
New Features in Database 11gR2

... you will not hear about from Oracle Corp.

presentation for:




Vancouver Oracle Users Group
March 2010

Introduction

- Daniel Morgan – damorgan11g@gmail.com
- Oracle Ace Director 🏆
- University of Washington, retired
- The Morgan of Morgan's Library on the web
 - www.morganslibrary.org/library.html
- Board of Directors: Western Washington Oracle Users Group
- Member: UK Oracle Users Group
- Former Member: Oracle Applications Users Group
- Frequent speaker
- Oracle since version 6
- 11gR1 and R2 beta test site



Morgan's Library: www.morganslibrary.org




Morgan's Library

www library

Morgan's 2010 - 2011 Calendar

Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan

Stanley meets: Charles Phillips, Tom Kyte, Mark Townsend, and Willie Hardie: ... Who's next?



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Presentations Map




Oracle's Hiring



Training Events


- **RMOUG** - Feb 16 - Feb 18, Denver, CO
- **VanOUG** - Early March: Watch for more
- **NZOUG** - Mar 15 - Mar 16, Rotorua, NZ
- **OUGN** - Apr 14-16, Oslo, Norway
- **OUGT** - May 17, Istanbul, Turkey
- **ORCAN** - May 18-19, Stockholm, Sweden
- **EMEA Harmony** - May 20-21, Tallinn, Estonia
- **ILOUG** - Jun 26, Herzlia, Israel

Oracle Events



Rocky Mountain Oracle Users Group: February

Morgan



aboard USA-71

Library News


- [Morgan's Notepad vi \(Blog\)](#)
- [Join the Western Washington OUG](#)
- [Morgan's Oracle Podcast](#)
- [DBA Best Practice Guidelines](#)
- [Bryn Llewellyn's PL/SQL White Paper](#)
- [Bryn Llewellyn's Editing White Paper](#)
- [Troubleshooting Performance](#)

ACE News

Would you like to become an Oracle ACE?

Learn more about becoming an ACE

- [ACE Directory](#)
- [ACE Google Map](#)
- [ACE Nomination Form](#)



America's Cup Boat USA-71



OpenWorld Unconference

Oracle OpenWorld *Unconference*

Monday - Oct 12

2pm

Overlook I: Fundamentals of Performance (Oracle ACE Director [Cary Millsap](#))

Overlook II: Oracle Scheduler: what front end tools are available: bring your own tools and demonstrate ! ([Ronald Rood](#), [Ciber](#))

Overlook III: [Hudson community meet up](#)

Tuesday - Oct 13

9am

Overlook I: What's New in Eleven ... Dot Two (that Oracle won't be talking about) presented by Oracle ACE Director Daniel Morgan

Overlook II: Creating Platform as a Service (PaaS) environments with WebLogic Server: Best Practices and Stories from the Trenches. (Bill Dettelback)

Overlook III: Reserved for onsite signups

10am

Overlook I: Oracle Indexes: Q & A Discussion With Oracle ACE Director Richard Foote

Overlook II: Experiences on Java programming within the databases, tips & tricks, tools, open source libraries and more. (Oracle ACE Marcelo F. Ochoa)



Overlook III: Reserved for onsite signups



Oracle OpenWorld 2009

**Oracle Advanced Compression in Oracle Database 11g Release 2:
Value/Performance (S307442)**

Thursday, Oct 15 09:00-10:00 *Moscone South, Room 102* Seats Available: 389

  [Email a Friend](#)

Track: Database
Secondary Track:

Description:

With the release of Oracle Advanced Compression in Oracle Database 11g Release 2, Oracle has implemented columnar compression and redefined the performance and value proposition. This session, hands-on in SQL*Plus, demonstrates Oracle Advanced Compression's new columnar storage capabilities in normal and partitioned heap tables, demonstrating the syntax and compression capabilities while highlighting the ability to leverage this new feature to generate substantial financial savings on storage subsystems.

