

Edition Based Redefinition

Zero Downtime Application Upgrades

presentation for:

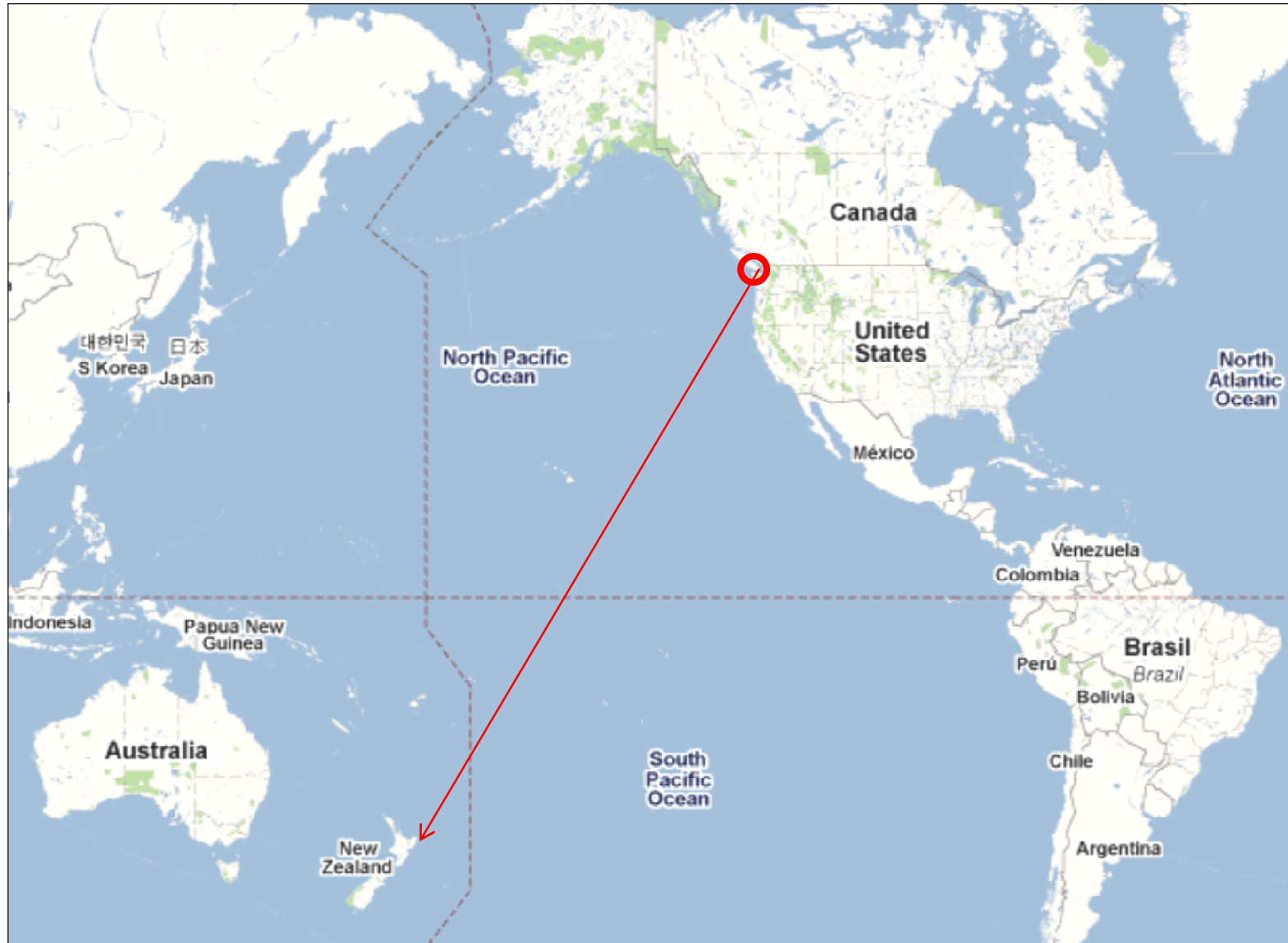


Introduction

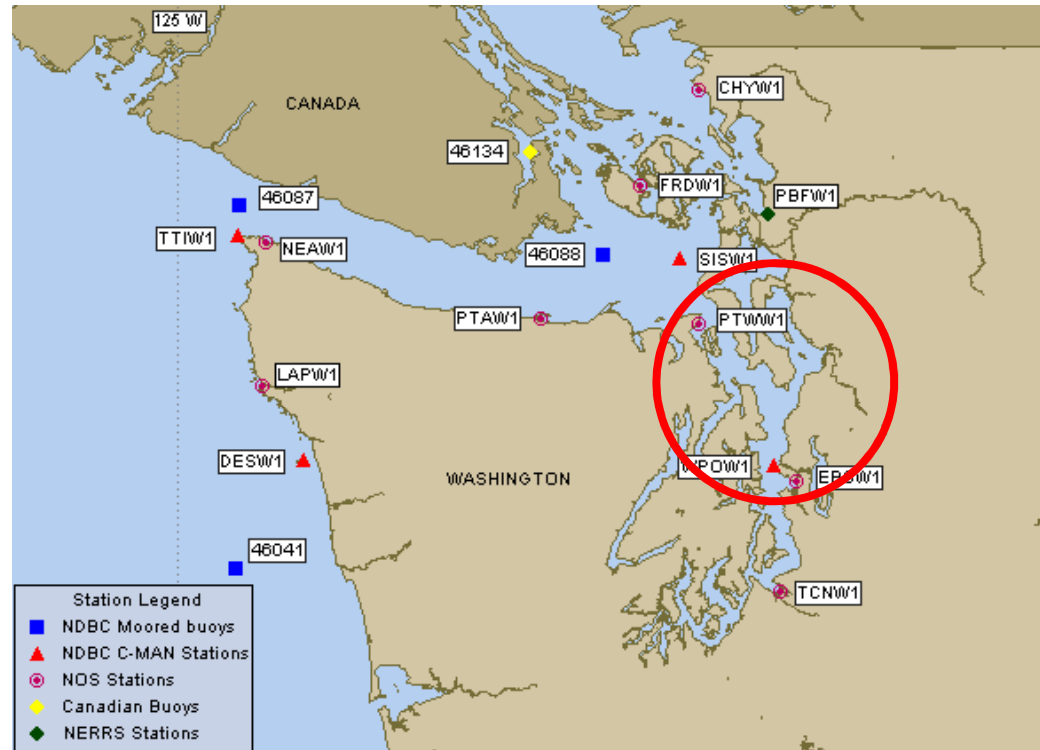
- Daniel Morgan – damorgan11g@gmail.com
- Oracle Ace Director 
- University of Washington, retired
- The Morgan of Morgan's Library on the web
 - www.morganslibrary.org/library.html
- Board of Directors Western Washington Oracle Users Group
- Member: UK Oracle Users Group
- Former Member: Oracle Applications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



cd \$MORGAN_HOME



cd \$MORGAN_HOME



cd \$MORGAN_HOME



Part of the Pacific Ring of Fire



Morgan's Library: www.morganslibrary.org

The screenshot shows the Morgan's Library website homepage. At the top, there is a purple header with the Morgan's Library logo on the left, the site name "Morgan's Library" in the center, and a search bar on the right. Below the header is a navigation bar for the "Morgan's 2010 - 2011 Calendar" with tabs for each month from Feb to Jan. The main content area features a large purple banner on the left with the text "Stanley meets: Charles Phillips, Tom Kyte, Mark Townsend, and Willie Hardie: ... Who's next?" and five photographs of people holding red t-shirts with an Oracle logo. Below the banner are several content blocks: "Community" with links to Events, Training, and Evening Workshops; "Resources" with