BENEFITS OF VERITAS INDEPTH FOR IBM’S DB2 UNIVERSAL DATABASE WITHIN AN OPERATIONAL ENVIRONMENT
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1. MANAGEMENT SUMMARY

Downtime and slow system performance can result in substantial monetary loss to any organization. Proactive application and database tuning significantly reduces system problems, however, maintaining a proactive performance process requires continuous data collection and analysis efforts from your Database Administrators (DBA). Improving the quality and quantity of performance data and providing superior organization of that information maximizes the time DBAs have available to proactively manage performance and capacity of your systems. More time means reduction of costly system downtime, optimization of application performance and elimination of unnecessary hardware upgrades.

Acquiring a tool to help your DBAs to better utilize their time proactively managing systems (i.e. making decisions based upon accurate and timely information supplied by the tools rather than remaining in a “fire-fighting” reactive mode) can result in a significant cost savings to your organization while improving the quality of service that your customers receive.

VERITAS Indepth for DB2 UDB (VERITAS Indepth) stands out from other performance monitoring and tuning tools because it monitors system performance differently. Using VERITAS Indepth it is possible to collect relevant information from your systems 24X7. The quality and completeness of this information allows Database Administrators to be proactive in managing systems and therefore minimize the risk of downtime whilst maximizing your return on investment.

If tuning of these systems is undertaken, real gains in database and application performance can be made without hardware upgrades. VERITAS Indepth collects detailed statistics in the production environment allowing the DBA to tune the worst performing SQL statements and verify the impact of these proposed changes before they are implemented. As these statistics can be gathered 24X7 and collected for long term analysis, it is possible to perform detailed trend analysis and capacity planning. This means that hardware upgrades can be planned well in advance and only undertaken when actually required.

VERITAS Indepth is complimentary to IBM’s management and analysis tools and together they can be used to maximize the value of your DBAs, minimize system problems and achieve maximum system up-time and performance.

2. VERITAS INDEPTH: APPLICATION PERFORMANCE MONITORING

Operational environments often consist of both in-house applications and packaged third party applications. In both cases there is a need for a tuning methodology that will allow you to tune an existing operational system whilst minimizing the chances of adversely affecting it.

2.1 MAXIMIZING THE EFFICIENCY OF DBAS

In order to guarantee the stability of the system, a DBA can take either the reactive or proactive approach. The reactive approach means that the DBA will sit at his desk, get user complaints and handle them as they come in. Many DBAs believe they can maintain the stability of the system by handling all users’ complaints in the shortest possible time. It is extremely easy for the DBA to slip into reactive mode, running from one escalated issue to another. The main problem in this approach is that reacting to a problem takes time. In many cases several problems will occur at once. Some while the DBA is away from their desk. Others during the night shift and over the weekend. The reactive DBA will then find himself working more and more hours, staying over the weekend and still not managing to do all his or her tasks.

The proactive approach is to prevent a fire from starting rather than to hire more firemen. The proactive DBA will build a foundation for a solid database and thus help in solving many problems before they occur.

Creating a solid database environment doesn't occur automatically or by reacting to the problems after they have occurred. The DBA must be proactive. He or she must allocate time in the day to review key areas of the system, locate changes and therefore identify potential problems before they turn into complaints.
2.2 MONITORING 24 HOURS BY 7 DAYS A WEEK
VERITAS Indepth facilitates the proactive tuning approach. It provides low-overhead 24x7 detailed operating system and DB2 application statistics. These statistics may be viewed by DB2 program, by statement, by user, by time element and most importantly by resource consumption. Thus the proactive DBA has many ways to identify potential bottlenecks and take corrective action before end-users are adversely affected.

2.3 MAXIMIZING INVESTMENT IN DB2, APPLICATIONS, AND HARDWARE
Without detailed performance statistics it is impossible to determine if performance problems are due to hardware or software inefficiencies. Often new hardware is purchased unnecessarily when application tuning would have resulted in better performance gains at a lower cost. Experience shows that in most production databases 20% of the statements are responsible for 80% of the resource usage. Therefore if tuning of these statements is undertaken, real gains in DB2 and application performance can be made without hardware upgrades. VERITAS Indepth collects detailed statistics in the production environment allowing the DBA to tune the worst offending statements and verify the impact of these proposed changes before they are implemented. As these statistics can be gathered 24X7, it is possible to perform detailed trend analysis and capacity planning. This means that hardware upgrades can be planned well in advance and only undertaken when actually required.

