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Oracle Database 11gR2 数据库性能调优介绍

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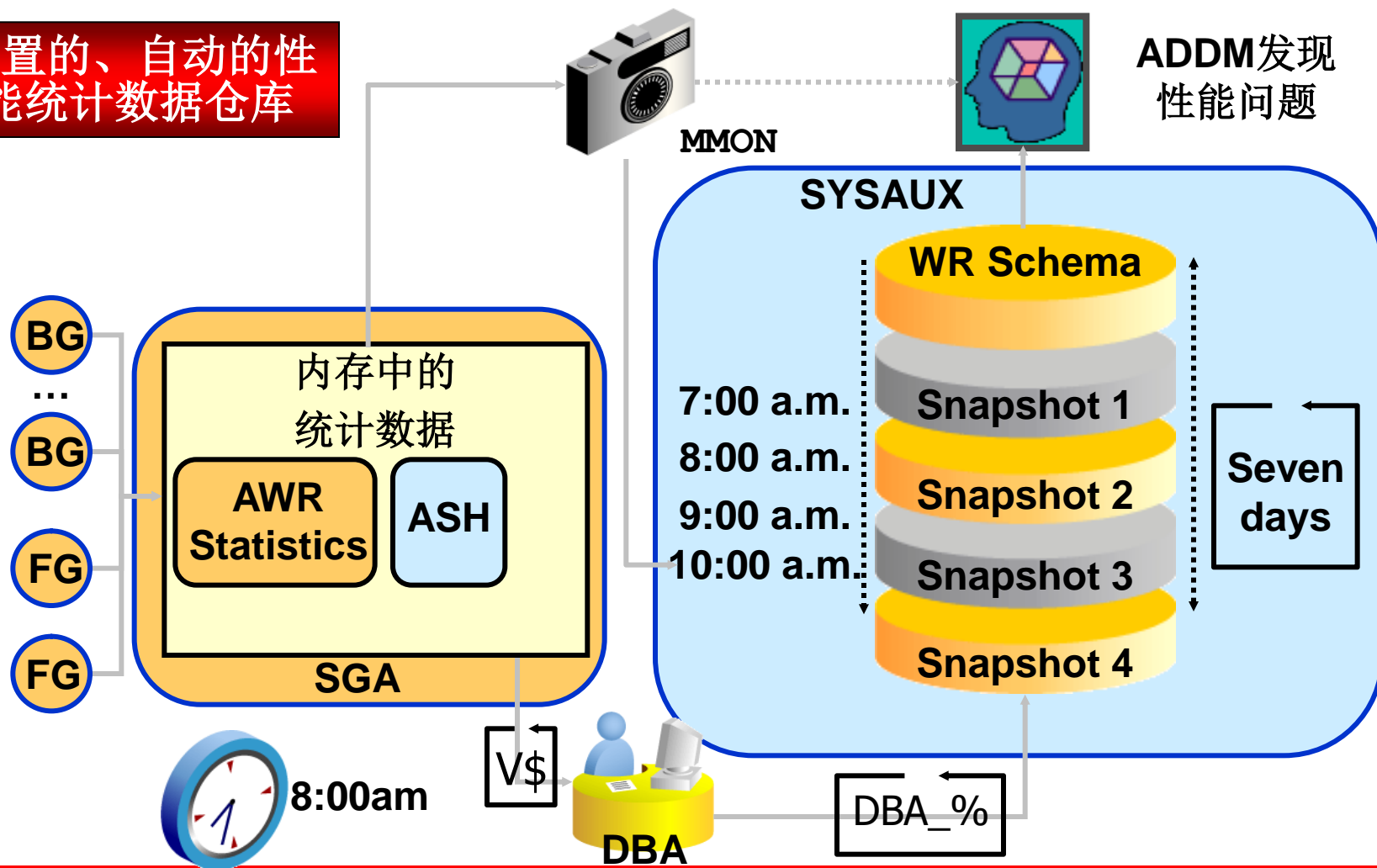
大中华区渠道咨询部

数据库性能诊断

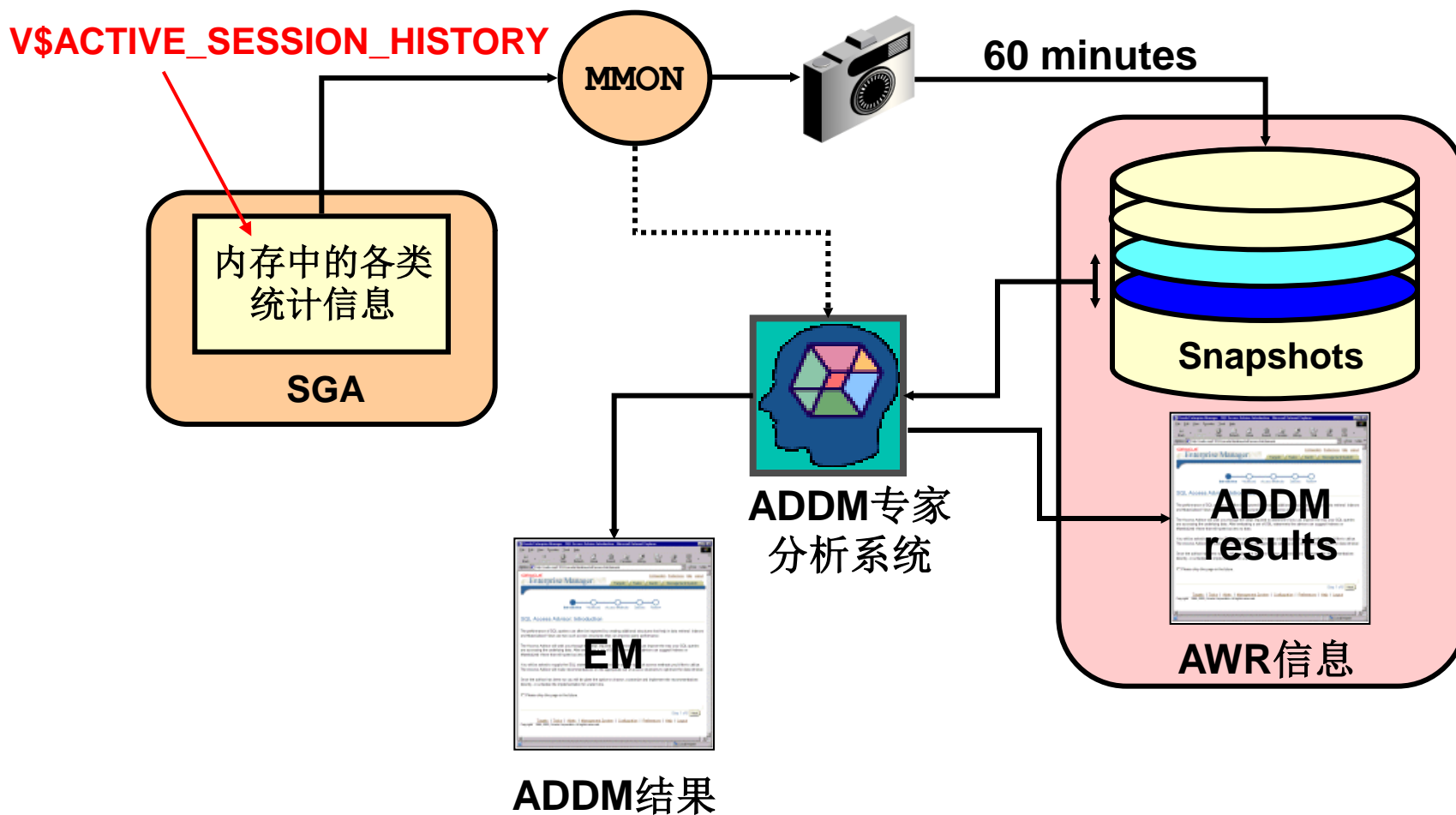
- 数据库内置的专家知识库系统
 - 全面的系统监控
 - 自动的识别性能瓶颈
 - 向导式的问题解决
- 自动的性能诊断
 - 自动的工作负载捕获和历史性能分析，性能数据集中存放在AWR(自动工作负载库)中
 - 集成在数据库核心的自我诊断引擎ADDM，对主机和数据库系统性能进行全面的监控
 - 分析并发现系统瓶颈，自动捕获、分析高负荷的SQL语句

