
Edition Based Redefinition

Zero Downtime Application Upgrades



presentation for:
NoCOUG Summer 2010

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Edition Based Redefinition in Oracle Database 11gR2

Daniel A. Morgan

- Oracle ACE Director 
- University of Washington Oracle Instructor for 10 years
- Morgan of Morgan's Library on the web
- Board Member: Western Washington OUG
- Member UKOUG
- Conference Speaker
 - OpenWorld, Collaborate, Kaleidoscope, Canada, Chile, Denmark, Estonia, Finland, Germany, Japan, New Zealand, Norway, Sweden, UK & US
- 11g Beta Tester



Morgan's Library: www.morganslibrary.org

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Morgan's 2010 - 2011 Calendar

May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
EMEA Harmony Conference Tallinn, Estonia May 20-21, 2010											

A joint conference of the Estonian, Finnish, Latvian and Russian user groups
EMEA Harmony will focus on Technology, Middleware and BI
Featured speakers include Tom Kyte, Mogen Norgaard, Tanel Poder, and Dan Morgan

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Presentations Map 

The Mad Dog ACE 

Training Events

- [EMEA Harmony](#) - May 20 - 21, Tallinn, Estonia
- [NoCOUG](#) - August 2010,
- [AIQUG](#) Sep 3 - 4, Hyderabad, India
- [OOW](#) - Sep 19 - 23, San Francisco CA
- [LAD Tour](#) - October
- [DOAG](#) - Nov 16 - 18, Nurnberg, Germany
- [UKOUG](#) - Nov 29 - Dec 1, Birmingham UK

Morgan 

Library News

- [Morgan's Notepad vi \(Blog\)](#) UPDATED
- [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](#)

Oracle Events 

EMEA Harmony - Tallinn Estonia - May 20-21

ACE News

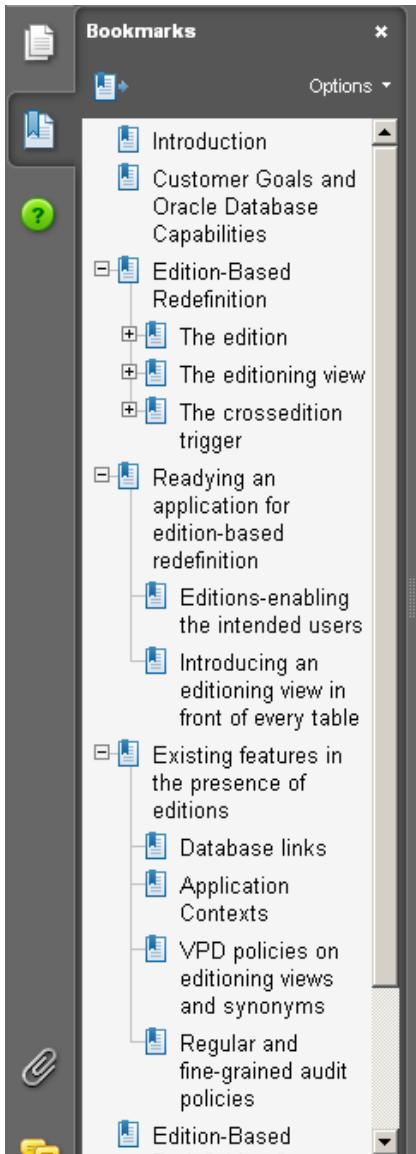
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Learn more about becoming an ACE



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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

Tom Kyte on Edition Based Redefinition

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TECHNOLOGY: Ask Tom

A Closer Look at the New Edition

By Tom Kyte 

Our technologist redefines and defers with Oracle Database 11g Release 2.

Instead of using the usual question-and-answer format of the Ask Tom column, I'm going to continue in this issue to explore some of the many new features of Oracle Database 11g Release 2. This time I'll be looking at two features:

- Edition-Based Redefinition
- Deferred Segment Creation

The Killer Feature: Edition-Based Redefinition

I consider Edition-Based Redefinition the killer new feature of Oracle Database 11g Release 2. In short, it's the ability to perform an online application upgrade of your application. It's also a huge feature—so huge that it'll take at least three columns to describe it. I'll start with how to use Edition-Based Redefinition to "patch" systems. Next time, I'll show how to use Edition-Based Redefinition to minimize downtime during a full-blown application upgrade that includes physical schema changes. Last, I'll show how to *remove* downtime during that same full-blown application upgrade.

As Published In

ORACLE
MAGAZINE
January/February 2010

TAGS
[asktom](#), [All](#)

OpenWorld Unconference

Oracle OpenWorld *Unconference*

Session ID	Title & Description
Unconference 21-Sep-2010 09:00 - 10:00	Title: Developer Coding Strategies for Very Large Databases Track: <u>Unconference</u> Location: Hotel Parc 55: Mason Room
S313426 21-Sep-2010 11:00 - 12:00	Title: Edition-Based Redefinition: Live in SQL*Plus Track: Database Location: Moscone South #302



Mythology & Dinosaurs

- Most Oracle DBAs and Developers are using Oracle 11g as though it was 8.0.5



- Maximum value comes from leveraging what is new

Delusions of Competency Quiz

- Does DBA_OBJECTS show all database objects?
- Can you create a before insert table trigger on a view?
- Can two different views with the same name exist in a schema?
- Can you replace a PL/SQL object without down-time while it is in use?
- Can all views be created with a WHERE clause?
- Can you set the firing order of table triggers?
- Do you know how to actualize a stored procedure?
- What does it mean to grant USE to a schema?

