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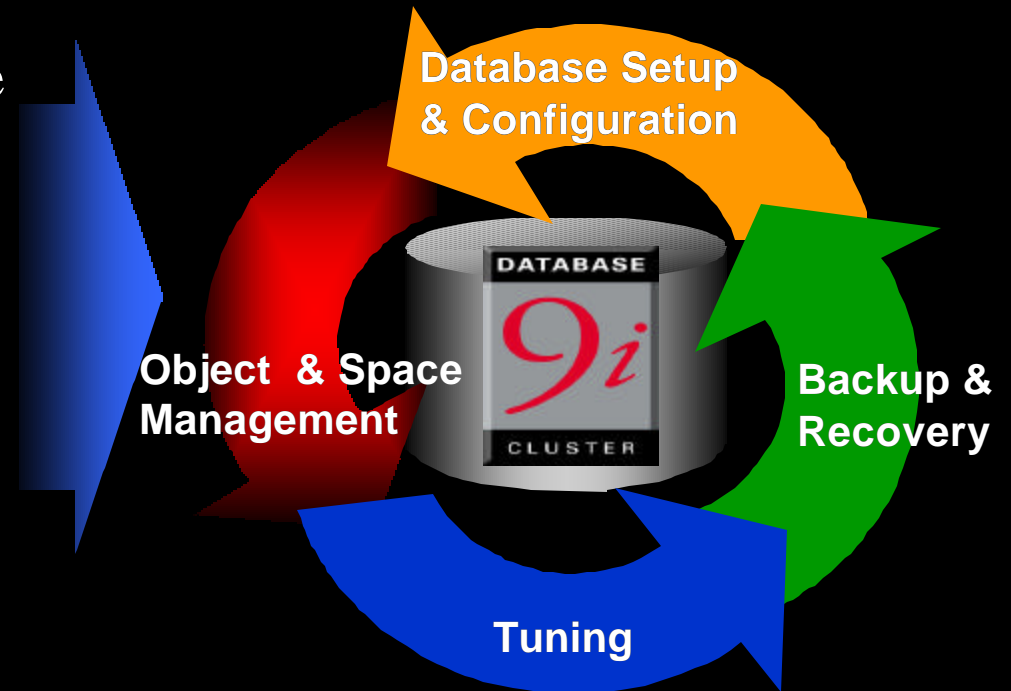# Oracle9*i*

Database Administration
Best Practices

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Agenda

- Introduction

- System & Database Configuration

- Space & Object Management

- Performance Tuning

- Backup & Recovery

- Summary

- Q & A

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Introduction

- Identify key database server practices that will help
    - minimize complexity
    - enhance performance
    - increase reliability
    - reduce cost

Database Setup & Configuration

Backup & Recovery

DATABASE 9i CLUSTER

Object & Space Management

Tuning

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"While Oracle has always included significant functionality in its DBMS product, it generally requires various 'tuning' to achieve the desired results . (Oracle)9i automates many secondary processes, enabling easier management and DBA user friendliness."

- Mark Shainman, META Group

"Enhanced administration and database management capabilities allow our customers to reduce their administrative and operational costs, while improving availability and performance of their systems ."

- Karl Buttner, President, 170 Systems

System & Database Configuration

- System Configuration

    - SAME storage configuration method

- Database Creation

    - DBCA

System Storage Configuration: SAME

- SAME (Stripe and Mirror Everything) is a storage configuration method proposing
  - stripe all files across all disks
    - use 1M stripe width
    - consider I/O bandwidth needs when sizing storage subsystems
    - keep redo logs on separate disks if storage subsystems cannot cache write operations
  - mirror all data

System Storage Configuration: SAME
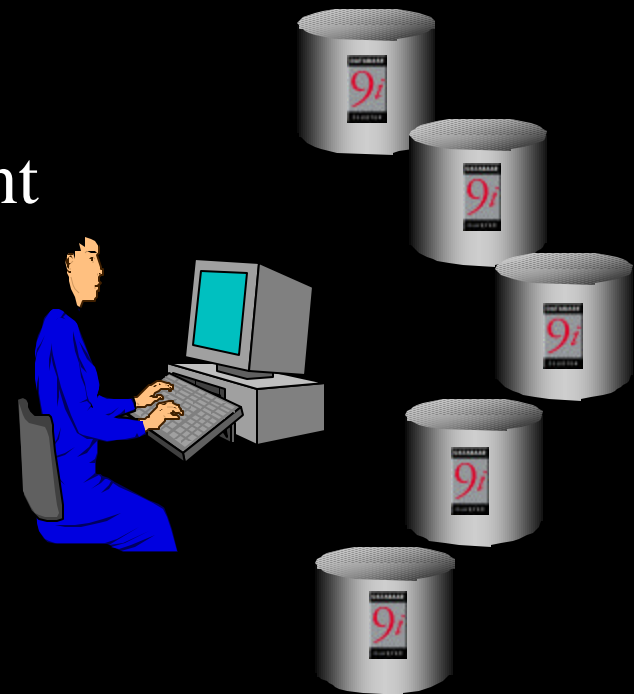
- Benefits
    - simplifies storage configuration
    - works for all workloads, e.g., OLTP, data warehouse, batch
    - eliminates I/O hot spots
    - maximizes bandwidth
    - not tied to any particular storage management solution
    - cognizant of current trends in system storage and Oracle database technology advancements

