
New Features in Database 11g

11.1.0.6 - 11.2.0.1

presentation for:




19 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
- 10g and 11g 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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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 Editioning White Paper](#)
- [Troubleshooting Performance](#)

ACE News

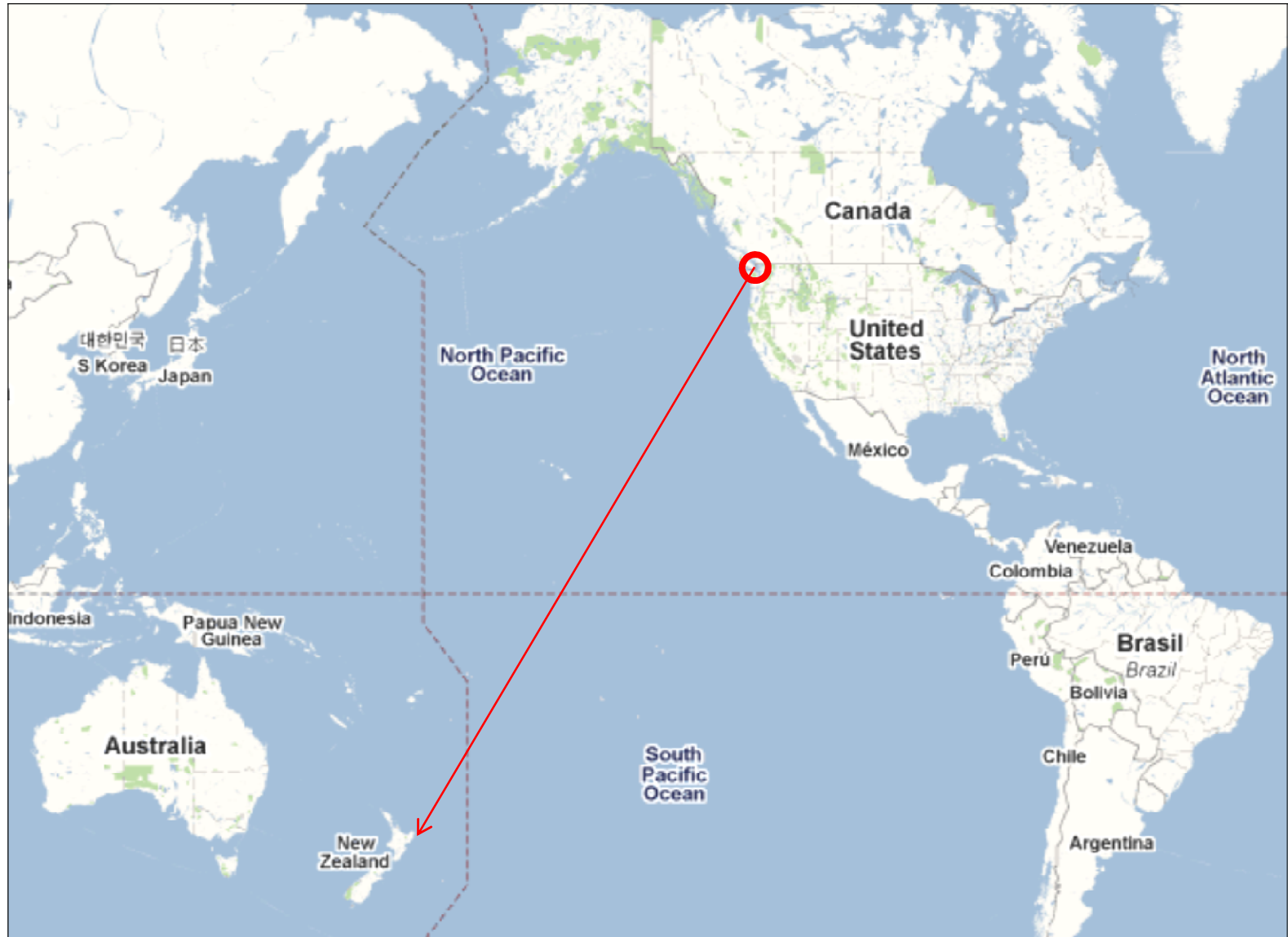
Would you like to become an Oracle ACE?

