

APEX and EBR

Zero Downtime (Apex) Application Upgrades



APEX and EBR

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EDITION BASED REDEFINITION

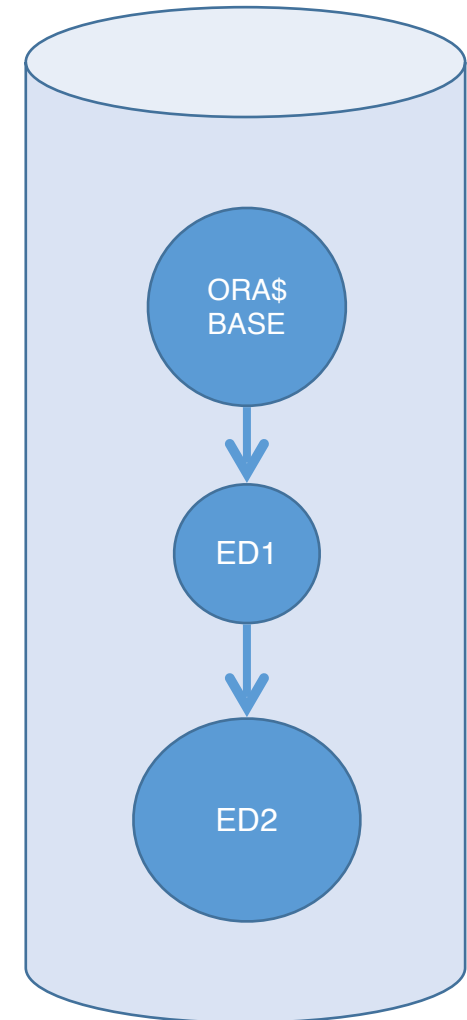
- ✓ **Edition based redefinition**
- ✓ **unique feature of the Oracle DB since 11.2**
- ✓ **no additional license costs**
- ✓ **available in EE, SE1, SE2, XE**
- ✓ **store and run different versions of PLSQL based objects AT THE SAME TIME**

editionable objects	non editionable objects
Packages, Functions, Procedures	Tables, Columns, Data
Trigger	Sequences
Types, Type Bodies	Indexes
Views, Editioning Views	Materialized Views
Libraries	Database Links
Synonyms	Public Synonyms
Virtual Columns	Function Based Indexes



USAGE

- ✓ *child can “inherit” objects from the parent edition*
- ✓ *“inherit” will break, the first time the child compiles an object*
- ✓ *a database session is attached to a specific edition*
- ✓ *users work in one session/edition*
- ✓ *a new application release is deployed in a second edition*
- ✓ *after some grace period (testing time), default edition is switched*
- ✓ *next time user logs in, he/she works in the new edition*



Demo 1



EDITION SETUP

- ✓ *make schema editionable*
- ✓ *create editions*
- ✓ *switch editions*
- ✓ *code something*



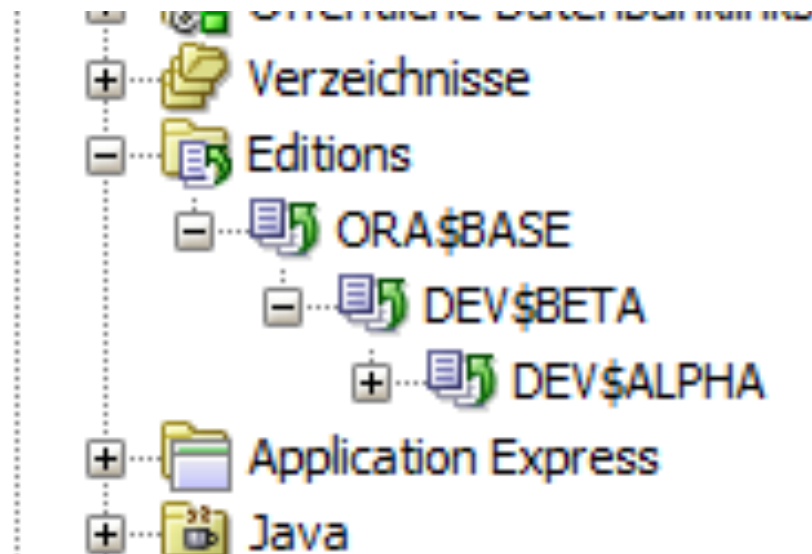
`DBA_setup_editions.sql`

Edition as a Service



CONNECT TO EDITION

- ✓ ***DB services are different names for a database***
- ✓ ***Can set the edition!***
- ✓ ***Used in the connection string***