自动工作负载库 (AWR)

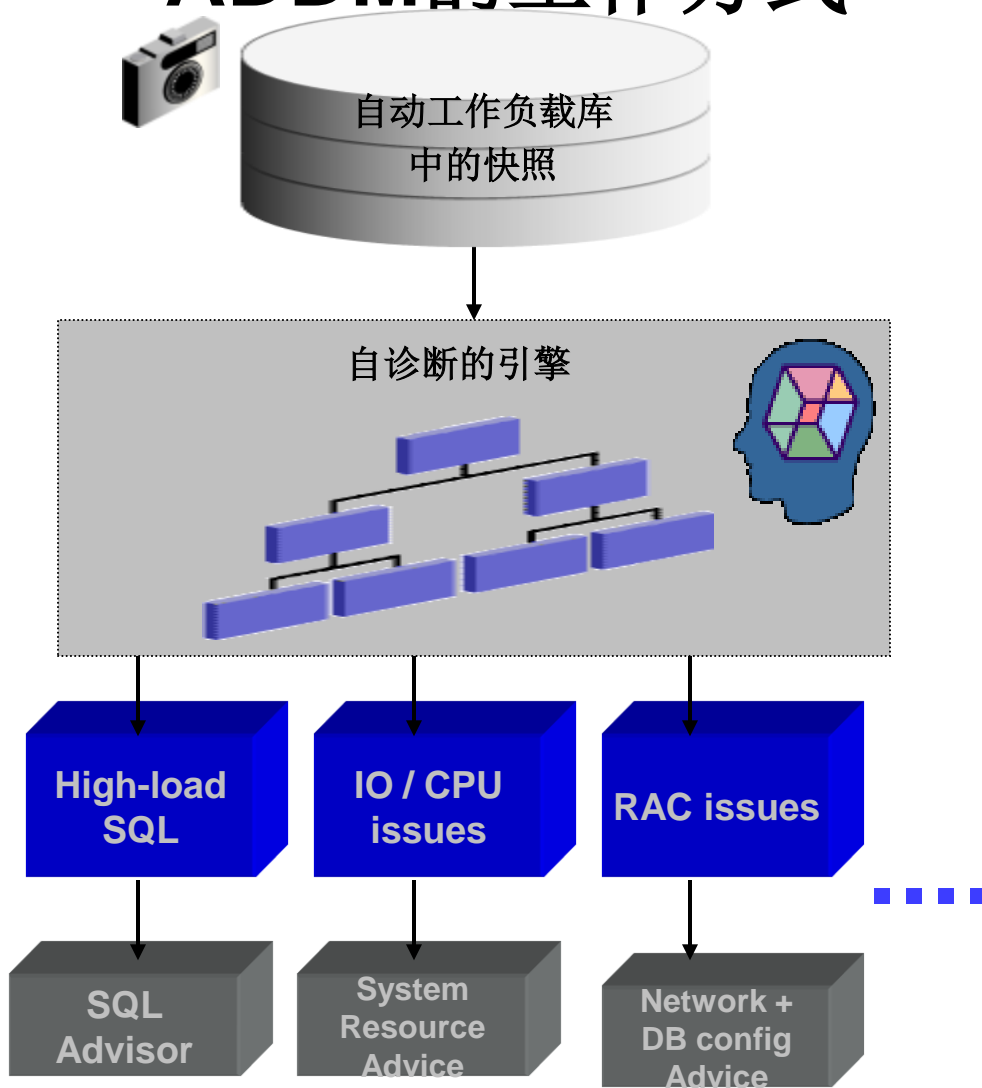
内置的、自动的性能统计数据库



ADDM 性能监控



ADDM的工作方式



- 使用AWR的快照自上向下的分析
- 以吞吐量为中心-集中于减少‘DB time’时间
- 分类树-基于几十年的Oracle性能调整专家技术
- 实时的结果
 - 不需要等几个小时才看到结果
- 查明根本原因
 - 从根本原因辨别出症状
- 报告出非问题区域
 - 例如，I/O不是性能问题的原因