EBR Basics

Why Should We Care?

- High availability
 - Amazon and Google are up 7 x 24 x 365
 - Our customers expect the same from us
- Different technologies help us achieve our HA goals

Resource	Solution
Data Center	Data Guard
Server	RAC
Storage	ASM, RAID, Resumable Transactions
Network	VLANs, Multiplexing, Bonding
Corruption	RMAN, Flashback
Software	Rolling Patches
Tables & Indexes	Online Redefinition/Create/Alter
Application Upgrades	N/A (not available ... until now with EBR)

EBR at 50,000 ft.

- A single technology that provides high availability during upgrades and will not:
 - Perturb users
 - Corrupt data
- A single technology that provides high availability during upgrades that:
 - Reflects pre-upgrade transactions after upgrade
 - Seamlessly rolls changes forward and backward
 - Is safe
 - Is secure
 - Is fully supported by Oracle
 - Is free (no extra licensing cost)

EBR at 50,000 ft.

- Changes to applications are evolutionary not revolutionary
- Data structures are stable
 - Add or drop a few columns, change a data type, alter some data
 - Maybe add or drop some indexes
- Only changing editable objects
 - Implement a new edition
- Adding or removing columns from existing tables
 - Implement a new edition and editioning views
- Need to populate data between application versions
 - Implement a new edition and cross-edition triggers

EBR at 5,000 ft.

- A revolutionary new capability
 - Code changes are installed in the privacy of an edition
- Editionable object types
 - PL/SQL objects of all kinds
 - Synonyms
 - Views
- Introduces to the database three new object types
 - Edition
 - Editioning View
 - Crossedition Trigger
- As of 11gR2 editioning is mandatory for all Oracle databases whether a new installation or an upgrade

EBR at 500 ft. - Three New Object Types

- **Edition** (only replacing PL/SQL, synonyms, and views)
 - 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 the child edition
- **Editioning View** (modifying table structures)
 - 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** (migrating data forward and backward)
 - Propagates data changes made by the parent edition into the child edition's columns, or (in hot-rollover) *vice-versa*

EBR at 50 ft. - Editions

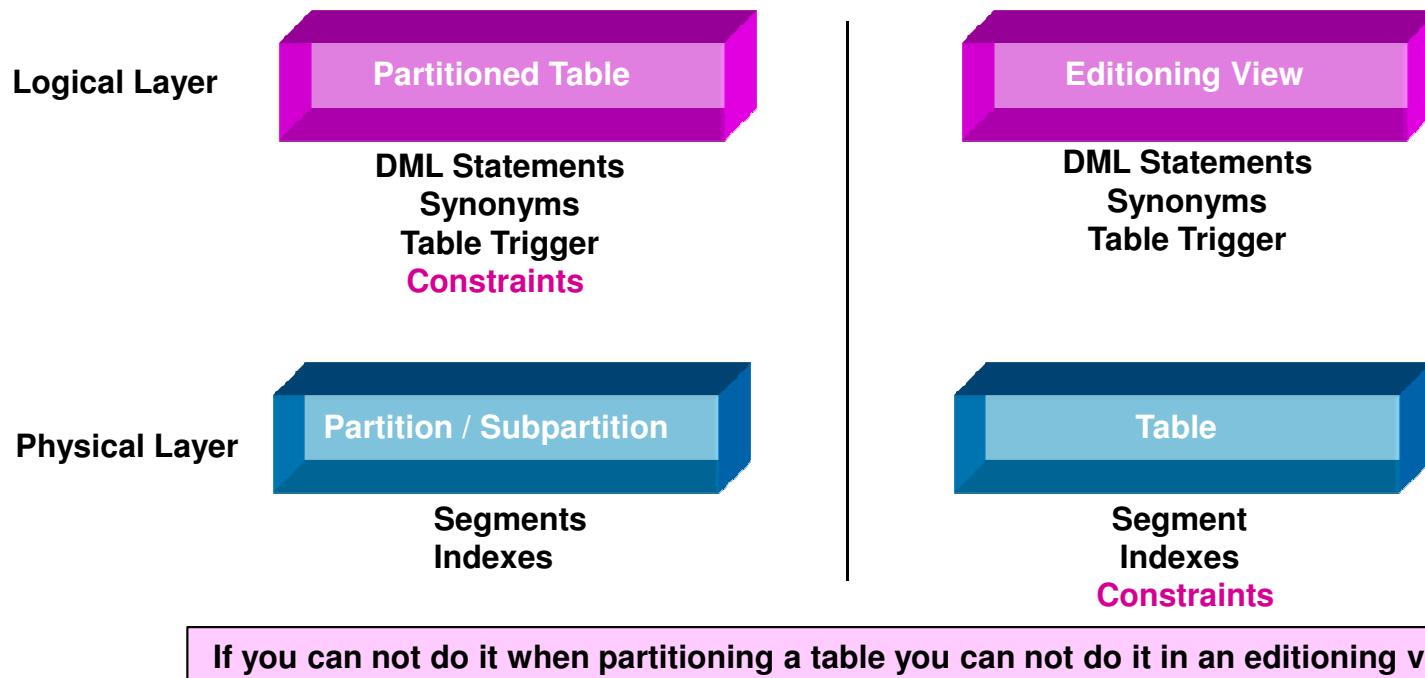
- A nonschema object, uniquely, identified by only its name
- Like another non-schema object, the directory, is listed in DBA_OBJECTS as owned by SYS but has no owner
- Every database from 11.2 onwards, whether brand new or the result of an upgrade from an earlier version, non-negotiably, has at least 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