Session Type: Conference Session
Tags: 11gac, Database, Database Maintenance
Length: 60 min
Speakers: [Daniel Morgan, University of Washington Instructor](#)
with co-presenter: Oak Table Network member Kevin Closson

Related Sessions:

New in 11gR1

New in 11gR1

- Oracle Database introduced a large number of new features. Among the most notable:
 - ADR
 - Flashback Archive
 - PL/Scope
 - Virtual Columns
 - Invisible Indexes
 - Read Only Tables
 - SKIP LOCKED
 - Interval Partitioning
 - System Partitioning
 - Reference Partitioning
 - New composite partition types
 - Pivot & Unpivot Operators

New in 11gR1

- Compound Triggers
- Follow Clause
- Continue Statement
- Improved Native Compilation
- Simple Integer Data Type
- New XML Functions
- Pragma Inline

New in 11gR1

- Many new packages, objects, and parameters in

- CTX_DDL
- DBMS_ADVISOR
- DBMS_AQ and DBMS_AQELM
- DBMS_AUTO_TASK
- DBMS_AW
- DBMS_CAPTURE_ADM
- DBMS_CDC_PUBLISH
- DBMS_CONNECTION_POOL
- DBMS_DATAPUMP
- DBMS_DRS
- DBMS_EXTENDED_TTS_CHECKS
- DBMS_FLASHBACK
- DBMS_HM

Connection Pool Management

Transaction Backout

Health Management

New in 11gR1

- DBMS_LOB
- DBMS_METADATA
- DBMS_MONITOR
- DBMS_NETWORK_ACL_ADMIN
- DBMS_ODCI
- DBMS_PREDICTIVE_ANALYTICS
- DBMS_REGISTRY
- DBMS_RESOURCE_MANAGER
- DBMS_RESULT_CACHE
- DBMS_SCHEDULER
- DBMS_SERVICE
- DBMS_SESSION
- DBMS_SHARED_POOL
- DBMS_SQL
- DBMS_SQLDIAG
- DBMS_SQLPA
- DBMS_SQLTUNE
- DBMS_STATS

Access Control Lists

Result Cache

New in 11gR1

- DBMS_STREAMS
- DBMS_SYSTEM
- DBMS_TTS
- DBMS_WARNING
- DBMS_WORKLOAD_CAPTURE
- DBMS_WORKLOAD_REPLAY
- DBMS_XA
- DBMS_XPLAN
- UTL_XML

Streams

PL/SQL Warnings

Real Application Testing

Distributed Transactions

Explain Plan

New in 11gR1

- And in 11.1.0.7
 - DBMS_AUDIT_MANAGEMENT
 - DBMS_BACKUP_RESTORE
 - DBMS_IR
 - DBMS_LOGSTDBY
 - DBMS_METADATA
 - DBMS_SCHEDULER
 - DBMS_SQLPA
 - DBMS_SQLTUNE
 - DBMS_WORKLOAD_CAPTURE
 - DBMS_WORKLOAD_REPLAY
 - DBMS_XPLAN
 - UTL_XML

Incident Reporting

What Oracle
will talk about
"here at OpenWorld"

What Oracle Will Talk About

- DBMS_REDEFINITION - 9.0.1
 - Tables, Constraints, Indexes, and Triggers
- Edition Based Redefinition - 11.2.0.1
 - Functions, Packages, Procedures, Synonyms, and Views
- New Grid Features
 - Single Node RAC
 - New ASM Capabilities
 - Omotion
 - DBFS
 - the Grid
- Advanced Compression
- Exadata V2 and Hybrid Columnar Compression

Bryn Llewellyn's White Papers


Library News

- [Morgan's Notepad vi \(Blog\)](#)
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- [Bryn Llewellyn's Editioning White Paper](#)
- [Troubleshooting Performance](#)

Doing SQL from PL/SQL: Best and Worst Practices

An Oracle White Paper
September 2008

PL/SQL-specific syntax.



```
-- Code 3
<<b>>declare
    Some_Value t.PK&type := 42;
    The_Result t%rowtype;
begin
    select      a.*
    into        b.The_Result
    from        t a
    where       a.PK = b.Some_Value;

    The_Result.v1 := 'New text';

    update     t a
    set        row = b.The_Result
    where      a.PK = b.The_Result.PK;

    The_Result.PK := -Some_Value;
    insert     into t
    values     The_Result;
end;
```

Resolution of names in embedded SQL statements.