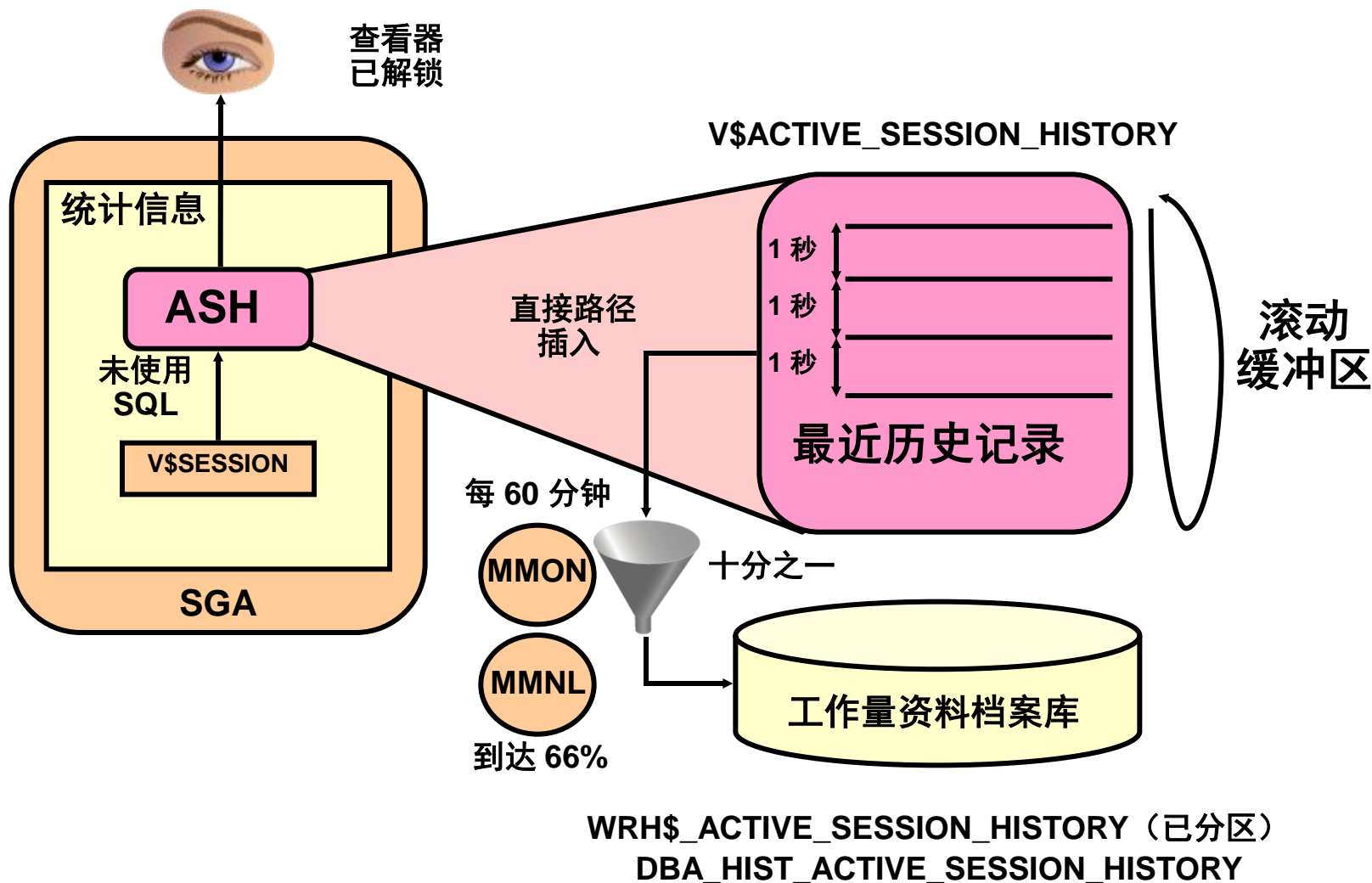
ADDM可以自动诊断的性能问题

- Top SQL
- I/O 问题
 - 热文件, 带宽
- 分解
 - Hard, Soft, Failed
- 配置问题
 - Log文件大小
 - Log缓冲大小
 - 归档
 - MTTR的设置
- 应用的使用
- 过多的Logon/Logoff
- 分配不足的内存
 - SGA, PGA
- 热块和对象
 - Buffer Busy Waits
 - Cache Buffer Chain Latches
- RAC服务问题
 - Network, LMS, Remote Instance
- 锁 & ITL冲突
- 检查点问题

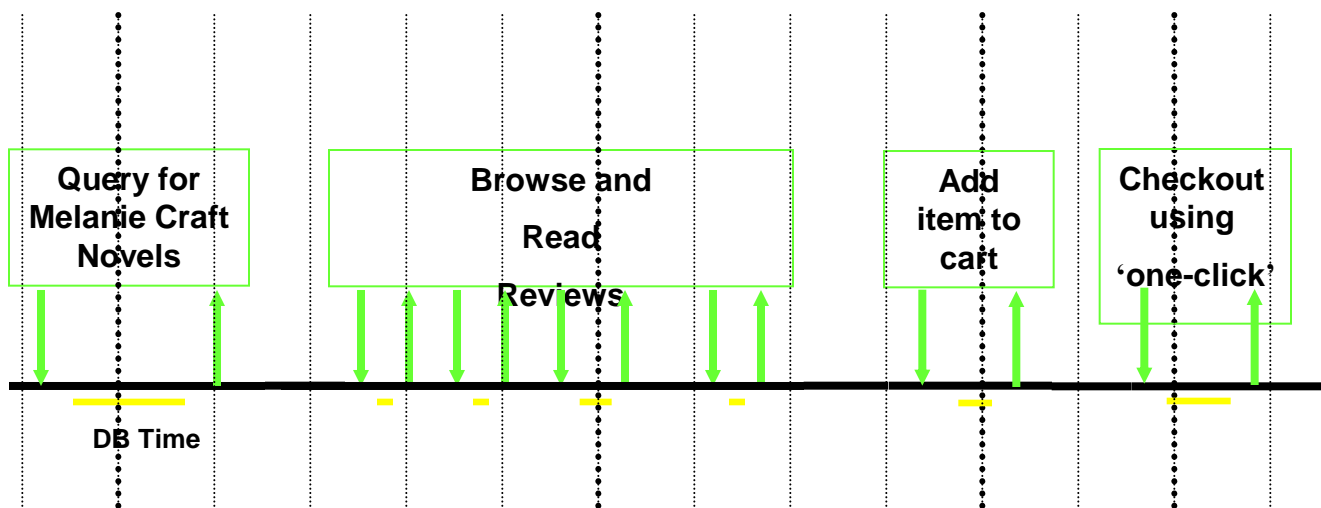
活动会话历史记录(ASH): 概览

- 存储数据库时间的历史记录
- 系统中的样本会话活动包括:
 - SQL 语句的 SQL 标识符
 - 对象编号、文件编号和块编号
 - 等待事件标识符和参数
 - 会话标识符和会话序列号
 - 模块和操作名称
 - 会话的客户机标识符
 - 服务散列标识符
 - 阻塞会话
- 对于首次故障分析始终处于打开状态
- 无需重放工作量

活动会话历史记录(ASH): 技术



活动会话历史 (ASH)



| Time | SID | Module | SQL ID | State | Event |
|---------|-----|----------------|---------------|---------|-------------------------|
| 7:38:26 | 213 | Book by author | qa324iff... | WAITING | db file sequential read |
| 7:42:35 | 213 | | | CPU | |
| 7:50:59 | 213 | | hk32pekfcdbfr | WAITING | buffer busy wait |
| 7:52:33 | 213 | One click | abngldf95f4de | WAITING | log file sync |