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Database Creation: DBCA

- GUI tool for creating, altering, and removing databases
- Benefits
  - automates all steps required in database creation
  - recommends optimal configuration settings
  - facilitates db cloning through templates
    - templates: XML files that store db structure definition
      - clone db structure and data
      - clone structure only
    - automate db creation

Space & Object Management

- Automatic Undo Management

- Locally Managed Tablespaces

- Temporary Tablespaces

- Automatic Segment Management

Automatic Undo Management

- Automatic management of undo segments
- Benefits
  - obsoletes creation/management of rollback segments
  - eliminates ORA-1555 (snapshot too old)
  - enables self-service error correction (Flashback)
  - minimizes undo contention
- Implementation
  - specify UNDO_MANAGEMENT=AUTO
    UNDO_RETENTION in initialization file
  - create Undo tablespace
  - EM has a utility that facilitates sizing of Undo tablespace

Locally Managed Tablespaces

- Manage space locally using bitmaps
- Benefits
  - no tablespace fragmentation issues
  - better performance handling on large segments
  - lower contention for central resources, e.g., no ST enqueue contention
  - fewer recursive calls
- Implementation
  - specify "EXTENT MANAGEMENT LOCAL" clause during tablespace creation
 - in-place migration

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(Default) Temporary Tablespace

- Special tablespace used for sorts, hash joins, etc.
- Benefits
  - improved concurrence of multiple sort operations
  - reduction in space management operations
  - does not need to be backed up
  - protection from using SYSTEM tablespace erroneously
- Implementation
  - CREATE TEMPORARY TABLESPACE <name> TEMPFILE <file-name> SIZE <size> EXTENT MANAGEMENT LOCAL
  - specify "DEFAULT TEMPORARY TABLESPACE" clause of CREATE or ALTER DATABASE command