Bryn Llewellyn's White Papers

Caveat

Prescribing best practice principles for programming any 3GL is phenomenally difficult. One of the hardest challenges is the safety of the assumption that the reader starts out with these qualities:

- Has chosen the right parents³.
- Has natural common sense coupled with well-developed verbal reasoning skills.
- Has an ability to visualize mechanical systems.
- Requires excellence from self and others.
- Has first class negotiating skills. (Good code takes longer to write and test than bad code; managers want code delivered in aggressive timeframes.)
- Has received a first class education.
- Can write excellent technical prose. (How else can you write the requirements for your code, write the test specifications, and discuss problems that arise along the way?)

Then, the reader would be fortunate enough to work in an environment which provides intellectual succor:

- Has easy access to one or several excellent mentors.

We all have our favorite customers: This is mine



**Store
More
Data**

**Maintain
Performance**

**Honor
the same
Service
Level
Agreement**

**GB, TB, PB, EB
What's the
big deal?**

Hybrid Columnar Compression on Exadata V2

Warehouse Compression

- 10x average storage savings
- 10x reduction in Scan IO

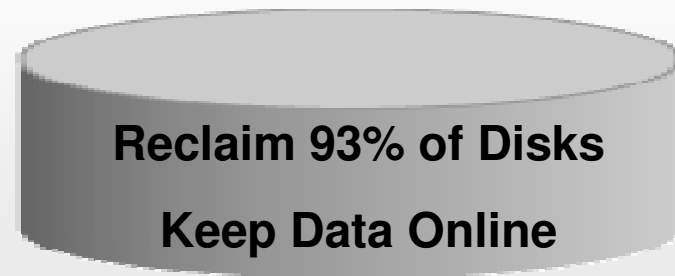
Optimized for Speed



Archive Compression

- 15x average storage savings
 - **Up to 70x on some data**
- Some access overhead
- For cold or historical data

Optimized for Space



Totally application transparent

How Traditional Compression Works

- A grossly oversimplified "how it works"
 1. Oracle examines full blocks for duplicates
 2. Creates a symbol that is stored in the block header
 3. Rewrites the block substituting the symbol for the values it represents
- Compression is performed at the block level
not the table like DB2

City	State	Postal Code
Hot Springs National Park	AR	71901
Hot Springs National Park	AR	71902
Hot Springs National Park	AR	71903
Hot Springs National Park	AR	71913

128 bytes

City	State	Postal Code
Hot Springs National Park	AR	71901
"	"	"02
"	"	"03
"	"	"13

38 bytes

9.2 Data Segment Compression

- Heap Organized Tables
- Materialized Views

```
CREATE TABLE reg_tab AS
SELECT *
FROM dba_tables;
```

```
CREATE TABLE COMPRESS comp_tab AS
SELECT *
FROM dba_tables;
```

