Proactive database performance management
1. The Significance of IT in current business market  
2. What is Proactive Database Performance Management?  

Performance analysis through the Identification of Root Cause and Trend  
Capacity Planning through Long-term trend analysis  

3. The Essential Elements of the Database Performance Management Product (Performance Part)  

Real-time Monitoring and Post-mortem Analysis Using the SGA Direct Access System  
O/S Resource Monitoring and Post-Motem Analysis using the Kernel API System  

4. The Essential Elements of the Database Performance Management Product (Feature Part)  

Provide an Effective Alarm  
Provide the convenience through the Multi-Database Concurrent Monitoring  
Problem Detection caused by Top-Down Approach  
Cluster Monitor required in the RAC field  
Related Analysis and Dimensional Analysis of the System, Session, SQL level  

Top Session ........................................................................................................................................ 7  
Session List .......................................................................................................................................... 7  
Session Detail ......................................................................................................................................... 7  

5. The Benefit of EXEM Tools  
6. Conclusion
1. The Significance of IT in current business market

The current business environment has the characteristics that depend on IT. Thus high-level IT System is essential for the high-availability of the business. Securing the availability of the database system that plays a key role within the IT Infra Structure and maintaining the optimal performance are essential goals to achieve in the system operation. However, the spread of the OLTP environment that processes the massive transactions real-time, the consolidation of the system, and the tendency of system architecture and application lifecycle shortened (in terms of time) which have become increasingly complex system remain challenges to overcome in our operational objectives.

2. What is Proactive Database Performance Management?

Therefore, the proactive database performance management method is required for an effective database performance management. The proactive database performance management system must include the following features.

Quick Recognition and Prevention of the Spread of the Performance Problem thorough Real-time Monitoring

To recognize the problems of the performance slowdown about the complex Database system early is to Complex Database system of the performance slowdown problem early is to make possible to set O/S resource, all the statistics Oracle provides, O / S resource, Oracle provides all Statistitc (eg number of active sessions, session logical reads, physical reads, parse count (hard), execution counts, etc), all the wait events that Oracle provides, events (e.g. enq: TX - row lock contention, enq: TX - allocate ITL entry, latch: cache buffers chains, latch: library cache, db file sequential read, db file scattered read, etc), and the alert threshold of all the wait alert logs provided by Oracle. Also, it is required to provide the warnings of the problems instantly through the pre-set window of the alert threshold, Alarm, e-mail, and SMS (System Management Server).
Performance analysis through the Identification of Root Cause and Trend

The specific root-cause must be identified in order to prevent the recurrence of the performance slowdown errors. For the root-cause analysis, logging all the datas of the problematic situations that can be replayed is needed to analyze the datas that have been logged in a wide angle. In other words, it is required to provide the system that can comprehensively and efficiently analyze the total datas of Database System Level, Session Level, SQL Level, Alert Log, Lock Tree, O/S Resource (CPU, Memory Usage, etc), and OS CPU TOP Process.

Capacity Planning through Long-term trend analysis

Long-term data is required for Capacity Planning. For an efficient management and analysis of the long-term data, Repository (e.g. Oracle repository) structure is required. The repository structure provides not only the long-term trend analysis, but also a variety of reports.

3. The Essential Elements of the Database Performance Management Product (Performance Part)

The Database Performance Management products will be most effective when System Resource Peak Time, Database performance slowdown, and database hang occur; it is the point where the database system monitoring and analysis are significantly needed. No matter how good of the features of a product has, if the product is not able to handle such situations, the effectiveness will be zero. Therefore, for performance monitoring and performance analysis to smoothly function, the following elements must be satisfied.
Real-time Monitoring and Post-motem Analysis Using the SGA Direct Access System

It is said that the majority of the database performance management products utilize the SGA Direct Access method, but it is rare to find a product that uses the SGA Direct Access method for Real-Time Monitoring and Post-Motem Analysis. Most performance management products collect data for the post-motem analysis using the SGA Direct Access method, but in terms of real-time monitoring, they are structured to process data through Query using the SQL*Net method. As collecting the data through Query, there are situations where the System CPU utilization becomes high and real-time monitoring is not able to smoothly perform at the points of the Database Performance Slowdown and Database Hang. Therefore, the database performance management product we wish to introduce must be the product that collects data through the SGA Direct Access method for both real-time monitoring and post-motem analysis.