3. USING VERITAS INDEPTH TO TUNE APPLICATIONS
There are many ways to tune applications using DB2. The sections that follow show how VERITAS Indepth can be used to implement a variety of techniques.

3.1 REWRITING SQL STATEMENTS
SQL is a rich language. Often statements can be written in many ways to provide the same result set. These different statements can result in the optimizer choosing different access paths into the database. Some access paths can be many times more efficient than others. VERITAS Indepth identifies the problem statements, provides easy to understand graphical explain plans, displays the optimized text generated by the DB2 optimizer and allows the user to test alternative statements where appropriate while providing a framework for easy alternative statement comparison.

![Figure 1: See DB2 Generated Optimized Text and the Original Statement Text Side-By-Side.](image)
4. MANAGING INDEXES

Where alternative SQL statements cannot be generated (for example in third party applications) it is often necessary to add indexes to help tune your worst offending statements. Although you know that adding the index will have a positive effect on the statement you are tuning, you do not know what impact it will have on the rest of the system. It is possible that other statements may also start using the index, but with a negative impact. Traditionally this has meant either a ‘try it and see’ approach or major re-testing on a test machine. VERITAS Indepth collects statements over time and stores these statements in a data warehouse. Based on this set of statements VERITAS Indepth can answer questions such as “which statements access table X”, “which statement access index Y” or even “which indexes are not being used”. Using this information you can see groups of statements that access a certain table based on common predicates, see predicate information (such are whether the predicates are indexable or SARGable and even see the predicate filtering factor in each statement). Using this information you can easily understand the effectiveness of each index, plan new index and remove non-effective indexes and hence minimize the risk of changes in the operational environment.

4.1 DROPPING REDUNDANT INDEXES

All indexes have to be maintained by DB2 whether they are being used or not. Therefore if an index is never being used it is putting an unnecessary overhead on the database. It can be very difficult to determine if an index is being used within a production environment. So indexes are often never removed ‘just in case’. VERITAS Indepth ensures that a DBA can locate unused indexes so that they can be removed and system resources saved.

5. LONG TERM ANALYSIS

Analyzing resource consumption over a long period of time is the only way to predict future resource consumption of DB2 and identify patterns in resource consumption.

To identify trends (such as what was the total resource consumption or a specific transaction or user resource consumption in January compared to February, March, and April) or patterns in resource consumption (such as what are the bottlenecks that typically occur at the beginning or end of each month, how does the night shift resource consumption looks like compared to the days shift resource consumption) you must be able to view summarized information on statement, user, program, transaction and the entire database levels over any length of time.

VERITAS Indepth collects performance information 24X7. This information can be accessed to see current and recent activity in DB2. Then, based on user specifications, the information is stored in a data warehouse (called the performance warehouse) for long-term analysis.

Figure 2: See trends in resource consumption.
VERITAS Indepth's Performance Warehouse contains long-term historical information on database and application. This reservoir of historical information can help you manage the performance of your system and business by enabling trend analysis and capacity planning.

Using VERITAS Indepth Performance Warehouse, you can track:
- Long-term historical resource consumption at the database and application level
- Long-term performance information on table spaces and buffer pools
- Long-term performance information on tables and indexes showing you total resource consumption of a table or an index
- Break down of table and index resource consumption down to the specific statements accessing these tables or indexes
- History of access paths of SQL statements

The Performance Warehouse enables you to achieve the following business goals:
- Track historical resource consumption trends to understand and predict long-term performance behavior
- Perform period-to-period comparisons to analyze performance improvements or degradation over time
- Track database access patterns to understand their affect on performance of data structure changes and object growth
- Proactively detect performance bottlenecks before they turn into problems and issue alerts when performance degrades from established baselines

Achieving these goals will allow you to better manage your DB2 database, make knowledgeable decisions on database changes, application changes and hardware upgrades and better plan for the future.

**6. CENTRALIZED MONITORING AND REMOTE ACCESS**

VERITAS Indepth uses a client server technology where the information is collected on the server by an intelligent agent running 24X7. Information can be viewed from the VERITAS Indepth client that can monitor multiple databases from a single point, allowing the DBA to switch from one to the other without leaving the product. More than that, this server based monitoring architecture results in no additional overhead when several DBAs are monitoring the system and in an ability to share information among DBAs where everyone can see the same picture. The Precise/SQL client software communicates with the server via a standard TCP/IP connection. DBAs are therefore able to monitor performance from remote sites or even from home, thus further maximizing their efficiency and flexibility.