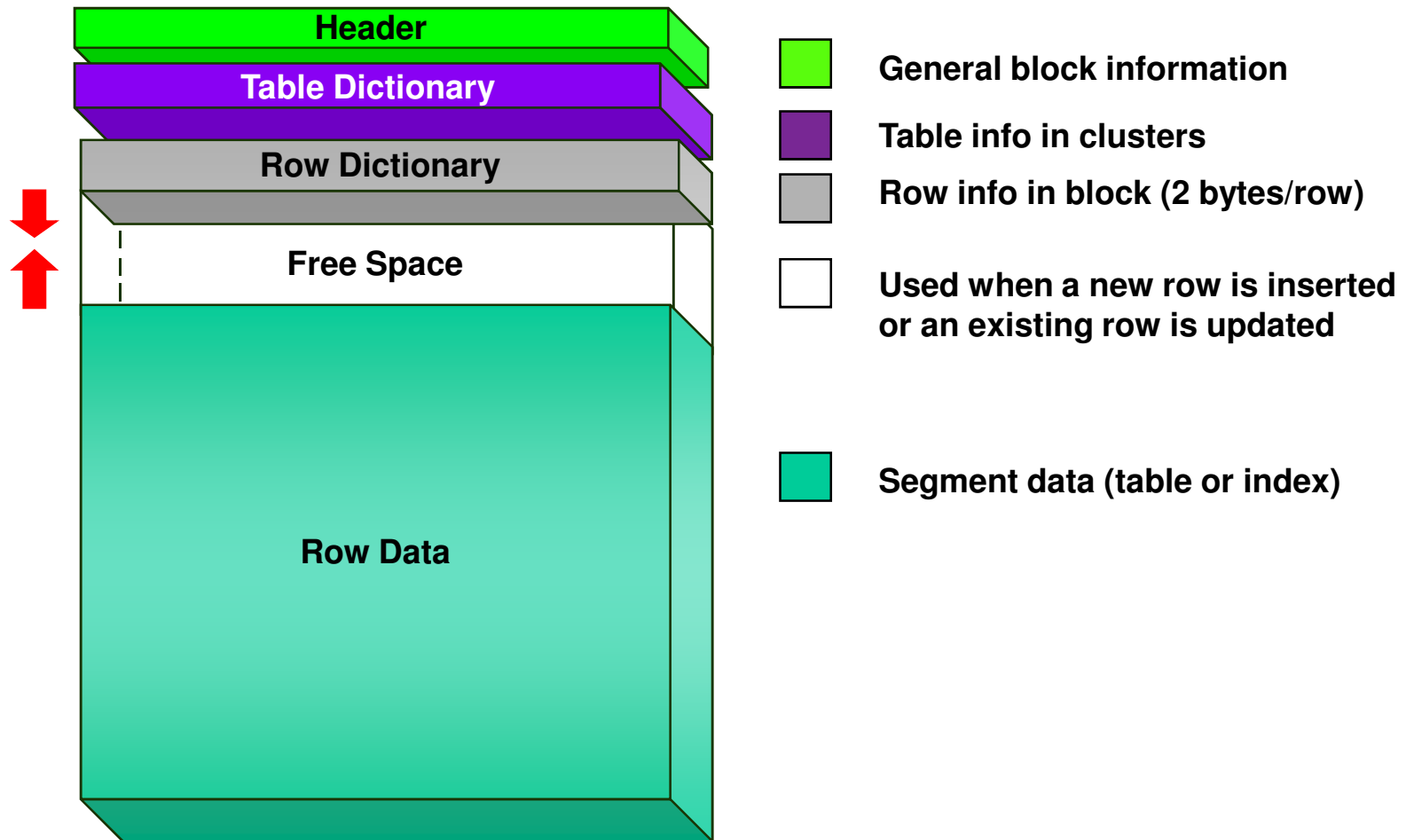
```
exec dbms_stats.gather_table_stats(USER, 'REG_TAB');
exec dbms_stats.gather_table_stats(USER, 'COMP_TAB');
```

```
SELECT table_name, blocks
FROM user_tables
WHERE table_name LIKE '%TAB';
```

```
SELECT table_name, blocks FROM user_tables WHERE table_name LIKE '%TAB';
```

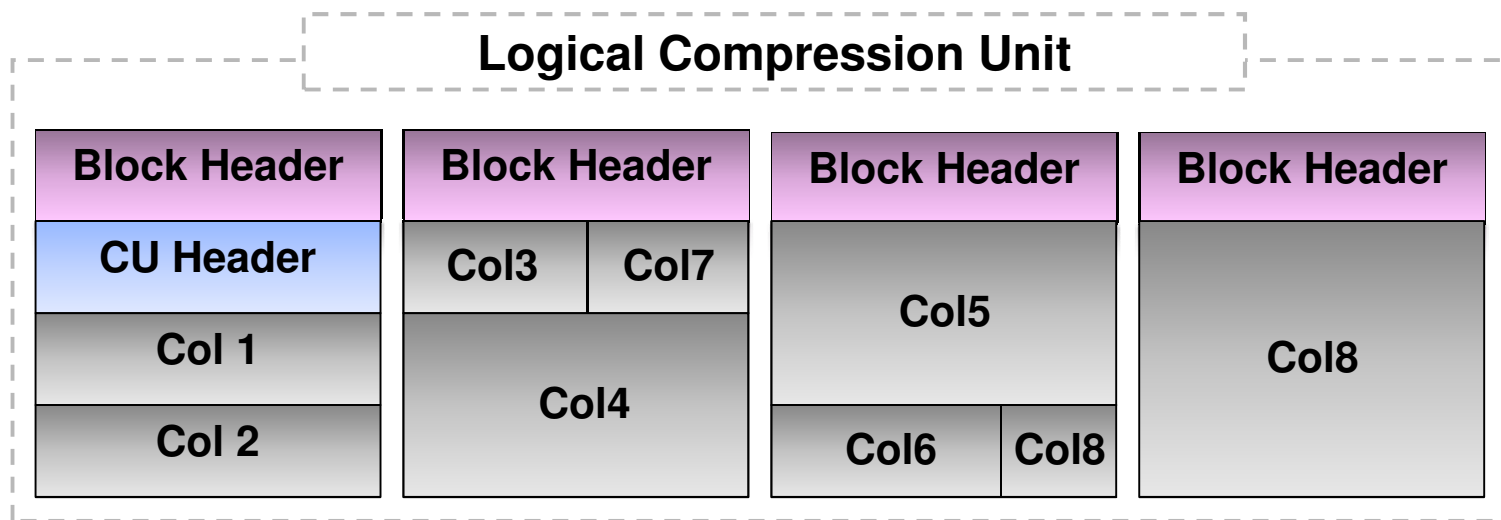
TABLE_NAME	BLOCKS
REG_TAB	109
COMP_TAB	20