细粒度的活动历史

Diagnostic Pack 诊断工具包

ORACLE Enterprise Manager 10g
Database Control

[Setup](#) [Preferences](#) [Help](#) [Logout](#)

[Database](#)

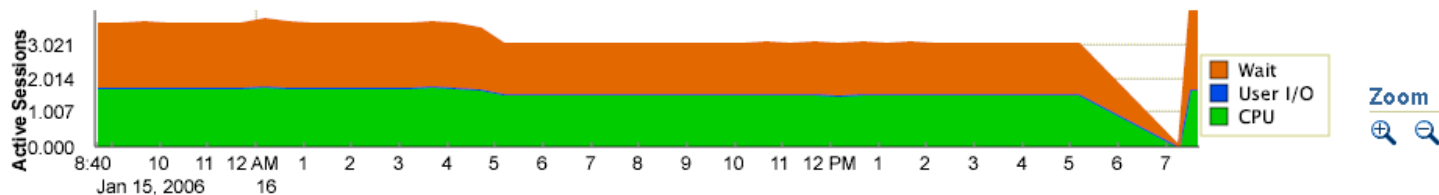
[Database Instance: r2e](#) > [Advisor Central](#) > Automatic Database Diagnostic Monitor (ADDM)

Automatic Database Diagnostic Monitor (ADDM)

ADDM自动识别出CPU利用率
过高是由于SQL语句的大量
重复解析造成的.....

Database Activity

The icon selected below the graph identifies the ADDM analysis period. Click on a different icon to select a different analysis period.



TIP For an explanation of the icons and symbols used in this page, see the [Icon Key](#)

Performance Analysis

Task Name [ADDM:2389503869_1_19195 \(End Time:Jan 16, 2006 7:40:05 PM\)](#)

Time Range **Jan 16, 2006 7:15:00 PM to Jan 16, 2006 7:45:00 PM**

[View Snapshots](#)

[View Report](#)

Database Time (minutes) **37.5**

Period Start Time **Jan 16, 2006 7:30:46 PM PST**

Period Duration (minutes) **9.3**

Task Owner **SYS**

Average Active Sessions **4**

| Impact (%) | Finding | Recommendations |
|------------|--|--|
| 100 | Host CPU was a bottleneck and the instance was consuming 86% of the host CPU. All wait times will be inflated by wait for CPU. | 1 Application Analysis 1 Host Configuration |
| 84.1 | SQL statements were not shared due to the usage of literals. This resulted in additional hard parses which were consuming significant database time. | 1 Application Analysis |

Informational Findings

ORACLE

Diagnostic Pack诊断工具包

Database Instance: r2e > [Advisor Central](#) > [Automatic Database Diagnostic Monitor \(ADDM\)](#) > Performance Finding Details

Logged in As SYS

Performance Finding Details

Database Time (minutes) **37.5**
Task Owner **SYS**

Period Start Time **Jan 16, 2006 7:30:46 PM PST**
Task Name **ADDM:2389503869_1_19195**


Period Duration (minutes) **9.3**
Average Active Sessions **4**

Finding **SQL statements were not shared due to the usage of literals. This resulted in additional hard parses which were consuming significant database time.**
Impact (minutes) **31.6**
Impact (%)  **84.1**

解释如何诊断这个性能问题的原因，并提供建议的解决方案



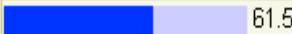
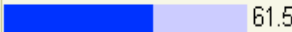
Recommendations

[Show All Details](#) | [Hide All Details](#)

| Details | Category | Benefit (%) ▾ |
|----------------------|--|---|
| Hide | Application Analysis |  84.1 |
| Action | Alternatively, you may set the parameter "cursor_sharing" to "force". Implement | |
| Action | Investigate application logic for possible use of bind variables instead of literals. | |
| Rationale | At least 1749 SQL statements with PLAN_HASH_VALUE 3191477378 were found to be using literals. Look in V\$SQL for examples of such SQL statements. | |

Findings Path

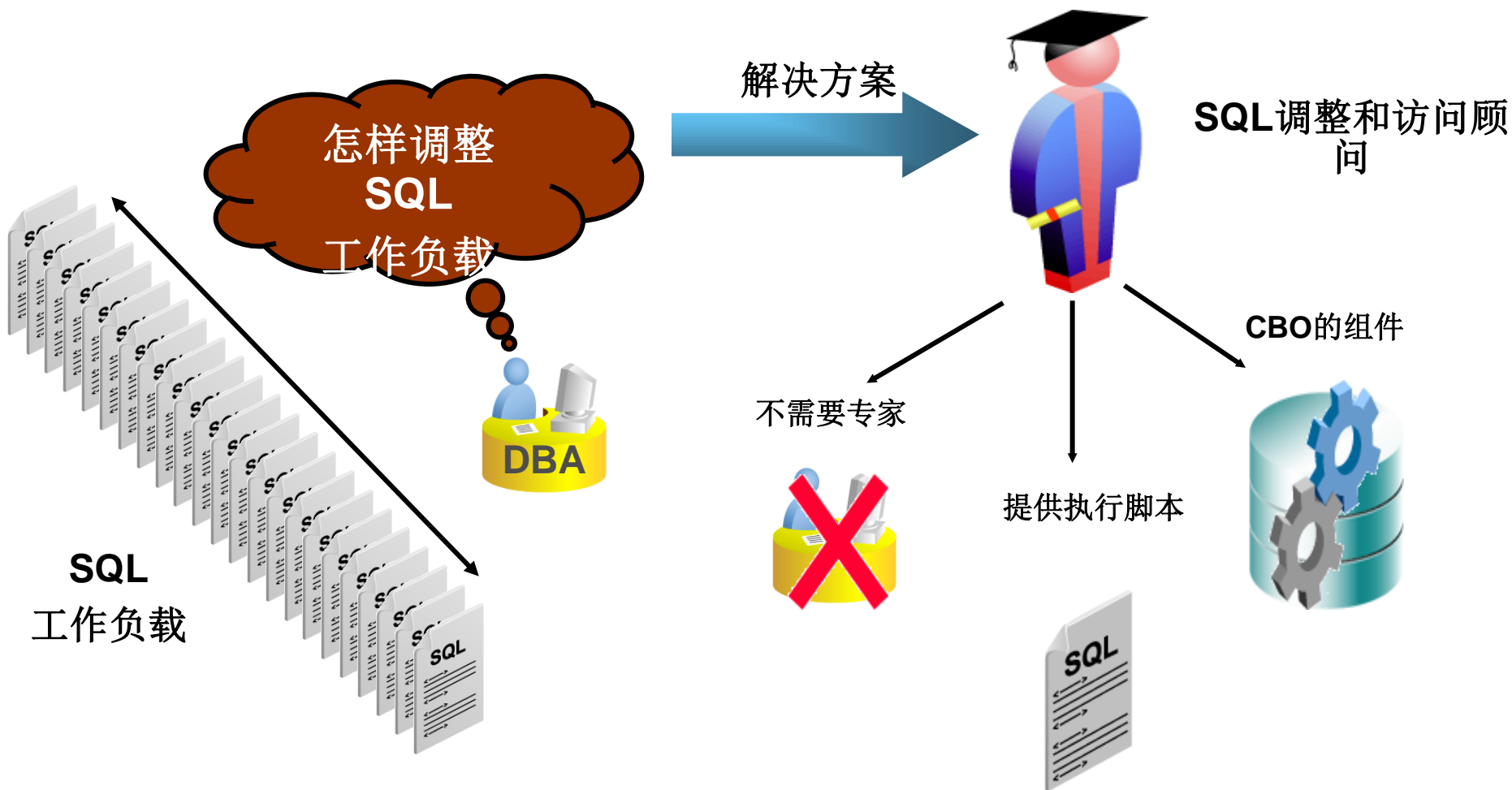
[Expand All](#) | [Collapse All](#)