O/S Resource Monitoring and Post-Motem Analysis using the Kernel API System

The O/S Resource required for the Database Performance Management is the CPU Usage of the O/S CPU, O/S Memory Usage, Top-CPU Processes, and Active Session. When using command provided by the O/S (top, vmstat, sar, topas, ps) for collecting such O/S Resource, the overload of the data collection occurs. Therefore, a small load of the data base through the Kernel API is required.

4. The Essential Elements of the Database Performance Management Product (Feature Part)

Provide an Effective Alarm

The settings and a variety of route-guides of Oracle Performance Statistics, Wait Event, O/S Resource, Oracle Alert Log, SGA Free Memory, Disk Usage, TableSpace Usage, Lock-Hold Time are required.
Provide the convenience through the Multi-Database Concurrent Monitoring

Typically, a single DBA manages multiple databases and that the DBA in a single window should be able to monitor multiple databases effectively. Therefore, real-monitoring the O/S resource of the multiple databases, the Activity of the Instance level, and the SQL of the program currently running should be possible. Providing such monitoring environment makes it possible to grasp the convenience of the multiple database monitoring.

Problem Detection caused by Top-Down Approach

The most effective method of tracking the database performance problem is to confirm the Root-Cause caused by the Top-Down Approach. In other words, solutions and features that can find the causes of the problems through System Level, Session Level, SQL Level, and Query Execution Plan Level must be introduced. Through these features, the causes of the problem can easily be found clicking the mouse twice or three times.

Cluster Monitor required in the RAC field

For the RAC System Monitoring which consists of multiple Nodes, current status of load-balancing between the Nodes, the status of I/O for Inter-Connector, and the status of the Global Event must be monitored. Through this the maintaining of the performance and the monitoring the errors for the RAC System are possible.

Related Analysis and Dimensional Analysis of the System, Session, SQL level

The Direct analysis of the daily or a particular route of the database performance trend, statistics, and wait events through dimensionally analyzing the performance history of the acquired/recorded database should be possible. The following features must be included when analyzing the Session Level.
**Top Session**

The information of Top Program, Top Module, TOP DB Users, and Top Machines that have been performed in particular routes should be provided and the related SQL analysis must be possible.

**Session List**

Extraction of the Target Analysis Session using a variety of the conditions (SID, SPID, Program name, Module name, CPU Usage, etc.) must be possible.

**Session Detail**

Trend Analysis per second of the target analysis session should be available. Through this, the causes for the problem and the analysis of the cause lowering the performance of the Batch Program can be analyzed in a wide angle.
5. The Benefit of EXEM Tools

The EXEM’s MaxGauge product has been developed with a focus on the proactive Database Performance Management. Not only has the product been designed to increase the improvement of the DBA performance management, but it has also been invented to successfully and efficiently perform in the stages of development, unit test, and load test.

EXEM’s MaxGauge satisfy the requirement of Database Performance Management Product, both Performance part and feature part.

Following is MaxGauge’s Benefit.

- Maxgauge analyze problematic programs and modules according to the CPU Time and Elapsed Time by using the Elapsed Time Analysis classified into the program and module. by this, not only you can build a priority of Programs and Modules which need to be tuned effectively, but also expect speedy stabilizing of system.

- When you progress Stress test, using real time monitoring and historical data analysis can remove problematic factor which can cause trouble after System Open. By this, minimizes the cost of Tuning and Stability that needs to spend after System Open.

- Using the alarm function on Various Performance KPI(e.g. CPU Utilization, Memory Utilization, Memory I/O, Disk I/O, Active Sessions, Lock Waiting Sessions, Tablespace Usage, Disk Usage, Event in Alert Log etc), you can sense problem early. It makes it possible to upgrade availability of Database.

- Using the Multiple Database concurrent monitoring function, you can build centralized control system. It makes Database Performance Management more efficiently.

- Using RAC Dashboard function, you can build a effective monitoring system in RAC environment.

- Using Top-Down Approach function can control Real-Time monitoring more efficiently, a quick solution minimizes Performance Slowdown term of Database, which improves Database availability.
• Using detail Historical Data analysis function, can figure out root-cause about performance problem. Along with, can remove continuous performance problem.

6. Conclusion

DBAs today need better, more advanced solutions to manage increasingly complex systems that are ever more critical to the organization. Advanced performance management tools can help DBAs not only respond to database performance problems more effectively, but also prevent problems from degrading service levels and protect the system by stopping issues from developing at all.