Database Block Anatomy



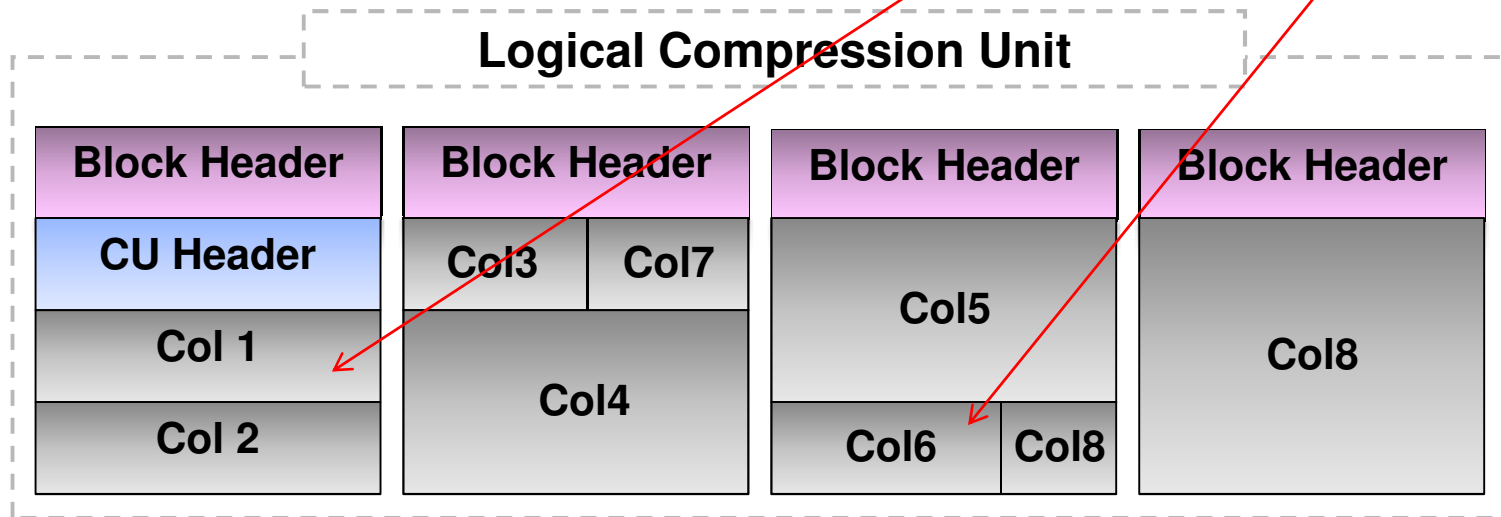
Logical Compression Unit

- Tables are organized into Compression Units (CU)
 - CU's are logical structure spanning multiple database blocks
 - Typically 32K - (4 x 8K block size)
 - Data is organized by column during data load
 - Each column is compressed separately
 - Column organization brings similar values close together



Logical Compression Unit

```
CREATE TABLE demo (  
  person_id    NUMBER(10),  
  first_name   VARCHAR2(20),  
  mid_initial  VARCHAR2(4),  
  last_name    VARCHAR2(35),  
  date_of_birth DATE,  
  hire_date    DATE,  
  status       VARCHAR2(5),  
  comments     VARCHAR2(500));
```



Business as Usual

- Fully supported with...
 - B-Tree, Bitmap Indexes, Text indexes
 - Materialized Views
 - Exadata Server and Cells
 - Partitioning
 - Parallel Query, PDML, PDDL
 - Schema Evolution support, online, metadata-only add/drop columns
 - Data Guard Physical Standby Support
- Will be supported in a future release
 - Logical Standby
 - Streams

HCC: Things to Consider ...