links to Library, How Can I?, Code Samples, Presentations, Links, Book Reviews, Downloads, and User Groups; "General" with links to Contact, About, Legal Notice & Terms of Use, and Privacy Statement; "Oracle's Hiring" featuring a graphic that says "97% of the Global Fortune 500"; "Training Events" listing various Oracle User Groups (RMOUG, VanOUG, NZOUG, OUGN, OUGT, ORCAN, FMEFA Harmony, ILOUG) with their dates and locations; "Oracle Events" with a world map showing event locations and a red banner for "Rocky Mountain Oracle Users Group: February"; "Morgan" with a photo of a boat and the text "aboard USA-71"; "Library News" listing various articles and guides; and "ACE News" with a question "Would you like to become an Oracle ACE?" and links to the ACE Directory, ACE Google Map, and ACE Nomination Form.

America's Cup Boat USA-71



EBR Basics

We all have our favorite customers: This is mine ... on a good day



**Store
More
Data**

**Maintain
Performance**

**Honor
the same
Service
Level
Agreement**

**What's the
big deal?**

Why Should We Care?

- High availability
 - Amazon and Google are up 7 x 24 x 365
 - Our customers expect the same from us
- Data Center Failure
 - Data Guard
- Server Failure
 - Real Application Clusters
- Storage Failure
 - ASM
 - RAID
 - Resumable Transactions
 - RMAN
- Network Failure
 - Multiplexing and Bonding

Why Should We Care?

