Managing Database Environments: The Oracle Difference

Oracle Technology Days
Overview

- Manageability Overview
- Diagnostic Pack
- Tuning Pack
Pain points

• “We’re growing like crazy - adding new applications each quarter. We can’t keep up with the number of databases that are being added each year.”

• “Our time to diagnosis has shrunk from 60 minutes to 5. We don’t have the right tools to support this service level.”

• “We can no longer afford to wait for a patch from the vendor to solve performance problems. We need a fix right now.”
Where DBA’s spend their time

Install 6%

Create & Configure 12%

Load Data 6%

Software Maintenance 6%

Ongoing System Management 55%

Source: IOUG 2001 DBA Survey

Oracle Technology Day
Ongoing System Management

55% of DBA’s time is spent in ongoing management, monitoring and tuning

#1 Cause:
Performance Diagnosis & Troubleshooting
Resource Tuning

Source: IOUG 2001 DBA Survey
Database Diagnostics
Traditional Performance Tuning Method

• Performance and Workload Data Capture
  • System Statistics
  • Wait Information, SQL Statistics, etc.

• Analysis
  • What types of operations DB is spending most time on?
  • Which resources is the DB bottlenecked & What is causing it?
  • What can be done to resolve the problem?

• Problem Resolution
  • If multiple problems identified, which is most critical?
  • How much performance gain expected if solution implemented?
Traditional Performance Tuning

- Performance and Workload Data Capture
  - System Statistics, Wait Information, SQL Statistics, etc.
- Analysis
  - What types of operations database is spending most time on?
  - Which resources is the database bottlenecked on?
  - What is causing these bottlenecks?
  - What can be done to resolve the problem?
- Problem Resolution
  - If multiple problems identified, which is most critical?
  - How much performance gain expected if is solution implemented?

Oracle Database 10g Automates All Steps to Addresses Main Issues & Challenges
Key Features

- **Automatic Performance Diagnosis**
  - Self-diagnostic engine built into core database kernel, Automatic Database Diagnostic Monitor (ADDM)
  - Automatic Workload Capture and Historical Performance Analysis (Automatic Workload Repository)
  - Comprehensive System (Database & OS) Performance Monitoring
  - Advanced Event Management

- **When Used With Grid Control**
  - Manages Large Sets of Oracle Databases and other infrastructure
  - Cross-system Performance and Availability aggregation
Proactive Performance Tuning

Automatic Database Diagnostic Monitor (ADDM)

- Self-Diagnostic Engine In the Database
- Integrate all components together
- Automatically provides database-wide performance diagnostic
- On-Demand Performance Analysis
- Provides impact and benefit analysis, non problem areas
- Runs proactively out of the box, reactively when required
Workflow

AWR Collects Statistics

ADDM Analyzes Data and Recommends

DB

Viewing Through EM

calls

Oracle Technology Day
ADDM identified the problem...

100 SQL statements consuming significant database time were found.
26.74 Individual database segments responsible for significant user I/O wait were found.
60.13 The buffer cache size determined causing significant additional I/O.
13.3 Read and write contention on database blocks was consuming significant database time in the cluster.
3.83 Contention on buffer cache latches was consuming significant database time.
...the offending SQL statement. Also, recommended running SQL Tuning Advisor as the solution.
Database Tuning
Common Causes of Poor SQL Performance

• Poor plan selection due to incorrect optimizer estimates
  • Manually hinting SQL a solution, but …
    • Requires significant expertise
    • Is time consuming – trial and error method
    • Does not work for packaged applications

• Bad SQL design
  • Only real remedy is to restructure SQL
  • Requires expertise, time, application knowledge
Database Tuning Pack

Main Features

• SQL Tuning Advisor
• SQL Access Advisor
• Object Reorganization
SQL Tuning Advisor

Designed to accept input from several SQL sources:

- **Automatic Database Diagnostic Monitor (ADDM)**
  - Shows high-load SQL with impact %
  - Based on analysis of SQL, recommends SQL advisors as needed
    - Not all high-load SQL are good candidates for advisors
    - E.g., SQL with HWM enqueue wait problem cannot be tuned by SQL advisors but requires space reconfiguration

- **Top Activity Enterprise Manager (EM) screens**
  - Real Time Mode:
    - Source: v$active_session_history (ASH)
    - Period: Last one hour
  - Historical Mode:
    - Source: Automatic Workload Repository (AWR)
    - Period: Last 7 days (default)
SQL Tuning Advisor: Usage Model