Learn more about becoming an ACE

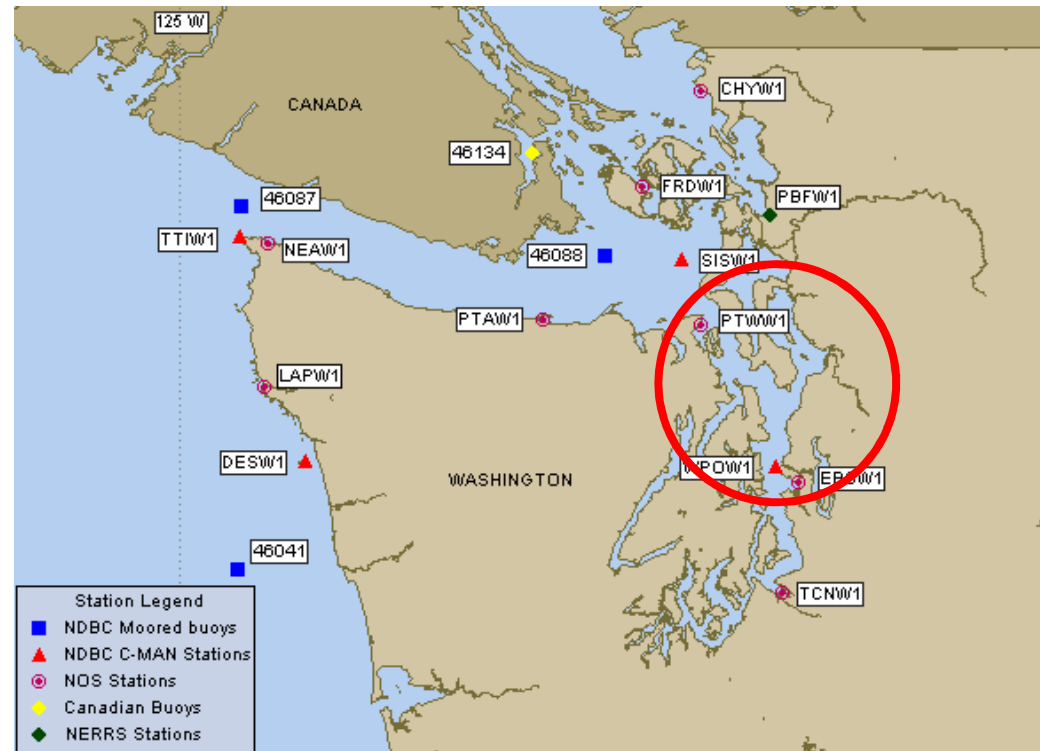


- [ACE Directory](#)
- [ACE Google Map](#)
- [ACE Nomination Form](#)

cd \$MORGAN_HOME



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Part of the Pacific Ring of Fire



America's Cup Boat USA-71



My Travels



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



New in 11gR1

New in 11gR1

- Oracle Database introduced a large number of new features. Among the most notable:
 - ADR (UDUMP and BDUMP are gone)
 - Case Sensitive Passwords
 - Create PFILE from memory
 - Flashback Archive
 - Virtual Columns
 - Invisible Indexes
 - Read Only Tables
 - Secure Files (renamed in 11.2 to DBFS)
 - SKIP LOCKED
 - Regular Expression
 - Interval, Reference, and System 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

New in 11gR2

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
- Now 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;
```

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 **P**oint-**I**n-**T**ime-**R**ecovery
 - 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');
END;
```

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)

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;
```

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

Built-in Packages

- New Packages (26 in all)

- DBMS_COMPRESSION
- DBMS_CUBE_LOG
- DBMS_PARALLEL_EXECUTE

Hybrid Columnar Compression

Control logging of OLAP components

Real Application Clusters

- 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



What Oracle
will talk about
"here at OpenWorld"

What Oracle Will Talk About

- New Grid Features
 - Single Node RAC
 - New ASM Capabilities
 - Omotion
 - DBFS Database File System (POSIX)
 - the Grid
- Advanced Compression
- Exadata V2 and Hybrid Columnar Compression
- Edition Based Redefinition - 11.2.0.1
 - Functions, Packages, Procedures, Synonyms, and Views

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:

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
```

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

Hybrid Columnar Compression "HCC"

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

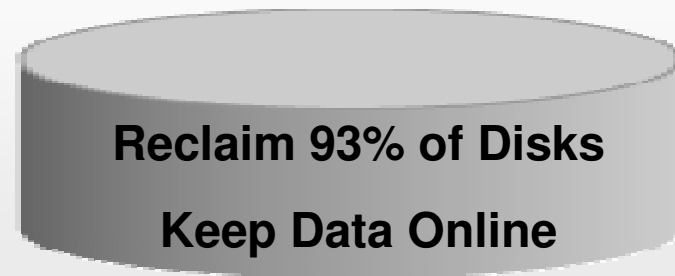
Optimized for Speed



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 slightly 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