| Findings | Impact (%) | Additional Information |
|--|---|--|
| SQL statements were not shared due to the usage of literals. This resulted in additional hard parses which were consuming significant database time. |  84.1 | |
| Hard parsing of SQL statements was consuming significant database time. |  86.3 | |
| Contention for latches related to the shared pool was consuming significant database time. |  61.5 | Additional Information |
| Wait class "Concurrency" was consuming significant database time. |  61.5 | |

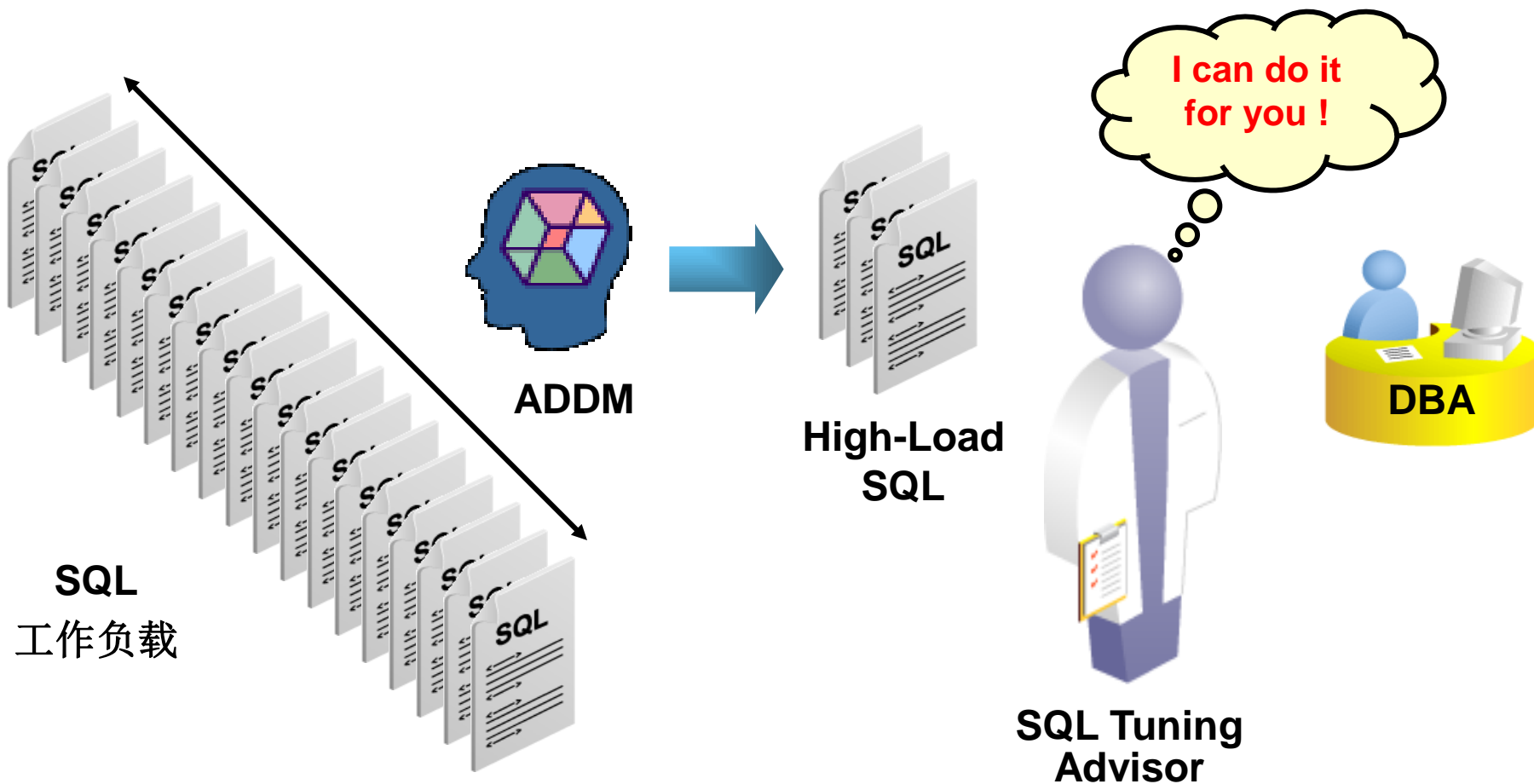
SQL优化

- 提供全面的、自动的、高效的性能调整解决方案
- 显著的降低数据库管理成本
- 提高性能和可靠性
- 包括：
 - SQL Tuning Advisor, SQL优化向导功能
 - SQL Access Advisor, SQL访问向导功能, 可以通过索引、汇总表, 来提高SQL语句的访问效率
 - SQL Tuning Sets
 - Reorganize Objects, 碎片整理功能