Demo 2



DB SERVICES

- ✓ *create DB services*
- ✓ *setup sql developer*
- ✓ *check listener*
- ✓ *persist services*



`DBA_setup_editions.sql`

EBR Database Setup



TIPPS AND TRAPS

- ✓ *Do not enable editions for other schemas like APEX_LISTENER just grant USE ON EDITION*
- ✓ *Test Services after Database Restart*
- ✓ *Avoid to delete columns*
- ✓ *Good database design helps to minimize table changes later*

EBR and APEX



APEX APPLICATION

- ✓ *Edition = application release*
- ✓ *but only on data base level*
- ✓ *Apex applications are mostly data inside the apex repository*
- ✓ *Duplicating Apex Code = Copying the Application*

EBR and APEX



APEX TODOS

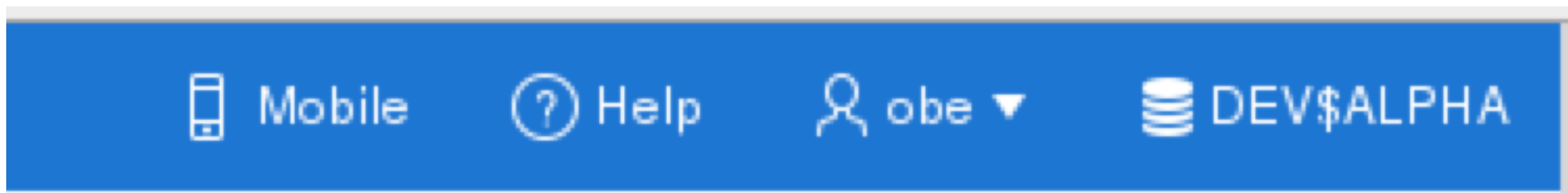
- ✓ *make application “edition aware”*
- ✓ *show current edition*
- ✓ *copy application*
- ✓ *apex db connection setup*
- ✓ *setup ords database pools for each edition*
- ✓ *map url to db pool*
- ✓ *resource template to combine url with application*

“*edition aware*” app



SHOW CURRENT EDITION

- ✓ *create application item A_CURRENT_EDITION*
- ✓ *set it with an application process*
- ✓ *show the item, either in page template or in navigation bar*



“*edition aware*” app



COPY APEX APPLICATION

- ✓ *App ID 100 = BASE*
- ✓ *App ID 110 = BETA*
- ✓ *App ID 120 = ALPHA*
- ✓ *change pages*



Sample Database Application

configure ORDS pools



XML FILES

- ✓ **defaults.xml**
- ✓ **setup –databases**
- ✓ **add service name**
- ✓ **copy&paste**

configuration file	purpose
defaults.xml	common settings, defaults for all connection pools
conf/apex.xml	APEX_PUBLIC_USER configuration for APEX
conf/apex_al.xml	APEX_LISTENER read repository/rest configuration
conf/apex_rt.xml	APEX_REST_PUBLIC_USER apex REST services
conf/apex_pu.xml	ORDS_PUBLIC_USER Plsql and SQL developer REST services
role-mapping.xml	map web server roles to RESTful roles
url-mapping.xml	maps url to connection pools