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 btyes

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

38 btyes

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;
```

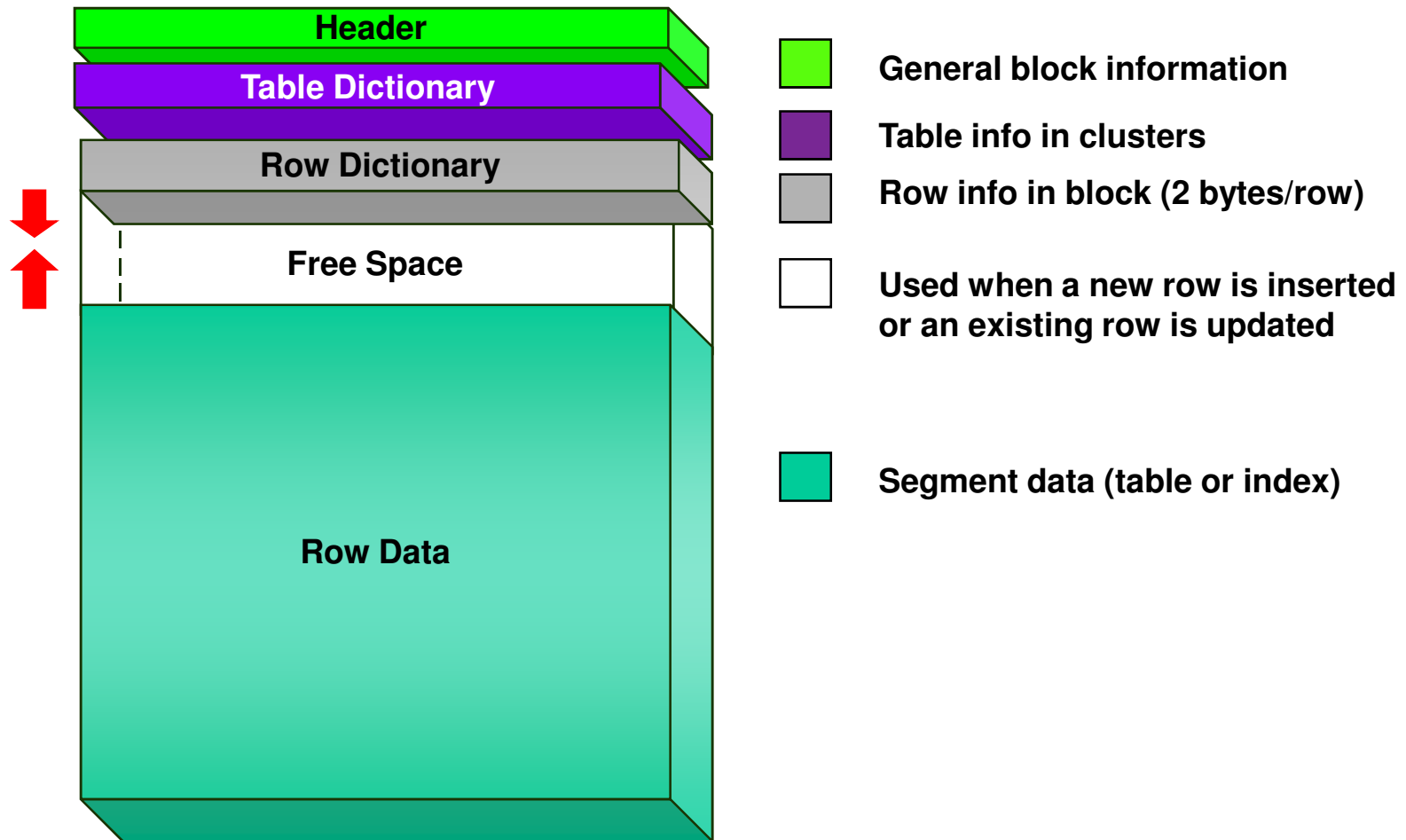
```
exec dbms_stats.gather_table_stats(USER, 'REG_TAB');
exec dbms_stats.gather_table_stats(USER, 'COMP_TAB');
```