SQL调整 and 访问顾问

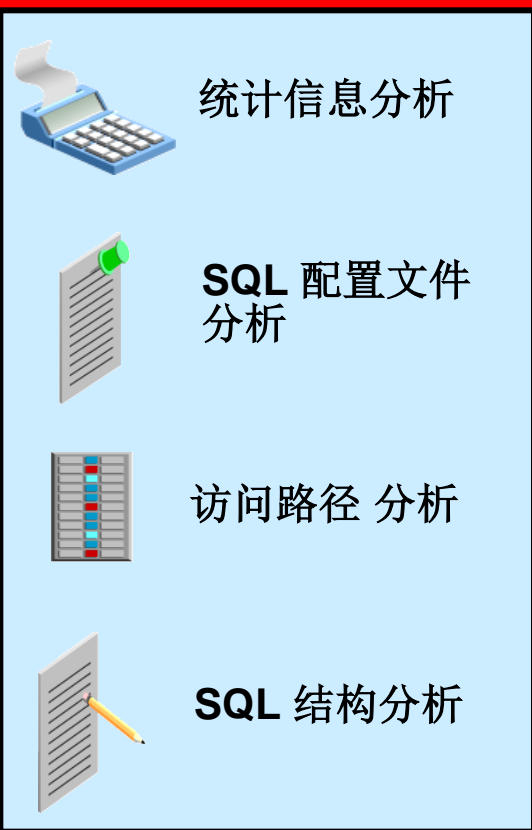


Oracle 自动化的SQL调整过程



自动、全面的 SQL 优化

自动调整的优化器



SQL 建议器



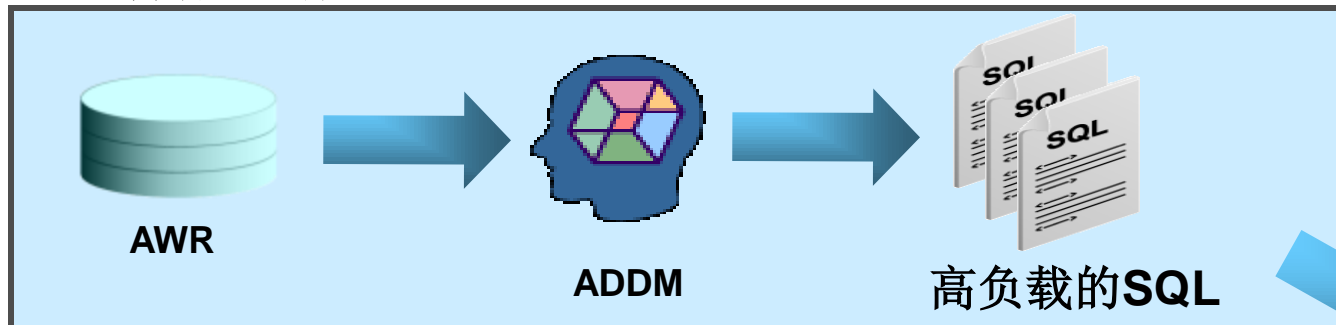
SQL 调整建议

-
- Diagram illustrating the SQL Tuning Advisor (STA) recommendations, represented by a person icon holding a clipboard, with four blue arrows pointing to the following actions:
- 收集丢失或陈旧的统计信息 (Collect missing or stale statistics)
 - 创建 SQL 配置文件 (Create SQL configuration file)
 - 添加丢失的索引 (Add missing indexes)
 - 修改 SQL 结构 (Modify SQL structure)



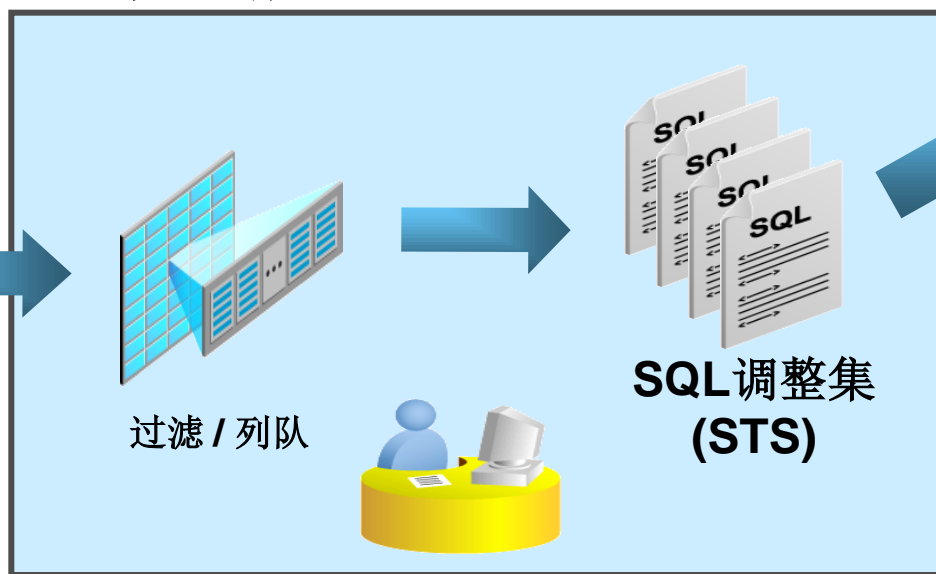
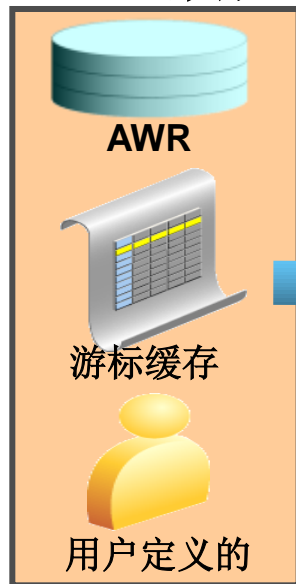
SQL调整顾问使用场景