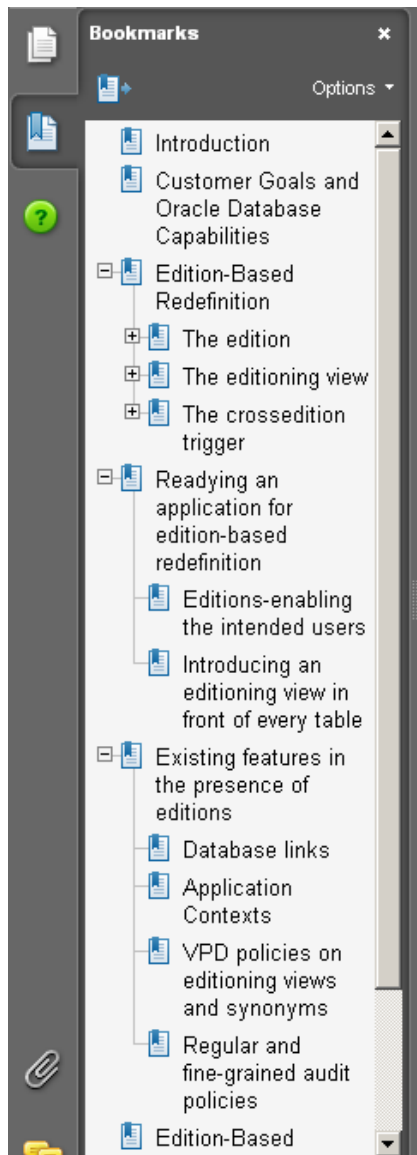
- Human Failure
 - Flashback Database
 - Flashback Drop
 - Flashback Transaction
 - Log Miner
 - RMAN
 - Streams
 - Transaction Backout
- Oracle Upgrade
 - Rolling Patches
- Application Upgrade and Maintenance
 - Tables: DBMS_REDEFINITION
 - but always tied to some code somewhere
 - PL/SQL Objects: Without Editioning ... downtime is unavoidable

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
- Editionable 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

Edition Privileges

- System Privileges
 - CREATE ANY EDITION
 - ALTER ANY EDITION
 - DROP ANY EDITION
- Object Privileges
 - USE (not granted by default)
- Roles
 - All three system privileges are granted to the DBA role (only)
 - USE is not, by default, granted to user or role
- Enable Editioning
 - **ALTER USER <user_name> ENABLE EDITIONS;**
 - **ALTER SESSION SET EDITION = <edition_name>;**

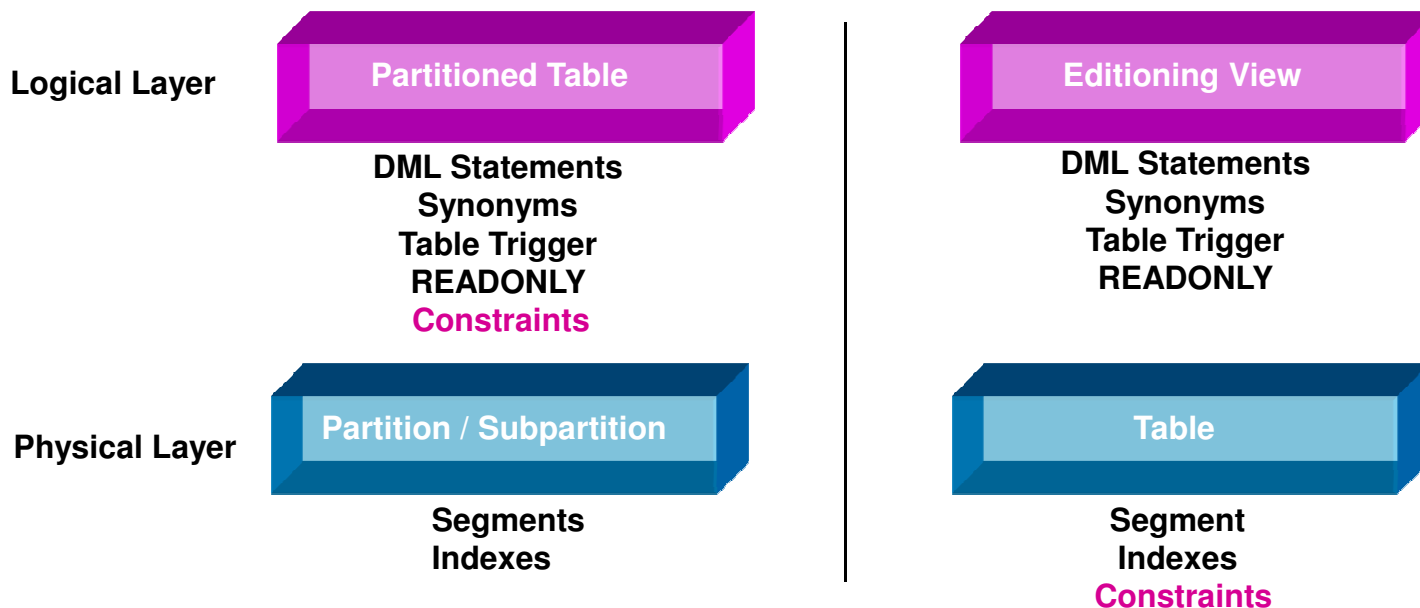
Edition Related Data Dictionary Views

- AUD\$ (obj\$edition)
- DBA_EDITIONS (edition_name, parent_edition_name)
- DBA_OBJECTS (edition_name)
- DBA_OBJECTS_AE (edition_name)
- DBA_SOURCE_AE (edition_name)
- DBA_USERS (editions enabled)
- FGA_LOG\$ (obj\$edition)
- UTL_RECOMP_ALL_OBJECTS (edition_name)
- V\$LOGMNR_CONTENTS (edition_name)
- V\$SESSION (session_edition_id)