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

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

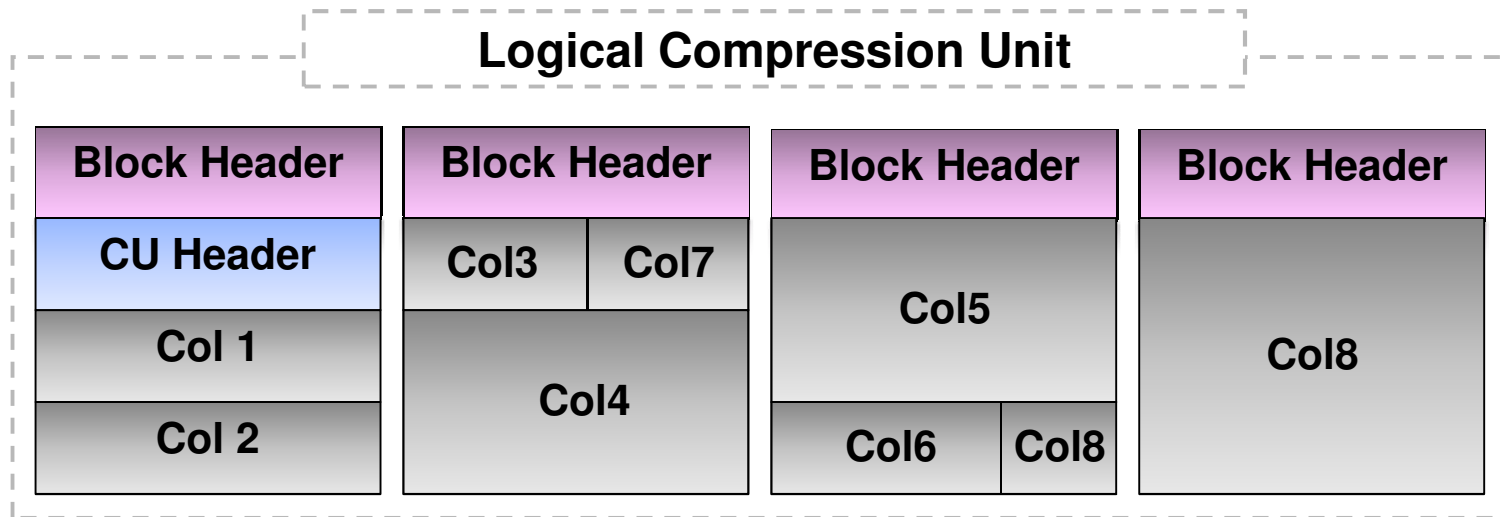
TABLE_NAME	BLOCKS
REG_TAB	109
COMP_TAB	20

Database Block Anatomy



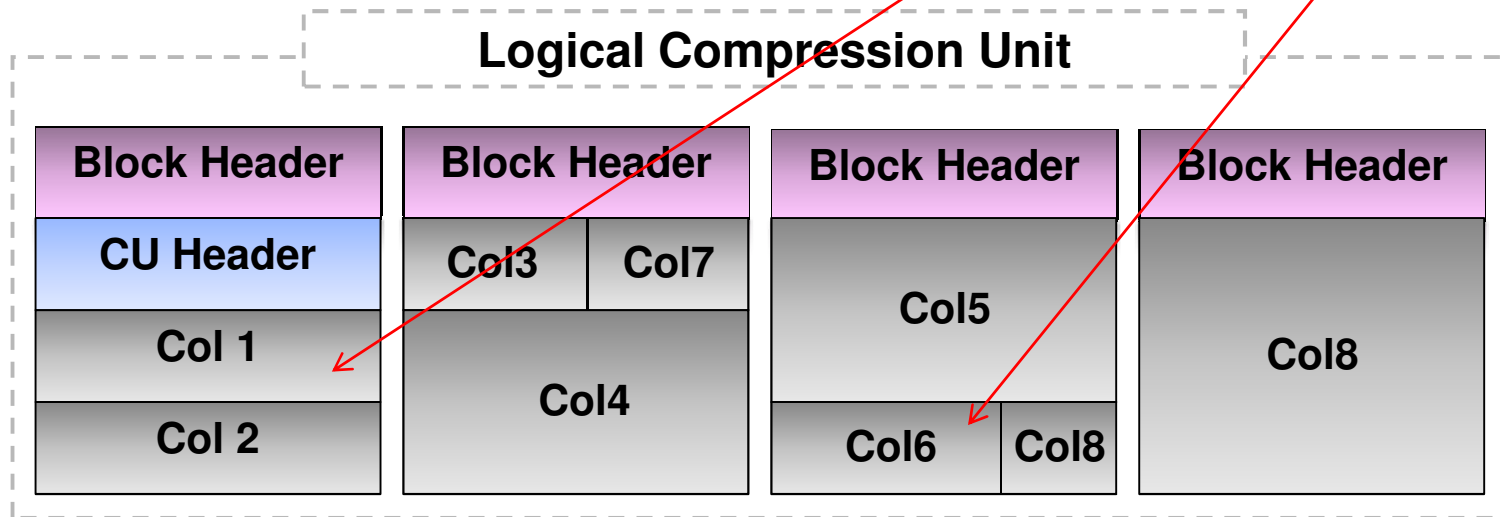
Logical Compression Unit

- 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));
```