EBR at 50 ft. - 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 any user or role
- Enable Editioning
 - **ALTER USER <user_name> ENABLE EDITIONS;**
 - **ALTER SESSION SET EDITION = <edition_name>;**
- Disable Editioning does not exist (and never will)

EBR at 500 ft. - Editioning Views

- 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 concatenations: just no ... no ... no and no
 - Your only choice is which columns to select (project)



EBR at 5 ft. - Editioning View DDL

```
CREATE OR REPLACE EDITIONING VIEW person AS
SELECT empno, ename, job, hiredate, deptno
FROM scott.emp;
```

An editioning view can NEVER be more complex than this

- No aggregation or concatenation
- No Joins
- No WHERE clause
- No GROUP BY clause
- No ORDER BY clause

EBR at 50 ft. - Crossedition Triggers

- A new 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
- Control trigger firing order control with [FOLLOWING and PRECEDING] keywords
- Nothing we do should affect the current application so crossedition triggers are always created in the child

EBR at 50 ft. - 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

EBR at 5 ft. - Crosseditioning Trigger DDL

```
CREATE OR REPLACE TRIGGER Contacts_Fwd_Xed
BEFORE INSERT OR UPDATE ON Contacts_Table
FOR EACH ROW
FORWARD CROSSDITION
DISABLE
BEGIN
  Set_First_And_Last_Name (:NEW.Name_1, :NEW.First_Name_2, :NEW.Last_Name_2);
  Set_Country_Code_And_Phone_No (:NEW.Phone_Number_1, :NEW.Country_Code_2, :NEW.Phone_Number_2);
END Contacts_Fwd_Xed;
/
```

```
CREATE OR REPLACE TRIGGER Contacts_Rvrs_Xed
BEFORE INSERT OR UPDATE ON Contacts_Table
FOR EACH ROW
REVERSE CROSSDITION
DISABLE
BEGIN
  :NEW.Name_1 := :NEW.Last_Name_2 || ', ' || :NEW.First_Name_2;
  :NEW.Phone_Number_1 :=
    CASE :New.Country_Code_2 WHEN '+1' THEN
      REPLACE (:NEW.Phone_Number_2, '-', '.')
    ELSE
      '011.' || LTRIM (:NEW.Country_Code_2, '+') || '.' || REPLACE (:NEW.Phone_Number_2, '-', '.')
    END;
END Contacts_Rvrs_Xed;
/
```

EBR at 5 ft. - Edition Enabled Data Dictionary Views

- AUD\$ (obj\$edition)
- DBA_EDITIONING_VIEW_COLS
- DBA_EDITIONING_VIEW_COLS_AE
- DBA_EDITIONING_VIEWS
- DBA_EDITIONING_VIEWS_AE
- DBA_EDITIONS (edition_name, parent_edition_name)
- DBA_ERRORS_AE (editioning_name)
- DBA_OBJECTS (edition_name)
- DBA_OBJECTS_AE (edition_name)
- DBA_SOURCE_AE (edition_name)
- DBA_TRIGGERS
- DBA_TRIGGER_ORDERING
- DBA_USERS (editions enabled)
- DBA_VIEWS (editioning_view)
- FGA_LOG\$ (obj\$edition)
- UTL_RECOMP_ALL_OBJECTS (edition_name)
- V\$LOGMNR_CONTENTS (edition_name)
- V\$SESSION (session_edition_id)