- When a row is updated
 - It is automatically migrated to OLTP Table Compression
 - Table size will increase moderately
 - All rows in the compression unit are locked
- When tables are queried
 - Table scans are faster due to less I/O
 - Index lookups are usually slower
 - Need to decompress the compression unit to read entire row

HCC's Performance Characteristics

	GB/s Physical	4 GFC HBAs	EHCC Reinflated Data Flow (GB/s)	Required Cores for "Primary Processing"
Generic System *	4	10	40	6.8
Database Machine	21 (disk)	N/A	210	35.7
	50 (flash)	N/A	500	85

- Division of work: Sun Oracle Database Machine has 112 processor cores for decompression and filtration
- A hypothetical equivalent non-Exadata system would need on the order of 10 cluster nodes just for decompression and filtration if provisioned 21 GB/s I/O

* Hypothetical as HCC is an Exadata Feature

Compression Advisor

- **DBMS_COMPRESSION** built-in package
 - **GET_COMPRESSION_RATIO**
Returns the possible compression ratio for an uncompressed table or materialized view and estimates achievable compression
 - **GET_COMPRESSION_TYPE**
Inspects data and reports what compression type is in use by row
- **Enterprise Manager Segment Advisor**
 - Estimates OLTP Table Compression automatically
 - Advises tables that will benefit from OLTP Compression

GET_COMPRESSION_RATIO

```
CREATE TABLE comp_test1 AS
SELECT * FROM dba_objects;
```

```
set serveroutput on
```

```
DECLARE
```

```
blkcnt_comp PLS_INTEGER;
blkcnt_uncm PLS_INTEGER;
row_comp    PLS_INTEGER;
row_uncm    PLS_INTEGER;
comp_ratio  PLS_INTEGER;
comp_type   VARCHAR2(30);
```

```
BEGIN
```

```
                                     tablespace    owner      table name  partition
dbms_compression.get_compression_ratio('UWDATA', 'UWCLASS', 'COMP_TEST1', NULL,
dbms_compression.comp_for_oltp, blkcnt_cmp, blkcnt_uncmp, row_comp, row_uncm,
comp_ratio, comp_type);
```

```
dbms_output.put_line('Block Count Compressed:      ' || TO_CHAR(blkcnt_comp));
dbms_output.put_line('Block Count UnCompressed:  ' || TO_CHAR(blkcnt_uncm));
dbms_output.put_line('Row Count Compressed:          ' || TO_CHAR(row_comp));
dbms_output.put_line('Row Count UnCompressed:       ' || TO_CHAR(row_uncm));
dbms_output.put_line('Block Count Compressed:       ' || TO_CHAR(comp_ratio));
dbms_output.put_line('Compression Type:            ' || comp_type;
```

```
END;
```

```
/
```

GET_COMPRESSION_TYPE

```
CREATE TABLE comp_test2
COMPRESS FOR OLTP AS
SELECT * FROM dba_objects;

set serveroutput on

DECLARE
  rid ROWID;
  n NUMBER;
BEGIN
  SELECT MAX(rowid)
  INTO rid
  FROM comp_test2;

  n := dbms_compression.get_compression_type(USER, 'COMP_TEST2', rid);
  dbms_output.put_line(n);
END;
/
```

New in 11gR2 and
you won't hear about
from your Oracle rep

What's Deprecated

- ALTER USER AUTHENTICATED USING PASSWORD
 - "has been deprecated for this release. If you use this clause, Oracle Database converts it to the AUTHENTICATION REQUIRED clause. If you do not specify the AUTHENTICATION REQUIRED clause, then Oracle Database uses either the AUTHENTICATED USING CERTIFICATE clause or the AUTHENTICATED USING DISTINGUISHED NAME clause."
- DB_EXTENDED Audit Syntax
 - Instead, use the DB, EXTENDED
- Listener Passwords
 - "This does not cause a loss of security because authentication is enforced through local operating system authentication."
- WKUSER Role and Ultra Search Schemas Deprecated
- DBCA no longer provides default security settings