configure ORDS connection pools



COMMANDS

```
java -jar ords.war setup --database apexalpha
```

```
[oracle@vbgeneric ords]$ java -jar ords.war setup --database apexalpha
Enter the name of the database server [localhost]:
Enter the database listen port [1521]:
Enter the database service name [DEV_BETA]:DEV_ALPHA
Enter 1 if you want to verify/install Oracle REST Data Services schema or 2 to skip this step [1]:2
Enter 1 if you want to use PL/SQL Gateway or 2 to skip this step.
If using Oracle Application Express or migrating from mod_plsql then you must enter 1 [1]:1
Enter the PL/SQL Gateway database user name [APEX_PUBLIC_USER]:
Enter the database password for APEX_PUBLIC_USER:
Confirm password:
Enter 1 to specify passwords for Application Express RESTful Services database users (APEX_LISTENER, APEX_REST_PUBLIC_USER) or 2 to skip this step [1]:1
Enter the database password for APEX_LISTENER:
Confirm password:
Enter the database password for APEX_REST_PUBLIC_USER:
Confirm password:
Apr 24, 2016 11:58:20 AM oracle.dbtools.common.config.file.ConfigurationFilesBase update
INFO: Updated configurations: apexalpha_al, apexalpha_rt
```

```
<?xml version="1.0" encoding="UTF-8" standalone="no"?>
<!DOCTYPE properties SYSTEM "http://java.sun.com/dtd/properties.dtd">
<properties>
<comment>Saved on Fri Jan 22 17:12:18 EST 2016</comment>
<entry key="db.password">@05F6F3ABB32550C3BD33C3358A775868E1</entry>
<entry key="db.username">APEX_PUBLIC_USER</entry>
<entry key="db.servicename">DEV_ALPHA</entry>
<entry key="debug.debugger">>true</entry>
<entry key="debug.printDebugToScreen">>true</entry>
<entry key="jdbc.InitialLimit">2</entry>
</properties>
```



map URL to database pool



COMMANDS

```
java -jar ords.war map-url -type base-path alpha apexalpha
```

```
[oracle@vbgeneric ords]$ java -jar ords.war map-url --type base-path alpha apexalpha
Apr 24, 2016 1:18:42 PM oracle.dbtools.url.mapping.file.MapURL execute
INFO: Creating new mapping from: [base-path,alpha] to map to: [apexalpha,,]
[oracle@vbgeneric ords]$
```

```
<?xml version="1.0" encoding="UTF-8"?>
<pool-config xmlns="http://xmlns.oracle.com/apex/pool-config">
  <pool name="apexalpha" base-path="alpha" updated="2016-04-22T06:17:08.423Z"/>
  <pool name="apexbeta" base-path="beta" updated="2016-04-22T06:17:08.423Z"/>
  <pool name="apexbase" base-path="base" updated="2016-04-22T06:17:08.423Z"/>
</pool-config>
```

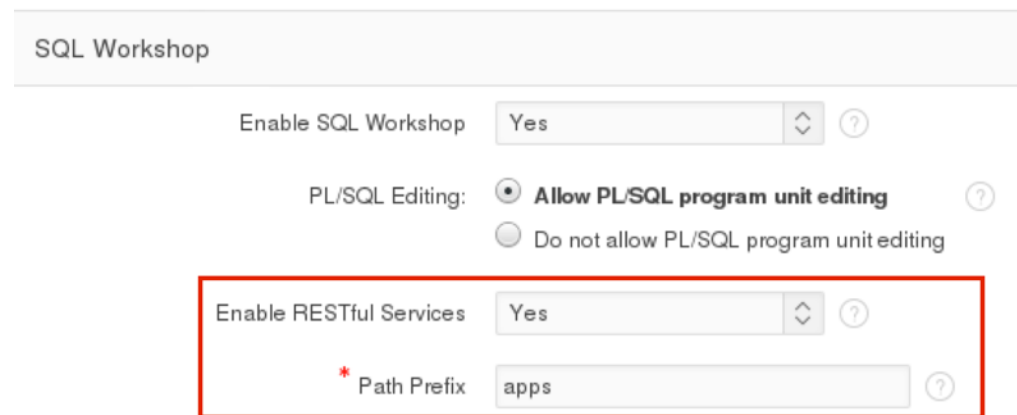
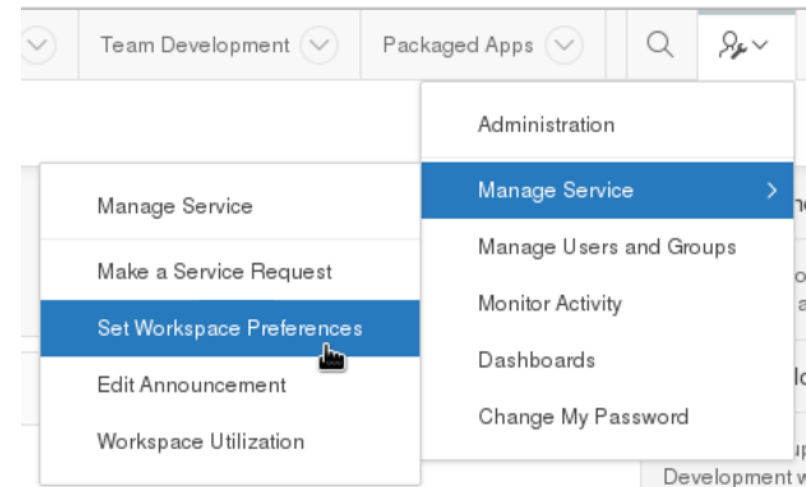