Compression Advisor

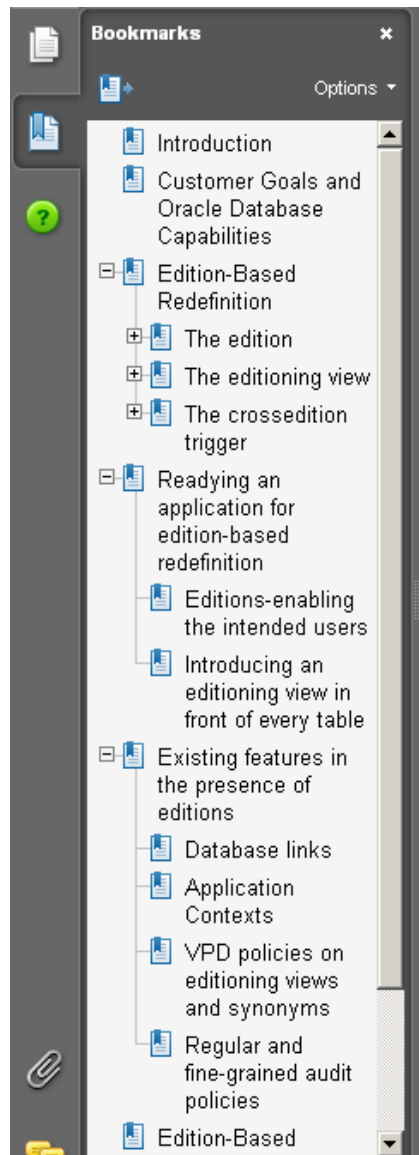
- DBMS_COMPRESSION built-in package
 - GET_COMPRESSION_RATIO
Returns the possible compression ratio for an uncompressed table or materialized view and estimates achievable compression
 - GET_COMPRESSION_TYPE
Inspects data and reports what compression type is in use by row
- Enterprise Manager Segment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

Edition Based Redefinition "EBR"

Why Do We Need EBR?

- Application upgrades need to:
 - Not perturb users
 - Not corrupt data
 - Reflect all pre-upgrade transactions
 - Seamlessly roll changes forward or backward
- Be safe
- Be secure
- Be fully supported by Oracle
- Be free

Bryn Llewellyn's White Paper



An Oracle White Paper
July 2009

Edition-Based Redefinition

a new capability in Oracle Database 11g Release 2
to support online application upgrade

What is EBR?

- A revolutionary new capability
 - Code changes are installed in the privacy of an edition
- Editable object types
 - Synonyms
 - Views
 - PL/SQL objects of all kinds
- New kinds of object
 - Edition
 - `dba_editions`, `dba_edition_comments`
 - Editioning View
 - `dba_editioning_views`, `dba_editioning_views_ae`,
`dba_editioning_view_cols`
 - Crossedition Trigger
 - `dba_triggers`