自动的选择



SQL来源

手工选择



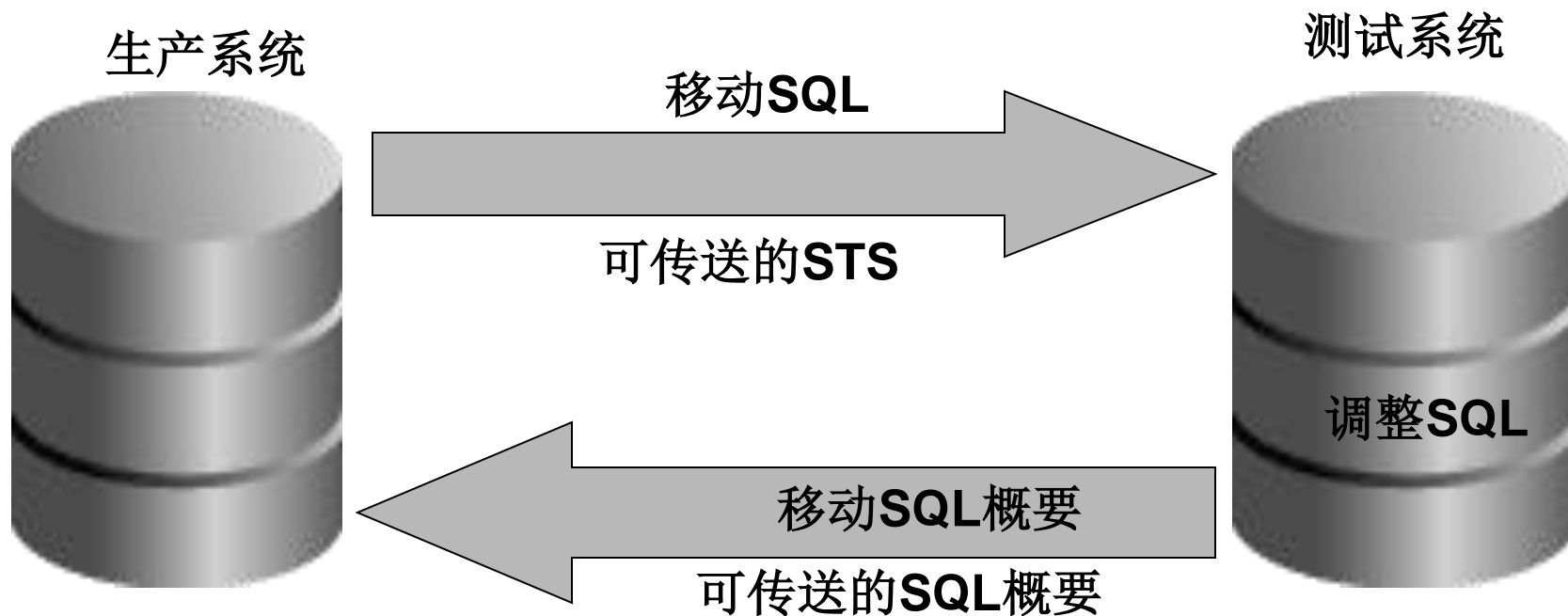
SQL调整顾问

SQL调整集(STS)

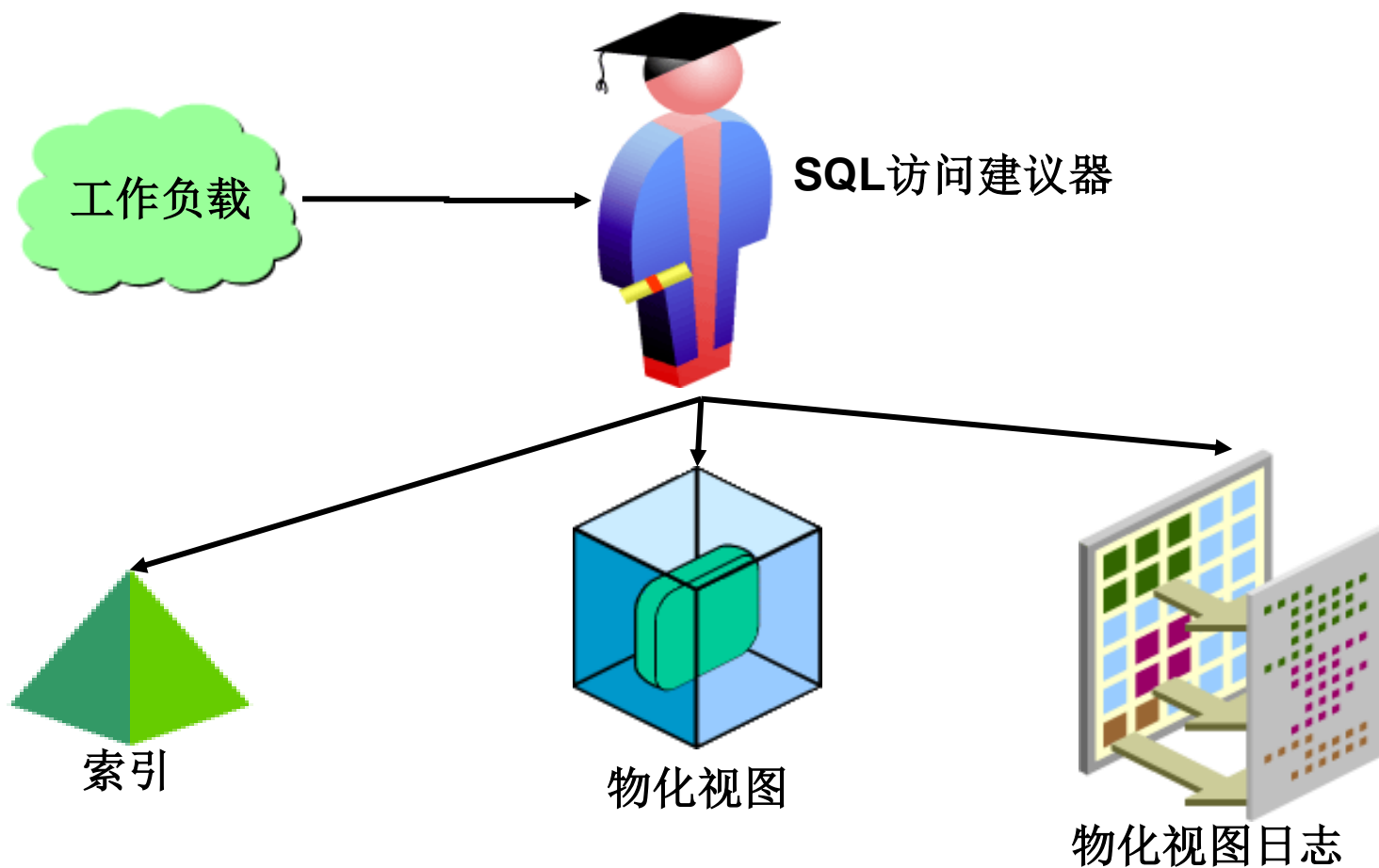
- 数据库10g后的新的用于捕获和管理SQL工作负载的对象
- 存放SQL语句和:
 - 执行上下文: 解析用户, 绑定值, 等.
 - 执行统计信息: CPU时间, 流逝的time, 执行的个数, 等.
- 可在数据库间传送 (>10.2):
 - 允许远程调整
- 从任何SQL源创建
 - AWR, 游标缓存, 用户定义的工作负载, STS