Ressource Templates



ENABLE REST IN WORKSPACE

- ✓ **set workspace preferences**
- ✓ **choose path prefix**

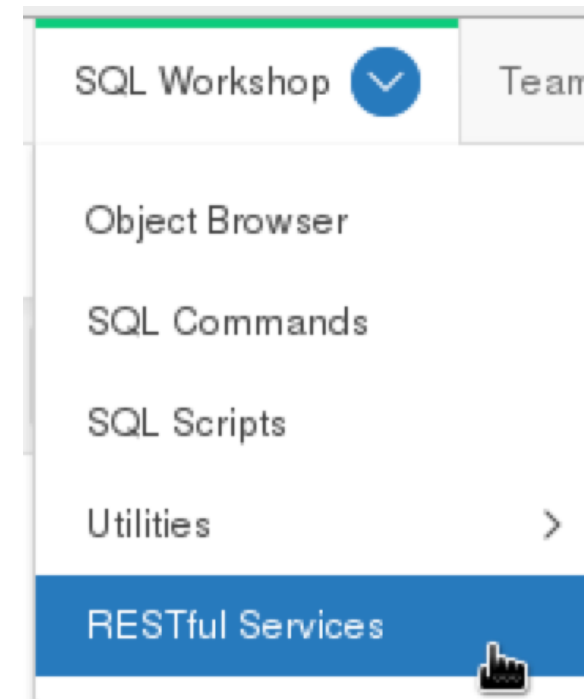


Ressource Templates



CREATE RESTFUL SERVICE

- ✓ **SQL Workshop / RESTful services**
- ✓ **create service module**
 - ✓ **GET plsql handler**
 - ✓ **no secure access**
 - ✓ **out parameter binding**
 - ✓ **url as location**
 - ✓ **html redirect code 301**
- ✓ **Test**
 - ✓ **check network**



Ressource Templates



CREATE RESTFUL SERVICE

- ✓ **create service module**
- ✓ **no URI prefix = general handler**

↑ RESTful Services > RESTful Service Module

EBR Demo

sample/

GET

+ Create Handler

+ Create Template

RESTful Module: EBR Demo

Cancel

Delete

Apply Changes

A RESTful Service Module is a grouping of common templates under a common URI prefix. This prefix is prepended to all templates.

* Name

EBR Demo



URI Prefix



Origins Allowed



Required Privilege

- Assign Privilege -



* Pagination Size

25



Status

Published



Ressource Templates



CREATE RESTFUL SERVICE

- ✓ create URI Template
- ✓ sample/

RESTful Services > RESTful Service Module > Resource Template

EBR Demo

sample/

GET

+ Create Handler

+ Create Template

URI Template: sample/

Cancel

Delete

Apply Changes

RESTful Service Module: EBR Demo

* URI Template: sample/

* Priority: 0

Entity Tag: Secure HASH

Ressource Templates



CREATE RESTFUL SERVICE

- ✓ create URI Template
- ✓ ressource handler
 - ✓ GET
 - ✓ PLSQL
 - ✓ no secure access

The screenshot shows the Oracle RESTful Services console interface. The breadcrumb navigation at the top reads: RESTful Services > RESTful Service Module > Resource Template > Resource Handler. On the left sidebar, the tree view shows 'EBR Demo' > 'sample/' > 'GET'. Below the tree, there are buttons for '+ Create Handler' and '+ Create Template'. The main content area is titled 'Resource Handler: GET' and includes 'Cancel', 'Delete', and 'Apply Changes' buttons. A descriptive text states: 'A resource handler is a query or an anonymous PL/SQL block responsible for handling a particular HTTP method. Although multiple resource handlers can be defined for a resource template, only one resource handler per HTTP method is permitted.' The configuration fields are: 'RESTful Service Module' (empty), 'URI Template' (sample/), 'Method' (GET), 'Source Type' (PL/SQL), 'Requires Secure Access' (No), and 'Pagination Size' (empty). A red rectangular box highlights the 'Method', 'Source Type', and 'Requires Secure Access' fields.