Automatic Segment Management

- Automatic intra-object space management
- Benefits
    - simplified administration (no more FREELISTS, FREELIST GROUPS, PCTUSED)
    - improved space utilization
    - enhanced performance
- Implementation
    - specify "SEGMENT SPACE MANAGEMENT AUTO" clause during tablespace creation
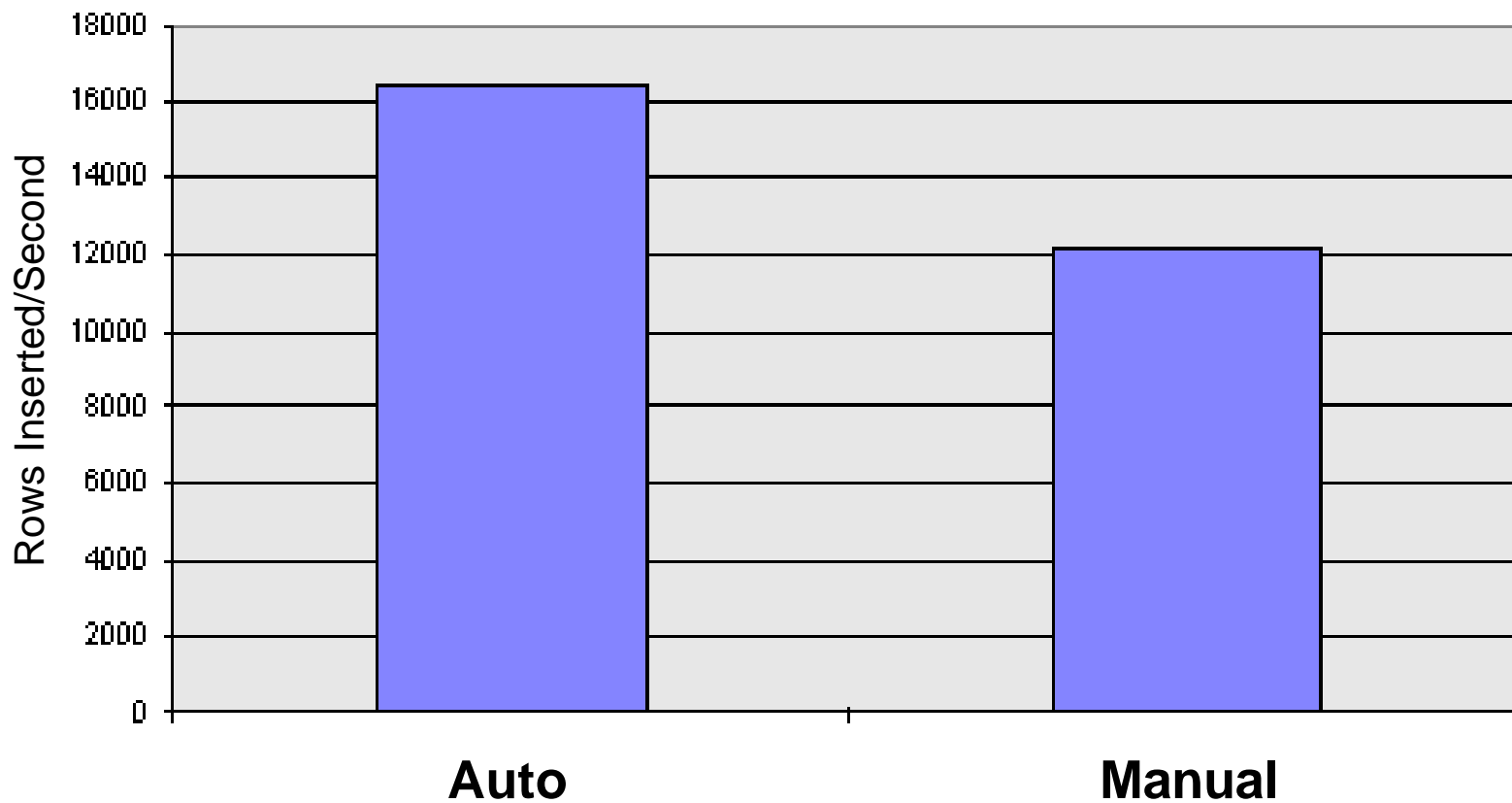
Performance Tuning

- Methodology
- Memory Tuning
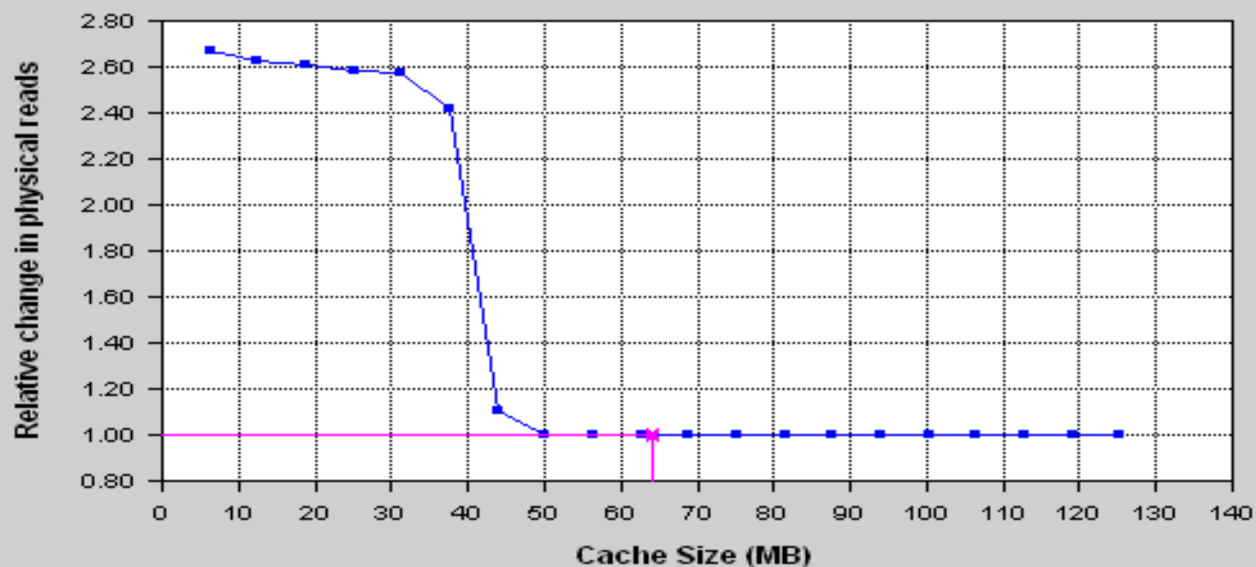 - Buffer Cache Tuning
  - PGA Tuning
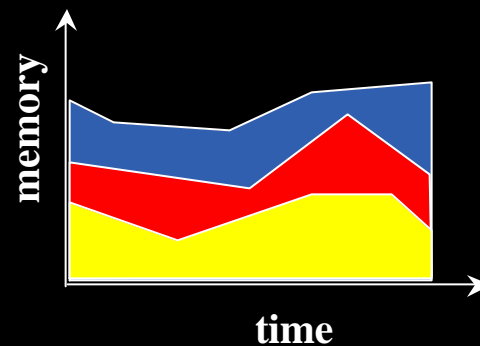
Methodology