Three New Object Types

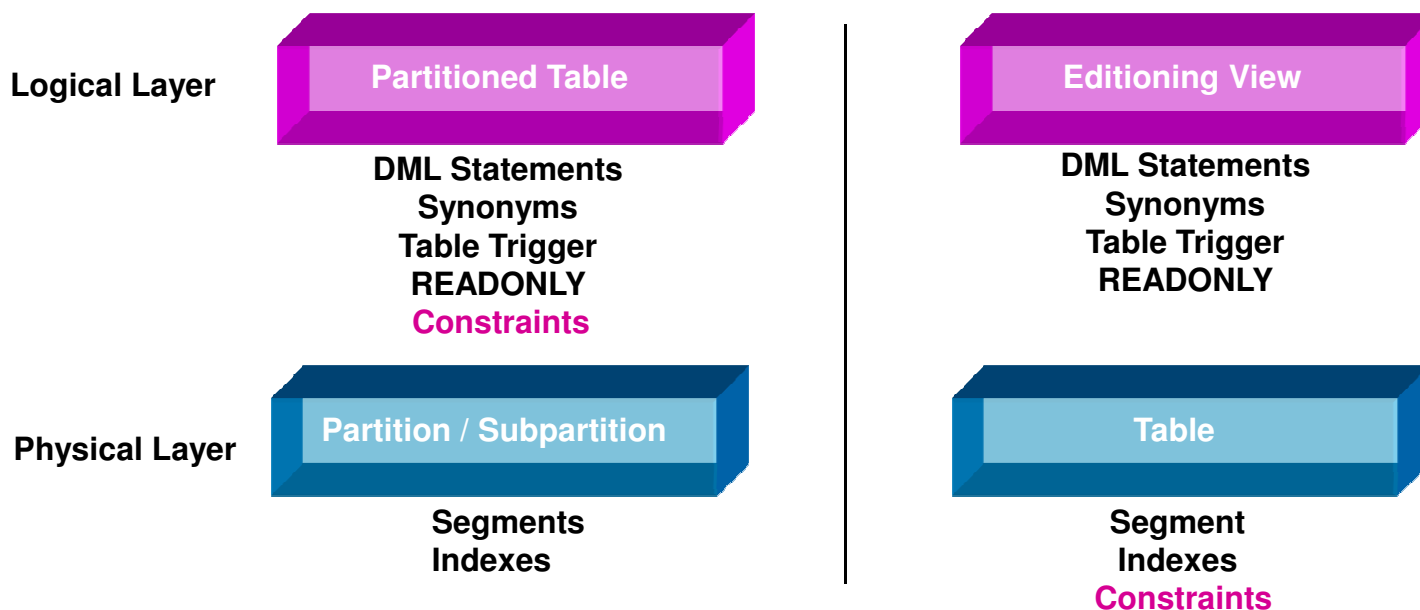
- Edition
 - All pre-upgrade editionable objects are part of a parent edition
 - New editions inherit (by pointer) editionable objects from the parent edition
 - All post-edition editionable objects are part of a child edition
- Editioning View
 - Exposes a different projection of a table into each edition
 - Allows each edition to see only its own columns
 - Data changes are made safely by writing only to new columns or new tables not seen by the old edition
 - Allows different "table" triggers to fire in each edition
- Crossedition Trigger
 - Propagates data changes made by the parent edition into the child edition's columns, or (in hot-rollover) *vice-versa*.

What is an Edition?

- A nonschema object, uniquely, identified by only its name
- Like another non-schema object, the directory, is listed in DBA_OBJECTS as owned by SYS but has no owner
- Every database from 11.2 onwards, whether brand new or the result of an upgrade from an earlier version, non-negotiably, has at least one edition
- The default edition name is ORA\$BASE
- Every foreground database session, at every moment throughout its lifetime, non-negotiably, uses a single edition
- A new edition must be the child of an existing edition
- A child edition is all that is required if an upgrade involves only synonyms, views, and PL/SQL objects

What is an Editioning View?

- A view that you may think of a partitioned table that can only have a single partition
 - Both must present all data "as is" ... no filters, no joins, no functions, no operators, no group by no having no order by no distinct no concatenation no ... no ... no ... no
 - Your only choice is which columns to select



If you can not do it in partitioning a table you can not do it in an editioning view

What is a Crossedition Trigger?

- A new, and special type of trigger specific to editioning
- Distinct from application code
- Can only be created on a table (not on an editioning view)
- Populates pre-upgrade transactions into the post-upgrade edition (or) post-upgrade transactions into the pre-upgrade edition
- Two types
 - FORWARD
 - REVERSE
- Leverage trigger firing order control with [FOLLOWING and PRECEDING
- Nothing we do should affect the current application so crossedition triggers are always created in the child

Crossedition Trigger Firing Rules

- Assumptions
 - All DDL is performed in the child edition so as not to disturb the working production application
 - All DDL to editioned objects is done in the post-upgrade edition
 - Pre-upgrade column changes are only changed in the parent
 - Post-upgrade columns are only changed in the child
- Forward Crossedition Triggers
 - Only fired by code running in the parent edition
 - Transforms from the old representation to the new
- Reverse Crossedition Triggers
 - Only fired by code running in the child edition
 - Transforms from the new representation to the old

Resources

- <http://tahiti.oracle.com>
- <http://otn.oracle.com>
 - downloads
 - forums
- <http://www.morganslibrary.org>
 - library
 - how can I?
 - code samples
 - links

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