Ressource Templates



CREATE RESTFUL SERVICE

- ✓ **create URI Template**
- ✓ **ressource handler**
- ✓ **set plsql source**
- ✓ **create OUT parameter**
- ✓ **LOCATION**
- ✓ **X-APEX-STATUS-CODE**

```
declare
url varchar2(4000);
dbedition varchar2(100);
begin

-- check context based upon current connection
dbedition := sys_context('userenv','current_edition_name');

if dbedition = 'ORA$BASE' then
url := '../f?p=100';
elsif dbedition = 'DEV$BETA' then
url := '../f?p=110';
elsif dbedition = 'DEV$ALPHA' then
url := '../f?p=120';
else -- use default application
url := '../f?p=110';
end if;

:URL := url;

:STATUS := 301; --redirect
end;
```

Parameters					Create Parameter >
Name	Bind Variable Name	Access Method	Source Type	Parameter Type	
LOCATION	URL	OUT	HTTP Header	String	
X-APEX-STATUS-CODE	STATUS	OUT	HTTP Header	String	

Ressource Templates



CREATE RESTFUL SERVICE

✓ TEST

localhost:8080/ords/alpha/apps/f?p=120:LOGIN_DESKTOP:.....

Most Visited Oracle Cloud Labs APEX

Sample Database Application

obe ✓

..... ✓

To sign in to the Sample Database application, please use

Method	File	Domain	Request URL	Status code
301 GET	sample	localhost:8080	http://localhost:8080/ords/alpha/apps/sample	301 Moved Permanently
301 GET	/	localhost:8080		
302 GET	f?p=120	localhost:8080		
302 GET	f?p=120:1:.....	localhost:8080		
200 GET	f?p=120:LOGIN_DESKTOP:.....	localhost:8080		
304 GET	Core.min.css?v=5.0.3.00.03	localhost:8080		
304 GET	Theme-Standard.min.css?v=...	localhost:8080		

Request URL: http://localhost:8080/ords/alpha/apps/sample

Request method: GET

Status code: 301 Moved Permanently

Response headers (0.116 KB)

Location: "http://localhost:8080/ords/alpha/apps/sample/"

Transfer-Encoding: "chunked"

Request headers (0.726 KB)

24 requests, 935.90 KB, 0.79 s

Final Result



TRY THE APPLICATION

The screenshots illustrate the application's behavior across different environments. The top screenshot (DEV\$ALPHA) shows a search for 'John Dulles' and 'William Hartsfield'. The middle screenshot (DEV\$BETA) shows a search for 'John Dulles'. The bottom screenshot (ORA\$BASE) shows a search for 'John Dulles' and 'William Hartsfield', with the latter highlighted in a red box.

Customer Name	Address	City	State	ZIP Code	Tags
Dulles, John	45020 Aviation Drive	Sterling	VA	20166	
Hartsfield, William	6000 North Terminal Parkway	Atlanta	GA	30320	REPEAT CUSTOMER