AE = All Editions

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

Editioning View Related Data Dictionary Views

- DBA_EDITIONING_VIEW_COLS
- DBA_EDITIONING_VIEW_COLS_AE
- DBA_EDITIONING_VIEWS
- DBA_EDITIONING_VIEWS_AE
- DBA_ERRORS_AE (editioning_name)
- DBA_OBJECTS_AE (editioning_name)
- DBA_VIEWS (editioning_view)

AE = All Editions

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

Crossedition Trigger Related Data Dictionary Views

- DBA_TRIGGERS
- DBA_TRIGGER_ORDERING
- DBA_ERRORS_AE (editioning_name)
- DBA_OBJECTS_AE (editioning_name)

AE = All Editions

Tracing Crossedition Triggers Footnote

It is typically not possible to trace the behavior of a crossedition trigger using `DBMS_OUTPUT.PUT_LINE`. This is because the procedure accumulates the lines in a `DBMS_OUTPUT` package global collection so that, when the server call terminates, `SQL*Plus` can traverse the collection to print out the lines. However, as has been explained (see “Package state when the same package is instantiated in more than one edition” on page 18), when a session uses different editions during its lifetime, then a particular package is separately instantiated in each edition from which a reference to the package is made. It is for this reason that the more cumbersome approach, using `UTL_FILE`, is used. This method of tracing, using `UTL_FILE` to open the trace file in append mode, write one line, and then to close the file is very inefficient. However, in a test such as this, the inefficiency is undetectable.

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Other Editioning Related PL/SQL Objects

- DBMS_EDITIONS_UTILITIES
 - SET_EDITIONING_VIEWS_READ_ONLY
- DBMS_METADATA_UTIL.GET_EDITIONID
- DBMS_PARALLEL_EXECUTE.RESUME_TASK
- DBMS_PARALLEL_EXECUTE.RUN_TASK
- DBMS_SESSION.SET_EDITION_DEFERRED
- DBMS_SQL.PARSE
- DBMS_UTILITY.VALIDATE
- SYS_CONTEXT Function

EBR for DBAs

Editioning for DBAs: Special Considerations

- All foreground processes use an edition
- Background processes that issue SQL statements, such as MMON, are tied to an edition
- Thus when dropping an edition make sure that it is not the default edition for sufficient time for MMON and other SQL issuing process to change to the new default (else you will generate an ORA-38805: edition is in use)
- Once a schema is edition enabled there is no disable
- When retiring the pre-upgrade edition revoke USE
- Dropping parent editions can be done for elegance but is not required

EBR Bugs

Only one worth mentioning

- Mental model ... objects are copied
- Physical model ... the appearance of polymorphism and inheritance
- The mental model will become the physical model so do not rely on this "feature."
- This will be addressed in 12gR1

Health Warning

Due to complaints made to Director-General Stephen McKernan at the Ministry of Health ...



You are now entering ...

... a ...



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

Delusions of Competence Quiz

- Can you create a before insert table trigger on a view?
- Can two different objects exist in the same schema with the same name (other than package spec and body)?
- Can you real-time replace a PL/SQL object without downtime while it is being used?
- Can all views be created with a WHERE clause?
- If you have two triggers on the same object can you force one to always fire before, or after, the other?
- Can your database have an object without an owner?
- What is visible in DBA_OBJECTS_AE?
- Do you know how to actualize a stored procedure?
- What does it mean to grant USE to a schema?

Editioning to English Dictionary

- Actualize
 - An inherited object compiled or created in the child edition when the inheritance link is broken. This "bug" will be fixed in 12gR1.
- Child Edition
 - A new edition that inherits the editionable objects from the previously existing "parent" edition
- Crossedition Trigger
 - A trigger that propagates transactions between editions
- Edition
 - A non-schema logical object
- Editionable Object
 - An object that is editionable in the current database version
- Editioning View
 - A new kind of view that acts much like a partitioned table

Editioning to English Dictionary

- Leaf Edition
 - The child edition after it becomes the default edition
- Parent Edition
 - The edition upon which a child has been, in essence, cloned. Changes to the parent "should" not roll forward into the child.