远程SQL调整

- 用来防护SQL顾问对生产系统的性能影响



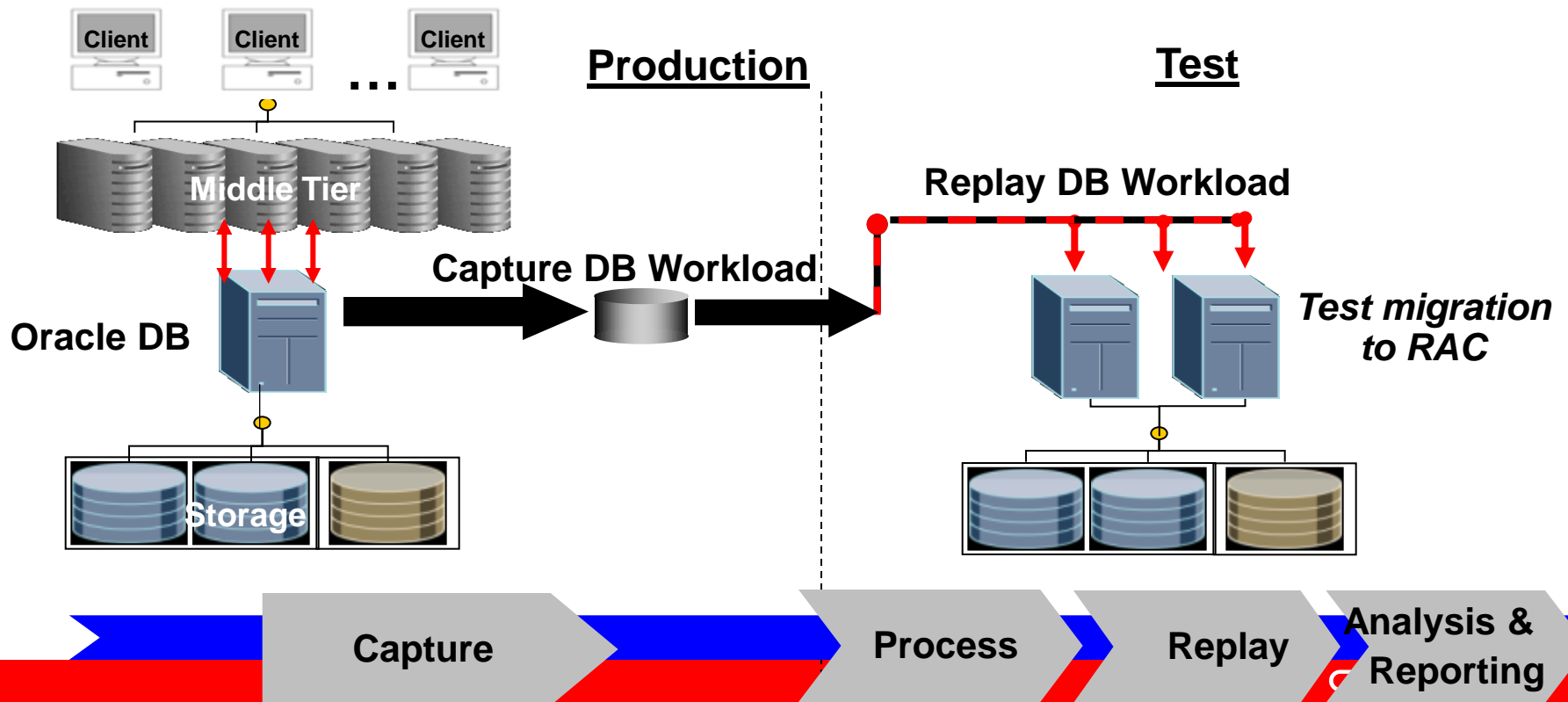
SQL访问建议器



Real Application Testing

Database Replay

- 在测试环境中重新创建实际生产数据库负载
- 可以按照生产系统的时间环境在测试系统中重现工作负载
- 在投入生产系统之前分析和解决问题



通过SQL Performance Analyzer 确定性能下降的SQL

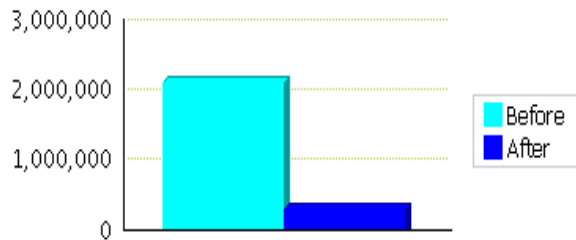
SQL Replay Analysis Result: STE_PAT

Task Name **STE_PAT**
Task Owner **SYSTEM**
Task Description

SQL Tuning Set Name **STE_123**
STS Owner **SYSTEM**

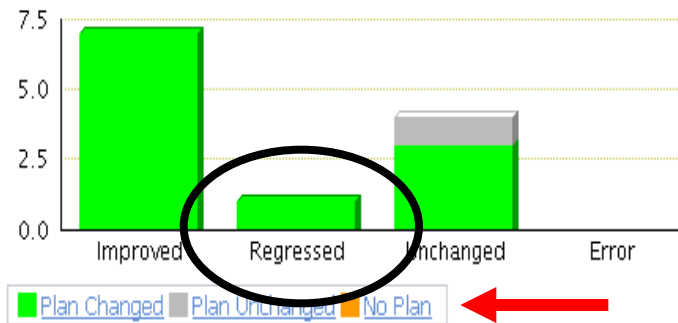
Global Statistics

Projected Workload Buffer Gets



Improvement Impact [+86.692%](#)
Regression Impact [-0.080%](#)
Overall Impact [+86.612%](#)

SQL Statement Count

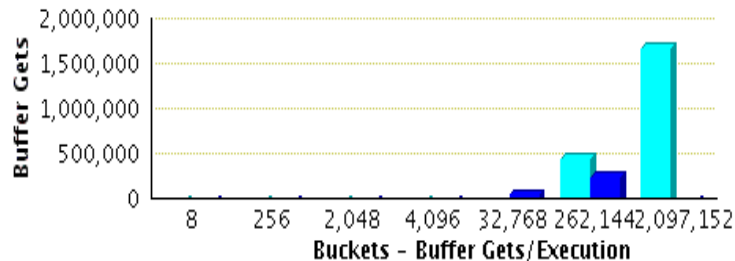


Recommendations

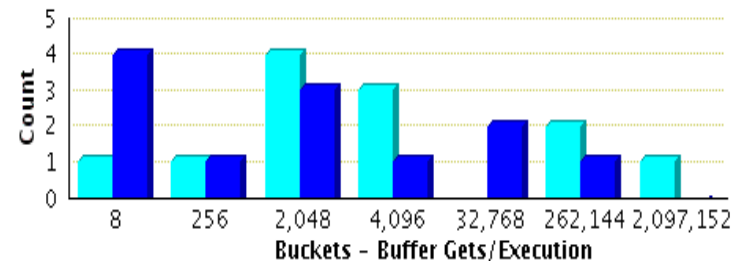
Run SQL Tuning Advisor to tune regressed SQL statements.

[Run SQL Tuning Advisor](#)

Projected Workload Buffer Gets Distribution



Single Execution SQL Statement Count Distribution





QUESTIONS ANSWERS