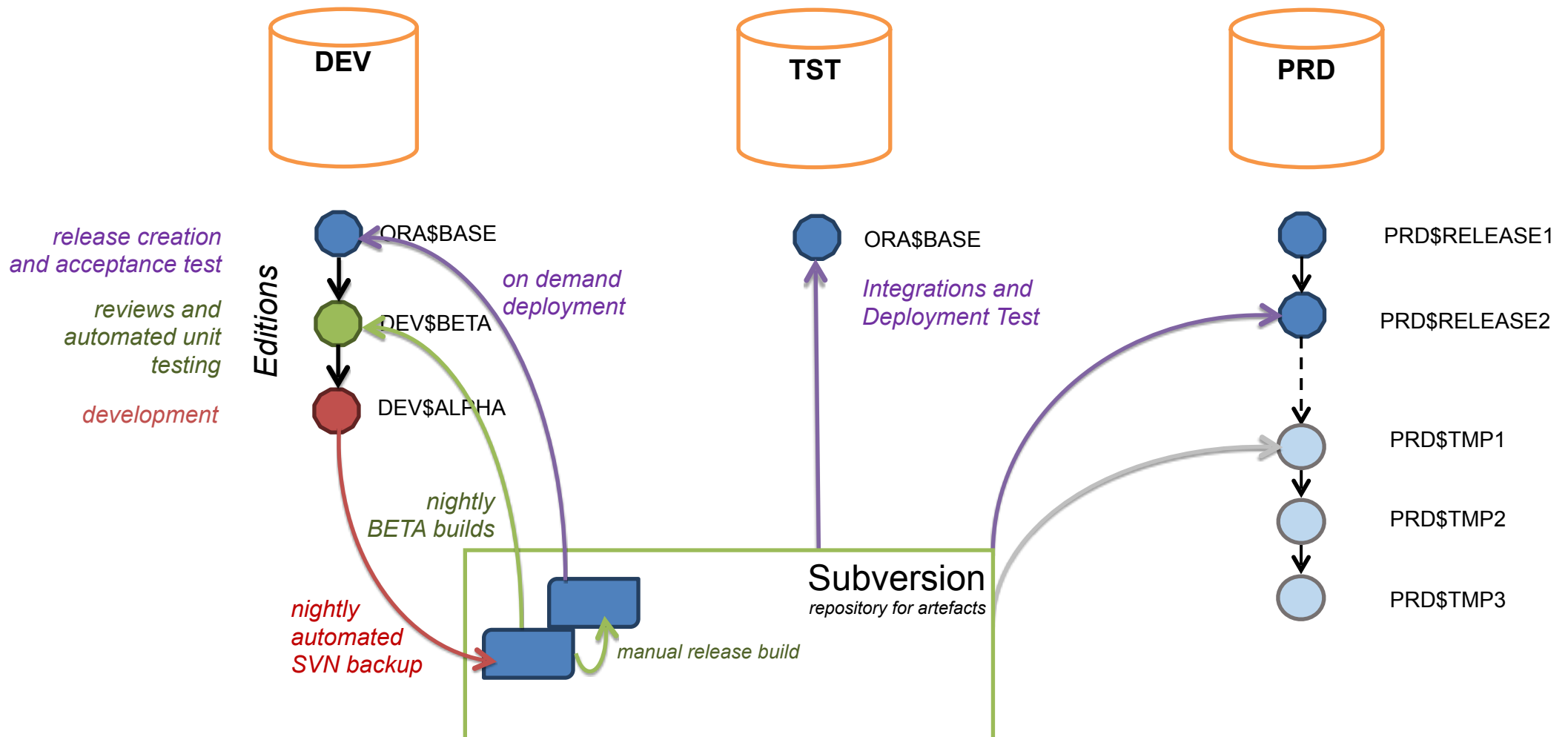
Architecture

*use EBR
to save a test database*

DB and SVN setup



EDITION ARCHITECTURE





RECOMMENDATIONS

- ✓ *Negative downtime is better than zero downtime!*
- ✓ *Install and run different application version in parallel*
- ✓ *Use it during development and save up on test databases*
- ✓ *choose url pathname different from schema name*

Want to know more?



LINKS

- ✓ **Oracle Documentation**
https://docs.oracle.com/database/121/ADFNS/adfn_ editions.htm#ADFNS020
- ✓ **Bryn Llewellyn**
<http://www.oracle.com/technetwork/database/features/availability/edition-based-redefinition-1-133045.pdf>
- ✓ **Tom Kyte: “A closer look at the New Edition”**
<http://www.oracle.com/technetwork/issue-archive/2010/10-jan/o10asktom-172777.html>
- ✓ **Chris Saxon**
https://www.doag.org/formes/pubfiles/7321069/docs/Konferenz/2015/vortraege/Development/2015-K-DEV-Chris_Saxon-Edition_Based_Redefinition_for_Zero_Downtime_PL_SQL_Changes-Manuskript.pdf
- ✓ **Lucas Jellema**
<http://www.slideshare.net/lucasjellema/edition-based-redefinition-continuous-database-application-evolution-with-oracle-database-11g-release-2>
- ✓ **Kris Rice**
<http://krisrice.blogspot.de/2013/07/nicer-urls-for-apex-yet-another-option.html>
<http://de.slideshare.net/KrisRice/oracle-rest-data-services-best-practices-overview>
- ✓ **Sven Weller: “Working with Editions”**
<https://svenweller.wordpress.com/2015/03/25/working-with-editions-part-1/>
<https://svenweller.wordpress.com/2015/06/16/working-with-editions-part-2/>
Soon to come: The Edition based “not only” Redefinition Manifesto

Danke

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