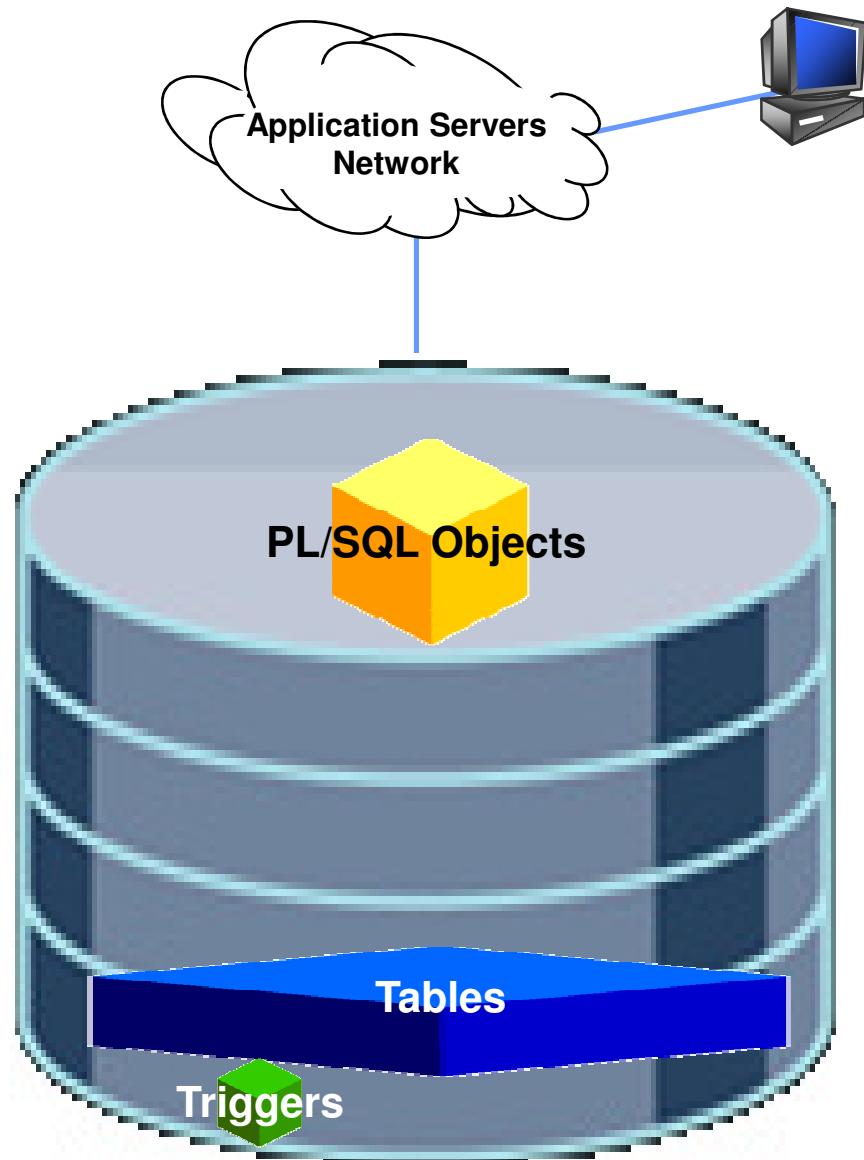
AE = All Editions

Other Editioning Related Objects

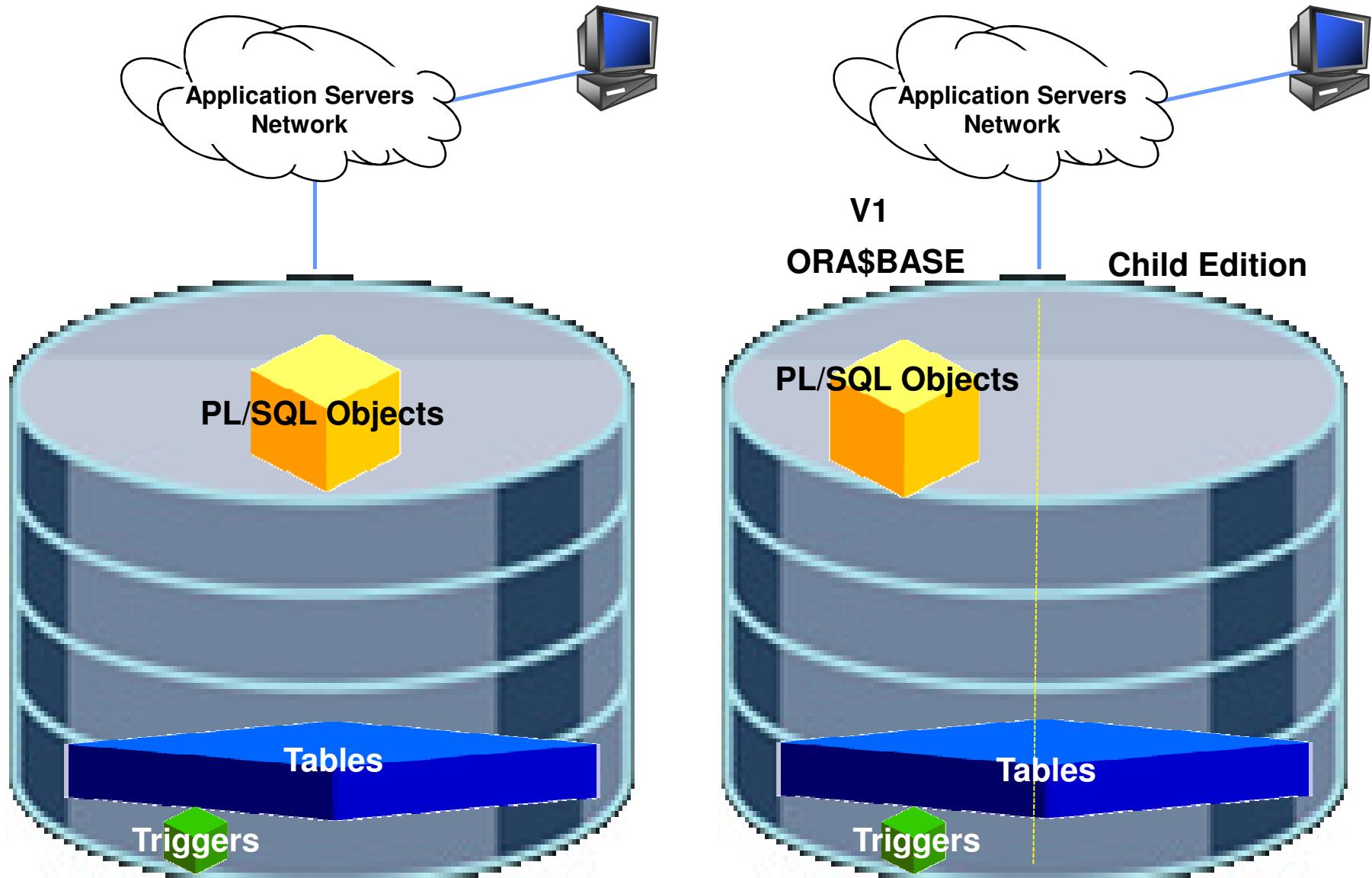
- DBMS_EDITIONS_UTILITIES.SET_EDITIONING_VIEWS_READ_ONLY
- DBMS_METADATA_UTIL.GET_EDITIONID
- DBMS_PARALLEL_EXECUTE.RESUME_TASK
- DBMS_PARALLEL_EXECUTE.RUN_TASK
- DBMS_SESSION.SET_EDITION_DEFERRED
- DBMS_SQLPARSE
- DBMS.Utility.VALIDATE
- Invisible Indexes
- SYS_CONTEXT Function

