, UPDATE, and DELETE activities happen on the table with respect to the quantity.

Today, databases are not meant just to salt away the books. In fact, DBs have been developed into extremely powerful creatures that offer rich financial backing to the developers to carry out the business logic at the DB layer. Some simple models of the powerful features of DBs are ‘Referential Integrity’, relational constraints, triggers and stored subprograms. Hence, applying these and many other features offered by DBs, developers implement the business logic at the DB layer. The examiner must ensure that the implemented business logic is correct and works accurately.

Above points describe the four most important ‘What To’ of database testing. Now, I will put some light on ‘How To’ of DB Testing. But, first, I feel it better to explicitly mention an important point here – DB Testing is a business-critical task, and it should never be assigned to a fresh or inexperienced resource without proper training.

How to Test Database:

1. Create your own Queries

To test the DB properly and accurately, first, a tester should have very good knowledge of SQL and specially DML (Data Manipulation Language) statements. Secondly, the tester should acquire a good understanding of internal DB structure of AUT.

If these two pre-requisites are fulfilled, then the tester is ready to test DB with complete confidence. (S)He will perform any CRUD operation from the UI application and will verify the result using SQL query. If you are using SQL server then you can make use of SQL Query Analyzer for writing queries, executing them and retrieving results.

This is the best and robust way of DB testing especially for applications with a small to medium level of complexity. Yet, the two pre-requisites described are necessary. Otherwise, this way of DB testing cannot be adopted by the tester.

Moreover, if the application is very complex then it may be hard or impossible for the tester to write all the needed SQL queries himself or herself. However, for some complex queries, the tester may get help from the developer too. I always recommend this method for the testers because it does not only give them the confidence in the testing they perform but also enhance their SQL skill.

2. Observe data table by table

If the tester is not good in SQL, then he or she may verify the result of CRUD operation (performed using GUI of the application) by manually viewing the tables (relations) of DB. Yet, this way may be a bit tedious and cumbersome especially when the DB and tables have a large amount of data.

Similarly, this way of DB testing may be extremely difficult for tester if the data to be verified belongs to multiple tables. This way of DB testing also requires at least good knowledge of table structures of AUT.

3. Get query from developer

This is the simplest way for the tester to test the DB. Perform any CRUD operation from GUI and verify its impacts by executing the respective SQL query obtained from the developer. It neither requires a good knowledge of SQL nor requires a good knowledge of application's DB structure.

So, this method seems easy and good choice for testing DB. But, its drawback is havoc. What if the query given by the developer is semantically wrong or does not fulfill the user's requirement correctly? In this situation, the client will report the issue and will demand its fix. Furthermore, in worst cases, the client may refuse to accept the application.

4. Make use of Database testing tools to turn out the process easier.

Nowadays, several tools are available that aids in the process of database testing. You should choose the correct tool as per your application and make the best use of it to do the database testing for the application.

For more info on database testing tools, check out the Useful Reads section at the end of this

Points to Consider for Testing Oracle DB:

- ✓ Consider a number of users
- ✓ SQL statements that they might execute
- ✓ The Memory used for each of the users for each of the statements
- ✓ The number of transactions that a user would normally execute to retrieve the desired information from the database
- ✓ Test if users are receiving the desired response from the database within the expected stipulated time.

1) Memory Test

In terms of Memory, depends on the number of processes that are running in the database as the database system constitutes a user, server, and background processes.

User processes are the processes which service user requests from the application. Server processes interpret the request from the application users and process the SQL statements sent from the user.

Background processes help with the functioning of the database and perform various tasks during the life

of the database. The advantage of Oracle is that the memory can be automatically managed by a database and it can tune it accordingly to the load. But, despite that, we need to make sure we have enough memory on the server and certain amount of memory is always dedicated to the Oracle database.

2) Space Test

In terms of Space, we need to consider the amount of data which would be worked on daily, weekly, monthly, yearly and how much of it would you want to be stored permanently or for a longer period of time.

We should get this valuable piece of information from the Business intelligence who has designed the infrastructure. Another crucial piece of information is to know if we need to store unlimited amounts of data. Define "unlimited" should be your first question. We can have terabytes of data stored as long as you have enough resources to support it. We would have to manage them with data requirements which have been ever growing.

3) Processing Test

In terms of Processing, how many CPU cores would we need? Remember a core is a physical entity and with the advent of CPU subsystem technology, we have various methods to employ and utilize multiple CPUs cores and multiple threads per core.

Suppose you have 8 CPUs at your disposal, are we sure we are utilizing all of them. Do we really need 8 CPUs? Can we manage them with 4 or 6? Estimating a number of CPU cores that you would require has become more and more imperative to understand processor requirements.

4) Application Testing

In terms of Application testing, we need to understand the type of application – Is it a Pro*C, OCI, JDBC application.

The mechanism of connection which depends on the type of client software used and is connection pooling employed. An approximate number of processes and sessions that are required to accommodate the users connecting to the database simultaneously.

For versions higher than Oracle 11g we also have a very good feature called the Oracle Real Application testing with several enhancements which makes use of SQL Performance Analyzer, Database replay and Test Data management which helps you diagnose the changes to data and manage them. More details on this in the next part of this series.

IV. CONCLUSION

Modern enterprises are aggressively adopting new technology solutions to enhance their competitiveness and profitability. As a result, management challenges continue to rise. Oracle Database 12c addresses these critical challenges by enabling database administrators to maintain database Automatic Diagnostic Repository Duplicate Bug? Yes EM Support Workbench: Apply Patch or Workaround Repair Advisors No EM Support Workbench: Package Incident & Configuration Information Repair Advisors

Auto Incident Creation First-Failure Capture Critical Error Alert DBA Targeted Health Checks 1 2 4 3 Manageability with Oracle Database 12c 22 performance at peak levels, adopt new technology rapidly and without risk, and increase DBA productivity and system availability by automating routine administrative tasks. Oracle Database 12c managed by Oracle Enterprise Manager Cloud Control 12c offers next-generation database management for the next-generation DBA

To conclude, we have dealt with the definition of a database, introduction to Oracle database, the need and aspects of testing oracle database.

In the next part of this series, we shall discuss more on each of the aspects of Oracle Database testing to make sure the design and functioning of the database are broadly met.

This performance test conducted in October 2016 provides a compelling indication of how Oracle Database In-Memory on a single HPE Integrity MC990 X server performs with mixed workloads running on Oracle Linux—large enterprises can run analytics on demand at extraordinary speed, without slowing transactions. Real-time analytics is now, and for business lines, it can mean significant competitive advantage. Certainly, transaction volume and analytic completion times will vary as greatly as the workload and database attribute themselves. Accordingly, the data simulation, workload simulation, and test results outlined in this paper are not intended to substitute for actual customer testing. Hewlett Packard Enterprise, therefore, provides systems locally or remotely for customer POCs. Contact an HPE Services representative or your Hewlett Packard Enterprise partner to experience the breakthrough capabilities of Oracle Database In-Memory on the MC990 X with a test plan tailored to your database environment.

The database is the core and critical part of almost every software application. So, DB testing of an application demands keen attention, good SQL skills, proper knowledge of DB structure of AUT and proper training.

To have the confident test report of this activity, this task should be assigned to a resource with all the four qualities stated above. Otherwise, shipment time surprises, bugs identification by the client, improper or unintended application's behavior or even wrong outputs of business-critical tasks are more likely to be observed. Get this task done by most suitable resources and pay it the well-deserved attention

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