- Gather statistics
    - establish a baseline
    - use StatsPack diagnostic tool
- Identify problem areas
    - analyze wait events and basic hit ratios
- Determine potential solutions
- Implement solutions
    - "change one thing at a time"
- Repeat the process

Memory Tuning: Buffer Cache Advisory

- Internal simulation to predict cache "miss" rates for different buffer cache sizes
- Simulation externalized through
    - data dictionary view V$DB_CACHE_ADVICE
    - a graphical view in Enterprise Manager (EM)

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Memory Tuning: Buffer Cache Advisory

- Benefits
  - determines size of buffer cache necessary for optimal performance for current workload
  - takes "mystery" out of buffer cache tuning
  - minimal performance overhead

- Implementation
  - set DB_CACHE_ADVICE=ON in initialization file or using ALTER SYSTEM command

Memory Tuning: Auto PGA Management

- Database server intelligently determines the necessary SQL work area for various processes
- Benefits
    - efficient utilization of SQL Work Area memory for optimal performance
    - simplified management
    - adaptability to changing workload

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Memory Tuning: Auto PGA Management

- Implementation
    - Set PGA_AGGREGATE_TARGET in initialization file or use ALTER SYSTEM command

- Upcoming enhancement
    - PGA Advisory similar to Buffer Cache Advisory will be introduced soon in a future release
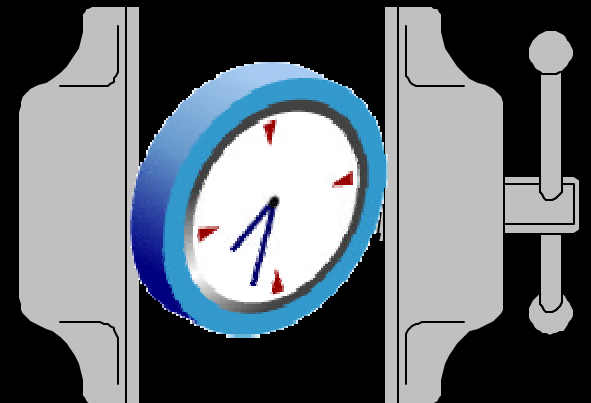
Backup & Recovery

- Instance Recovery
  - MTTR Target

- Media Recovery
  - Backup Strategy
  - Recovery Strategy

Backup & Recovery

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Instance Recovery: MTTR Target

- Bounds instance recovery time
- Benefits
    - makes instance recovery time predictable
    - protects large systems from long recovery times
- Implementation
    - set initialization parameter FAST_START_MTTR_TARGET
    - Future enhancement: MTTR advisory

Media Recovery

- Backup Strategy
  - logical backup
    - exports
  - physical backup
    - database must be in Archivelog mode
    - files must be backed up frequently on a regular basis
- Backup Tool
  - Recovery Manager (RMAN)
  - Backup Solutions Program
    - http://otn.oracle.com/deploy/availability

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Media Recovery

- Plan and test for
  - media failure
    - restore files from backup and roll forward
  - human error
    - Flashback Query, LogMiner
  - data block corruption
    - block media recovery
  - disasters
    - standby database
    - Data Guard automates management of standby databases

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Summary

Best Practices Checklist

1. SAME	Yes
2. DBCA	Yes
3. Automatic Undo Management	Yes
4. Locally Managed Tablespaces	Yes
5. Temporary Tablespaces	Yes
6. Automatic Segment Management	Yes
7. Buffer Cache Advisory	Yes
8. Automatic PGA Tuning	Yes
9. Formal Backup & Recovery Strategy	Yes

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