EBR Implementation

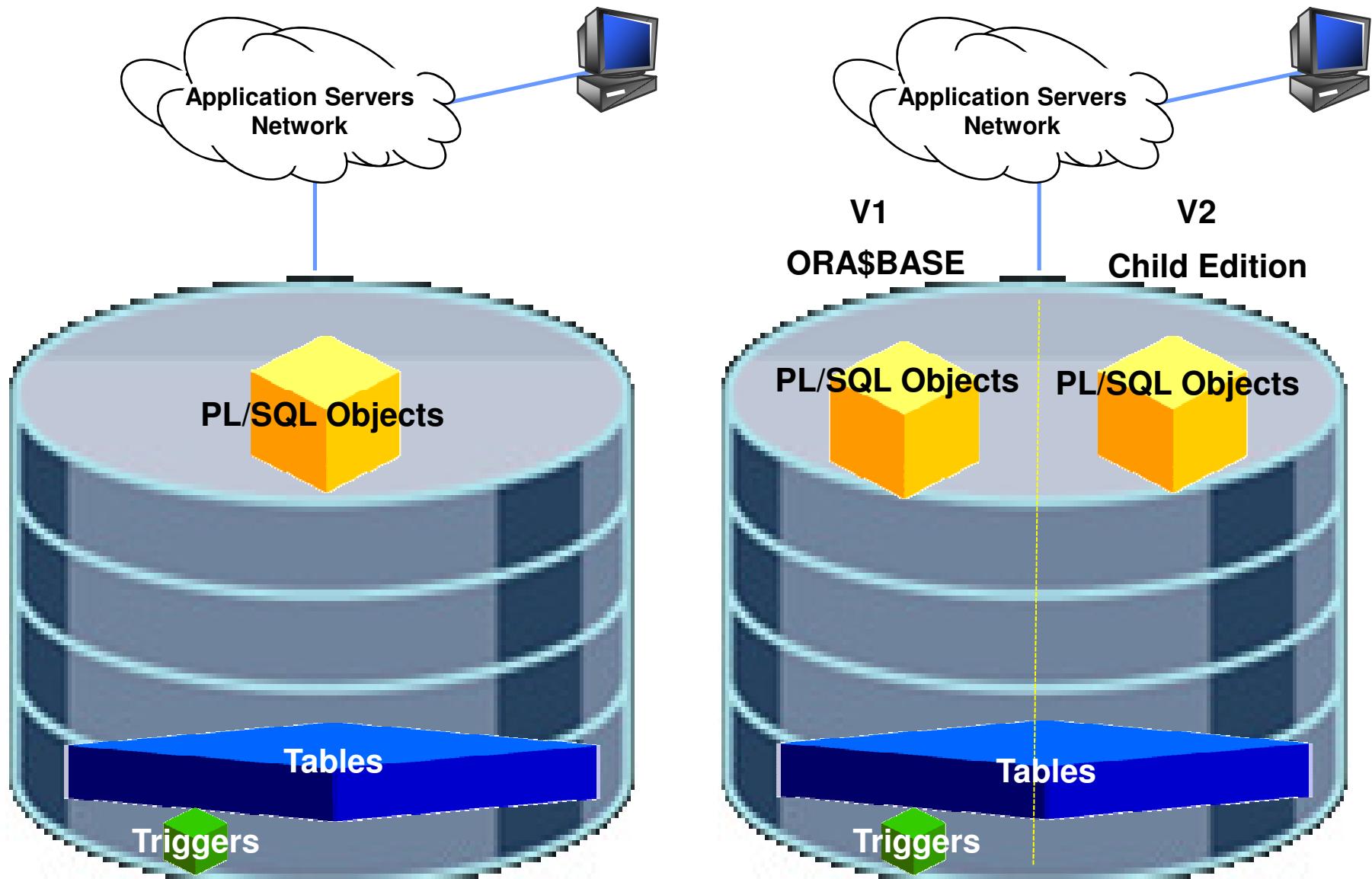
Application Version 1



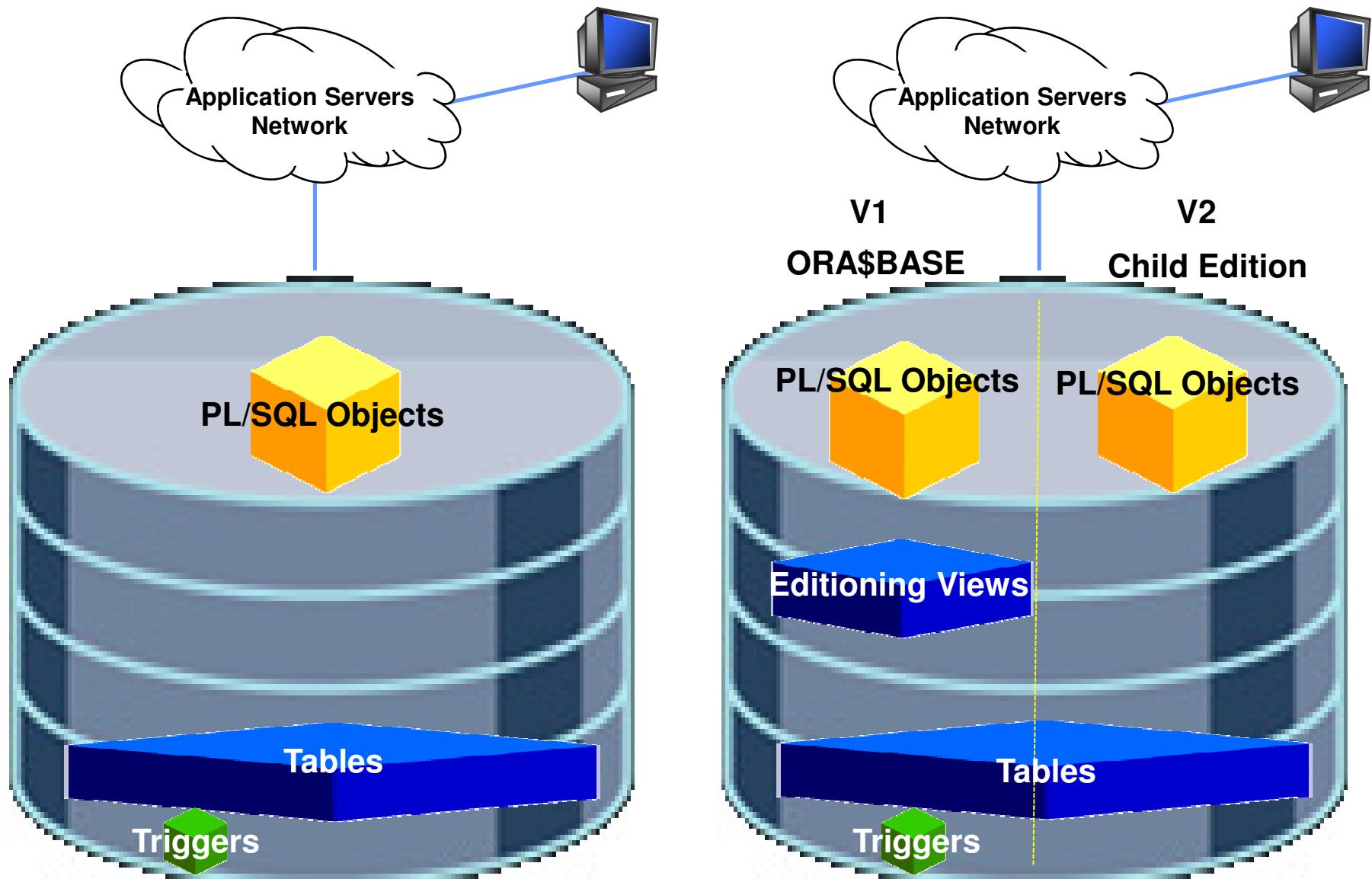