Database Level Changes

- Structure changes in the ADR
- DataGuard Compressed Table Support for Logical Standby and LogMiner
- DataPump Legacy Mode
- ALTER SYSTEM SET cpu_count = 4;

Demo

Execute for Directory Objects

- In 10g we granted READ and/or WRITE
- But this also allowed executing the ORACLE_LOADER access driver
- Only a user that has been given EXECUTE access to the directory object is allowed to run programs in it

```
CREATE DIRECTORY stage on /home/oracle/stage
```

```
GRANT read ON stage;
```

```
GRANT write ON stage;
```

```
GRANT execute ON stage;
```

RAC Clusters

- In-Memory Parallel Query

- Traditionally, parallel execution has access to large amounts of data by taking full advantage of the system's I/O capacity
- In an Oracle RAC environment, Oracle maps fragments of the object into each of the buffer caches on the active instances
- As clusters scale-out this new functionality optimizes large parallel operations by minimizing or eliminating physical I/O if parallel operation can be satisfied in memory

```
parallel_adaptive_multi_user=TRUE  
parallel_automatic_tuning=FALSE  
parallel_degree_limit=CPU  
parallel_force_local=FALSE
```

Oracle did have one session on IMPQ

```
PARALLEL_DEGREE_POLICY = {MANUAL | LIMITED | AUTO}  
parallel_degree_limit=AUTO
```

RMAN

- Automatic Block Repair

```
RMAN> BLOCKRECOVER DATAFILE 2 BLOCK 12,13 DATAFILE 3  
      BLOCK 5,98,99 DATAFILE 4 BLOCK 19;  
  
RMAN> BACKUP VALIDATE DATABASE;  
RMAN> BLOCKRECOVER CORRUPTION LIST;
```

- New options for DUPLICATE DATABASE
 - DUPLICATE can be performed without connecting to a target database: Requires connecting to a catalog and auxiliary database.
- Enhanced Tablespace PITR
 - Recover a dropped tablespace.
 - Can be repeated multiple times for the same tablespace
 - DBMS_TTS.TRANSPORT_SET_CHECK is run automatically

How Can I #11

```
BEGIN
  SELECT COUNT(*)
  INTO i
  FROM gv$backup_corruption;

  IF i <> 0 THEN
    dbms_system.ksdfls;
    dbms_system.ksdddt;
    dbms_system.ksdwrt(2,'ORA-20341: GV$BACKUP_CORRUPTION contains '|| TO_CHAR(i)||' corruption
records');
  END IF;

  SELECT COUNT(*)
  INTO j
  FROM gv$copy_corruption;

  IF j <> 0 THEN
    dbms_system.ksdfls;
    dbms_system.ksdddt;
    dbms_system.ksdwrt(2,'ORA-20342: GV$COPY_CORRUPTION contains ' || TO_CHAR(j)||' corruption
records');
  END IF;

  SELECT COUNT(*)
  INTO k
  FROM gv$database_block_corruption;

  IF k <> 0 THEN
    dbms_system.ksdfls;
    dbms_system.ksdddt;
    dbms_system.ksdwrt(2,'ORA-20343: GV$DATABASE_BLOCK_CORRUPTION contains '||TO_CHAR(k)||'
corruption records');
```

Storage

- Tablespaces
 - Enhancements to SecureFiles (learn about DBFS)
 - New Tablespace Master Rekey
- Indexes
 - Zero-size unusable indexes & index partitions
- Tables
 - Segment creation on demand (deferred segment creation)

Demo

SQL

- New Analytic Functions
 - LISTAGG
 - NTH_VALUE
 - RESPECT or IGNORE NULLS

```
SELECT department_id "Dept.",  
LISTAGG(last_name, ';' ) WITHIN GROUP (ORDER BY hire_date) "Employees"  
FROM employees  
GROUP BY department_id;
```

```
SELECT prod_id, channel_id, MIN(amount_sold),  
NTH_VALUE (MIN (amount_sold), 2)  
OVER (PARTITION BY prod_id ORDER BY channel_id ROWS  
BETWEEN UNBOUNDED PRECEDING AND UNBOUNDED FOLLOWING) NV  
FROM sales  
WHERE prod_id BETWEEN 13 AND 16  
GROUP BY prod_id, channel_id;
```

```
FIRST_VALUE (<expression> [RESPECT | IGNORE> NULLS]) OVER (<analytic clause>)
```