**Automatic selection**
- AWR
- ADDM
- High-load SQL

**Sources**
- AWR
- Cursor cache
- Custom

**Manual Selection**

**SQL Tuning Advisor Links**
SQL Tuning Advisor is used to analyze and tune SQL statements. It can be launched from the following places. You can tune SQL statements using SQL Tuning Advisor:
- Top SQL
- SQL Tuning Sets
- Snapshots
- Preserved Snapshot Sets

**Filter**

Oracle Technology
DB Control and SQL Tuning Advisor

SQL Tuning Advisor Links
SQL Tuning Advisor is used to analyze index structures for SQL statements using SQL Tuning Sets.

Top SQL
SQL Tuning Sets
Snapshots
Preserved Snapshot Sets

Oracle Technology
SQL Tuning Advisor: Options and Recommendations

Scope

- Limited. Analysis without SQL Profile recommendation. Takes about 1 second per statement.
- Comprehensive. Complete analysis including SQL Profile. May take a long time.

Total Time limit: 30 Minutes

Execution Plan, Current Statistics, Execution History, Tuning History

The following table lists all the recommendations available for the SQL statement:

<table>
<thead>
<tr>
<th>Plan Hash Value</th>
<th>Advisor Task Owner</th>
<th>Advisor Task Name</th>
<th>Task Completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>2040254386</td>
<td>SYS</td>
<td>SQL_TUNING_1075487455000</td>
<td>Jan 30, 2004 4:58:19 AM</td>
</tr>
</tbody>
</table>

Recommendations

Select SQL Text

- select time_id, QUANTITY_SOLD, AMOUNT_SOLD from sales a, customers c ...

<table>
<thead>
<tr>
<th>Parsing Schema</th>
<th>SQL ID</th>
<th>Statistics</th>
<th>SQL Profile</th>
<th>Index</th>
<th>Restructure SQL</th>
<th>Miscellaneous</th>
<th>Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>SH</td>
<td>fu02g8b2lva1</td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Select Recommendation

- A potentially better execution plan was found for this statement.

Recommendations

- Consider accepting the recommended SQL profile.

Rationales

- Benefit: 98.97

Implement

Original Explain Plan
SQL Access Advisor: Overview

What indexes and MVs do I need to optimize my entire workload?

Solution

No expertise required

Provides implementation script

Component of CBO

SQL Access Advisor

DBA

Workload

Oracle Technology Day
## SQL Access Advisor - Recommendations

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Can Be</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add new index on table or materialized view</td>
<td>YES</td>
</tr>
<tr>
<td>Drop an unused index</td>
<td>YES</td>
</tr>
<tr>
<td>Modify an existing index by changing index type</td>
<td>YES</td>
</tr>
<tr>
<td>Modify an existing index by adding columns at the end</td>
<td>YES</td>
</tr>
<tr>
<td>Add a new materialized view</td>
<td>YES</td>
</tr>
<tr>
<td>Drop an unused materialized view</td>
<td>YES</td>
</tr>
<tr>
<td>Add a new materialized view log</td>
<td>YES</td>
</tr>
<tr>
<td>Modify an existing materialized view log to add new columns or clauses</td>
<td>YES</td>
</tr>
</tbody>
</table>
Typical SQL Access Advisor Session

SQL Access Advisor

Recommendation Options

Review Recommendations

Oracle Technology Day
Object Reorganization

- Reorganization is used for:
  - Rebuilding indexes and tables that are fragmented
  - Relocating objects to another tablespace
  - Recreating objects with optimal storage attributes
Summary
Oracle Database 10g: Twice as Manageable as Oracle9i

Summary

- 44% less time
- 47% fewer steps

Oracle Technology Day
Benefits...

• No need to build manually tuning scripts
• Allows for more superior and efficient tuning
• Provide advice on improving the performance of the SQL Statements and the benefits
• Tuning without SQL modification
Conclusion

• Automates management of performance issues for the Oracle Database
  • Automatic problem identification and resolution
    • Unique to Diagnostics Pack
  • Automatic and transparent SQL Tuning
    • Unique to Tuning Pack
  • Guided problem resolution
  • Graphical, intuitive and easy to use – “Point & Click”
• Adds significant business value
  • Enhances DBA’s quality of life and productivity
  • Makes available more resources to focus on strategic initiatives