Create Child Edition: Prepare for EBR



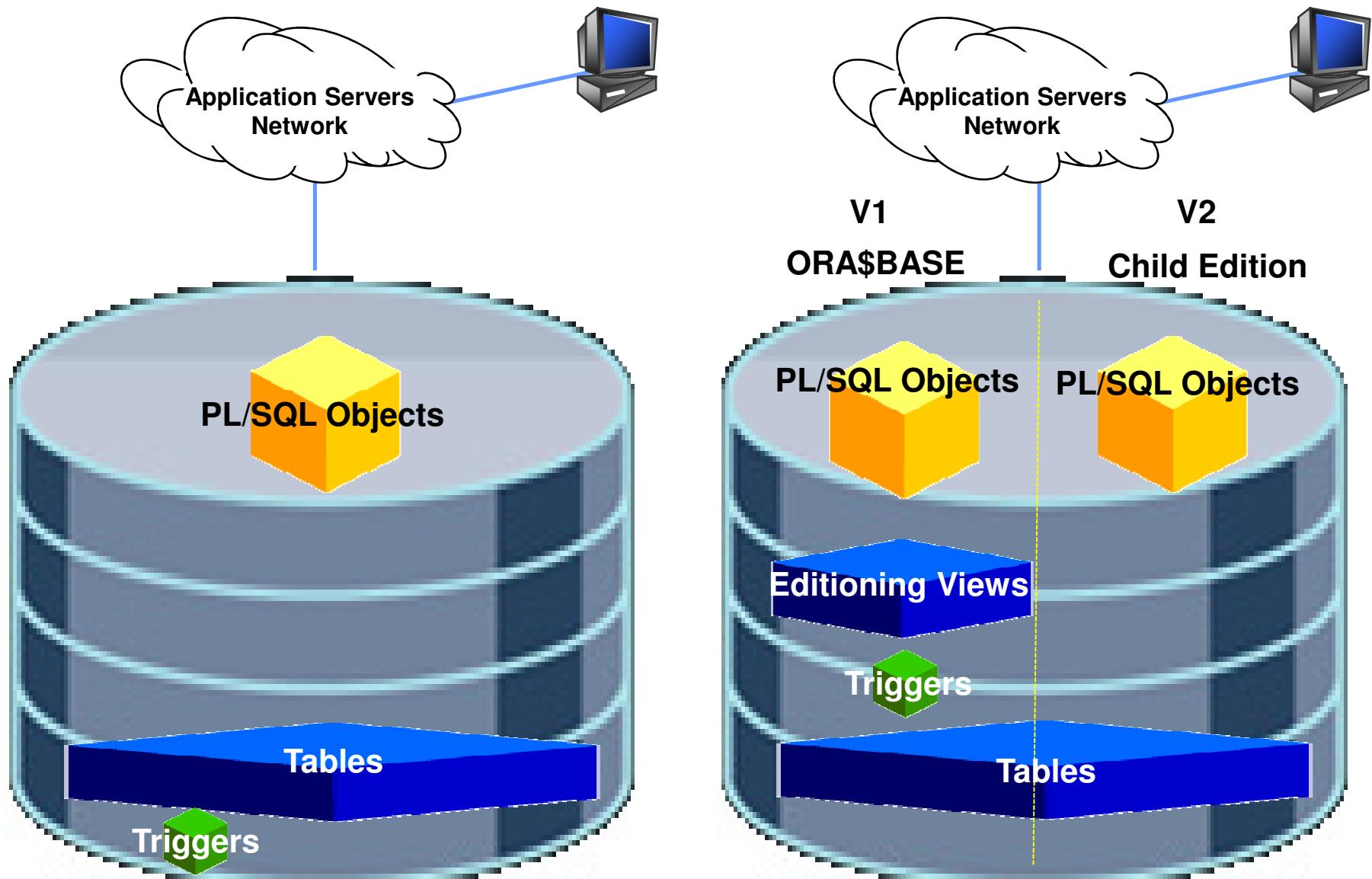
Create Child Edition: Actualize PL/SQL Objects