SQL

- ALTER DATABASE LINK
- IGNORE_ROW_ON_DUPKEY_INDEX Hint
 - To ignore collisions and insert the rows that do not collide with existing rows, put the hint in the INSERT statement
- Improved Flashback Archive allows more DDL
- DATABASE_ROLE constant for SYS_CONTEXT
 - PRIMARY
 - PHYSICAL STANDBY
 - LOGICAL STANDBY
 - SNAPSHOT STANDBY

```
SELECT sys_context('USERENV', 'DATABASE_ROLE') FROM dual;
```

Demo

SQL

- Recursive Queries
 - CONNECT BY
- Recursive Common Table Expressions (WITH)

```
WITH <alias> AS
  (subquery_sql_statement)
  SEARCH <BREADTH | DEPTH>
  FIRST BY <column_name> [ASC | DESC] [NULLS FIRST | NULLS LAST]
  SET <ordering_column>
  CYCLE (alias) SET <cycle_mark_alias>
  TO <cycle_value> DEFAULT <no_cycle_value>
SELECT <column_name_list>
FROM <alias_one>, <alias_two>
WHERE <join_condition>;
```

PL/SQL

- New NO_DATA_NEEDED Predefined Exception
 - ORA-06548: For parallel access and pipelined table functions
The caller of a pipelined function does not need more rows to be produced by the pipelined function.
- Improved fine grained dependency tracking
- Warnings
 - Severe
 - 5018 - omitted optional AUTHID clause
 - 5019 - deprecated language element
 - 5020 - parameter name must be identified
 - Informative
 - 6016 - native code generation turned off (size/time)
 - 6017 - operation will raise an exception
 - 6018 - an infinity or NaN value computed or used
 - Performance
 - None

Demo

Built-in Packages

- New Packages (26 in all)

- DBMS_COMPRESSION
- DBMS_CUBE_LOG
- DBMS_PARALLEL_EXECUTE

HCC

Control logging of OLAP components

RAC

- Packages with new Functions and Procedures (108)

- DBMS_BACKUP_RESTORE
- DBMS_CUBE
- DBMS_LOB
- DBMS_LOGSTDBY
- DBMS_METADATA
- DBMS_METADATA_UTIL
- DBMS_NETWORK_ACL_ADMIN
- DBMS_RESULT_CACHE
- DBMS_SCHEDULER

Restore blocks from Standby

Create CUBE Materialized View

Set Content Type for BLOBS + DBFS

DB IS LOGSTDBY & IS APPLY SERVER

Assign ACL to a Wallet

Delete Dependency

File Watcher

Built-in Packages

- Packages with new Functions and Procedures

- DBMS_SESSION [Get package memory utilization & EBR](#)
- DBMS_SPACE_ADMIN [Segment Repair \(NOT!\)](#)
- DBMS_SPM [Migrate Stored Outlines](#)
- DBMS_SQLDIAG [Dump Trace File](#)
- DBMS_SQLPA [DBMS_SPA "Undocumented" <g>](#)
- DBMS_SQLTUNE [REPORT_SQL_MONITOR enhanced](#)
- DBMS_STATS
- DBMS_STREAMS & STREAMS_ADM
- DBMS_UTILITY [WAIT_ON_PENDING_DML](#)
- DBMS_WLM
- DBMS_WORKLOAD_CAPTURE & REPLAY
- DBMS_WORKLOAD_REPOSITORY [GLOBAL_DIFF_REPORT](#)
- DBMS_XPLAN [DIFF_PLAN procs](#)

Built-in Packages

- Packages with new Functions and Procedures

- UTL_HTTP

SET_AUTHENTICATION_FROM_WALLET

- UTL_SMTP

CLOSE_CONNECTION

- And many have new overloads (39+)

- And new parameters (13+)

- And new types (1+)

- And new constants (4+)

- Adding new and enhanced functionality

New in Database 11.2 Summary

..... We did not come here to fear the future



Questions

ERROR at line 1:

ORA-00028: your session has been killed

All demos at morganslibrary.org

- **Library**
- **How Can I?**

damorgan11g@gmail.com

Thank you