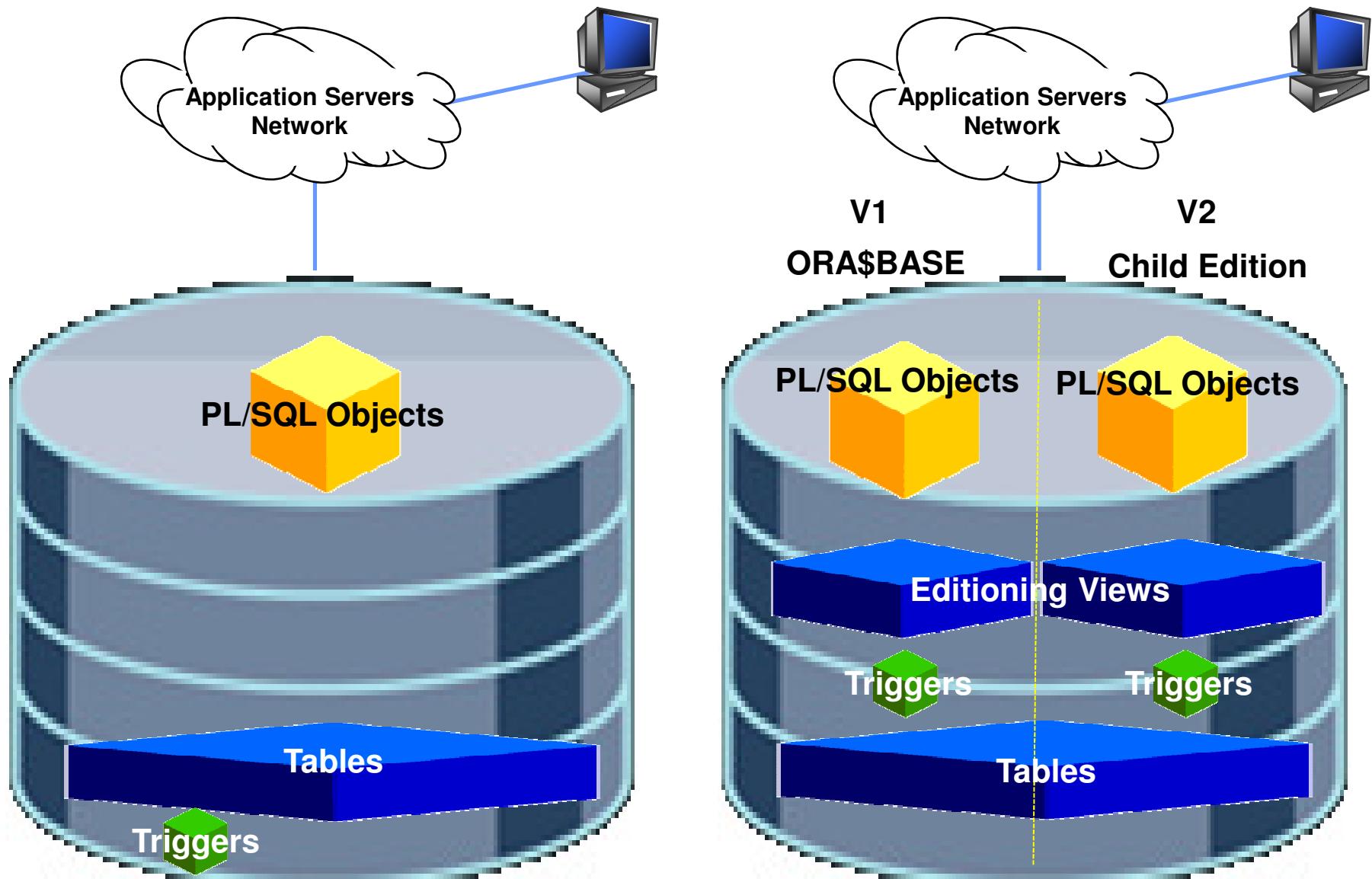
Prepare to Modify Tables



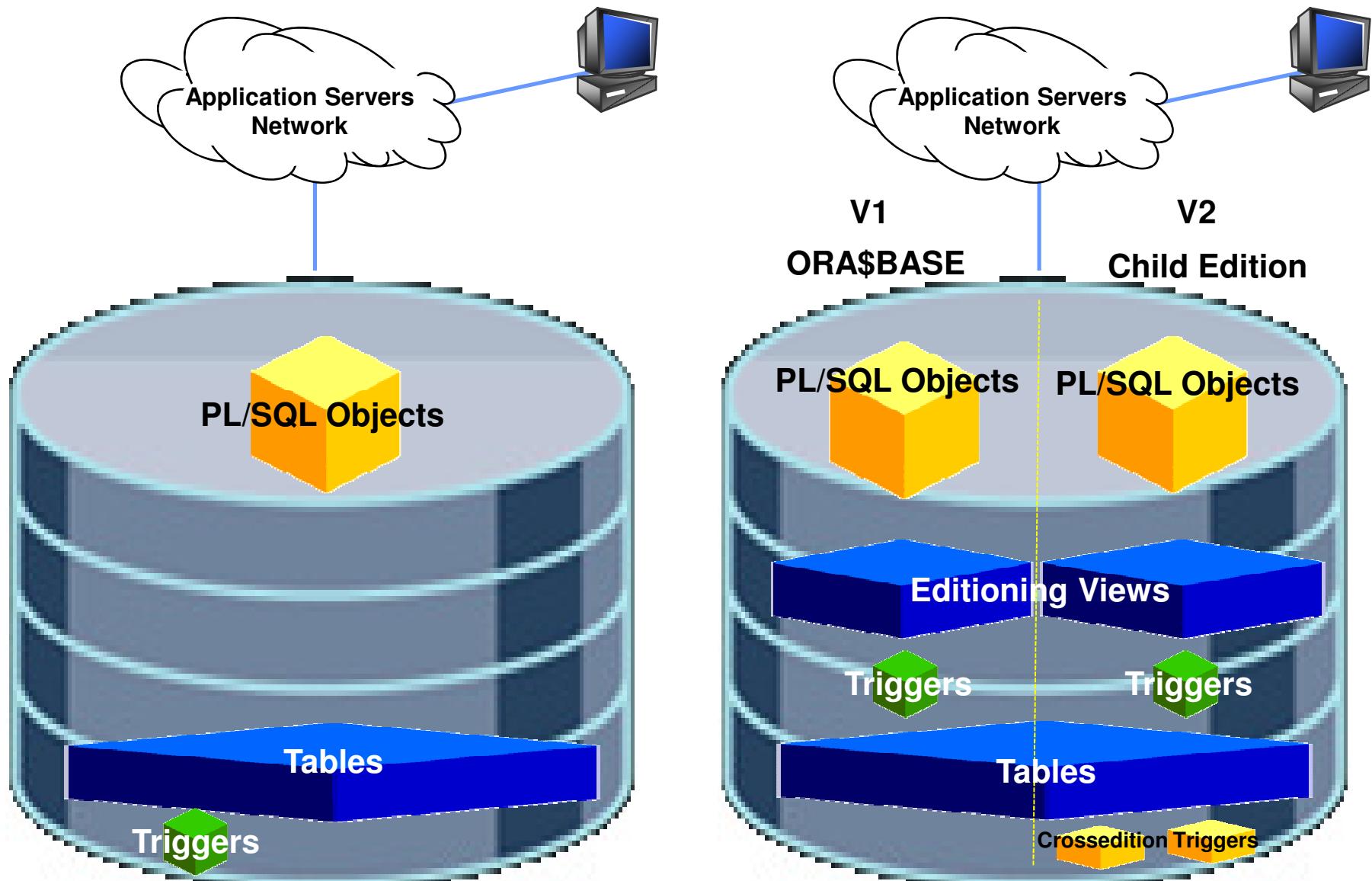
Rebuild Table Triggers on Views



Create Child Edition Editioning Views w/ Triggers



Replicate Data Between Editions



Health Warning

Due to complaints made to the EPA, OSHA, and the office of the Surgeon General ...



you are now entering ...

... a ...



Questions

ERROR at line 1:

ORA-00028: your session has been killed



All demos at morganslibrary.org

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damorgan11g@gmail.com

Thank you