All about APEX Metadata

Oliver Lemm

code of change

Hyand

about me

Deputy Head of Business Unit APEX / Low Code @ Hyand

Architect, Projekt Manager & Developer

Oliver Lemm
@OliverLemm

APEX & Oracle DB architect and specialist from Germany
DevOps, Testing and all about PL/SQL
Oracle ACE Pro ♠

💼 Science & Technology   📍 Germany   🗓 Joined February 2011

61 Following   **1,759** Followers

ODTUG Kscope

DOAG
Konferenz + Ausstellung

IT-Tage 2024

APEX connect
by DOAG

āʹpěks world
(#orclapex)   (#apexworld)

āʹpěks alpe adria

High delivery reliability and international network of locations

Kaunas

Vilnius

Hamburg

Wolfsburg

² ˣ Braunschweig   ² ˣ Berlin

Dortmund

Ratingen

Cologne

Frankfurt

Wrocław

Munich

Cluj-Napoca

Pune

> 900
Employees
(of which 160 in shoring
locations)

> 150
Clients

> 10
Industries

16
Locations

Hyand

1. Introduction into Metadata

2. Navigation on Metadata

3. Settings & Checks on Metadata

4. Quality Assurance on Metadata

5. Export / Import with Metadata

Introduction into Metadata

"data that provides information about other data"

Hyand

Metadata is the key

- APEX has its own scheme

- Your App is Metadata

- App Definition is divided from App Logic and

  App Data

APEX_230200	• wwv_flow... • wwv_flow_ir
APEX_240100	• wwv_flow... • wwv_flow_ir
APEX_240200	• wwv_flow... • wwv_flow_ir

don't use wwv_…

use

   apex_…
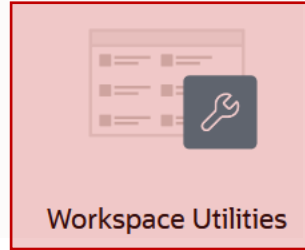
   apex_appl_…

   apex_application_…

Oracle APEX Views

Report View   Tree View

View ↑≡	Comment
APEX_APPLICATIONS	Applications defined in the current workspace or database user.
APEX_APPLICATION_ALL_AUTH	All authorization schemes for all components by Application
APEX_APPLICATION_AUTH	Identifies the available Authentication Schemes defined for an Application
APEX_APPLICATION_AUTHORIZATION	Identifies Authorization Schemes which can be applied at the application, page or component level
APEX_APPLICATION_BC_ENTRIES	Identifies Breadcrumb Entries which map to a Page and identify a pages parent
APEX_APPLICATION_BREADCRUMBS	Identifies the definition of a collection of Breadcrumb Entries which are used to identify a page Hierarchy
APEX_APPLICATION_BUILD_OPTIONS	Identifies Build Options available to an application
APEX_APPLICATION_CACHING	Applications defined in the current workspace or database user.
APEX_APPLICATION_COMPUTATIONS	Identifies Application Computations which can run for every page or on login
APEX_APPLICATION_GROUPS	Application Groups defined per workspace. Applications can be associated with an application group.
APEX_APPLICATION_ITEMS	Identifies Application Items used to maintain session state that are not associated with a page
APEX_APPLICATION_LISTS	Identifies a named collection of Application List Entries which can be included on any page using a region of type List. Display attributes are controlled using a List Template.
APEX_APPLICATION_LIST_ENTRIES	Identifies the List Entries which define a List. List Entries can be hierarchical or flat.
APEX_APPLICATION_LOCKED_PAGES	Locked pages of an application
APEX_APPLICATION_LOVS	Identifies a shared list of values that can be referenced by a Page Item or Report Column

APEX   App Builder ⌄   SQL Workshop ⌄   Team Development ⌄

Create   Import   Dashboard   **Workspace Utilities**

Oracle APEX Views
Query the various views against Oracle APEX metadata.

∨ APEX_WORKSPACES
  › APEX_APPLICATIONS
  › APEX_DG_BLUEPRINTS
  › APEX_ISSUES
    APEX_ISSUE_EMAIL_PREFS
  › APEX_ISSUE_LABEL_GROUPS
    APEX_ISSUE_MILESTONES
  ∨ APEX_REST_CATALOG_GROUPS
    ∨ APEX_REST_CATALOGS
        APEX_REST_CATALOG_PLUGINS
        APEX_REST_CATALOG_SERVICES

Handling Views

- evolution of Views
  1. apex_application_pages
  2. apex_appl_page_igs

- use "autocompletion"

- data based on
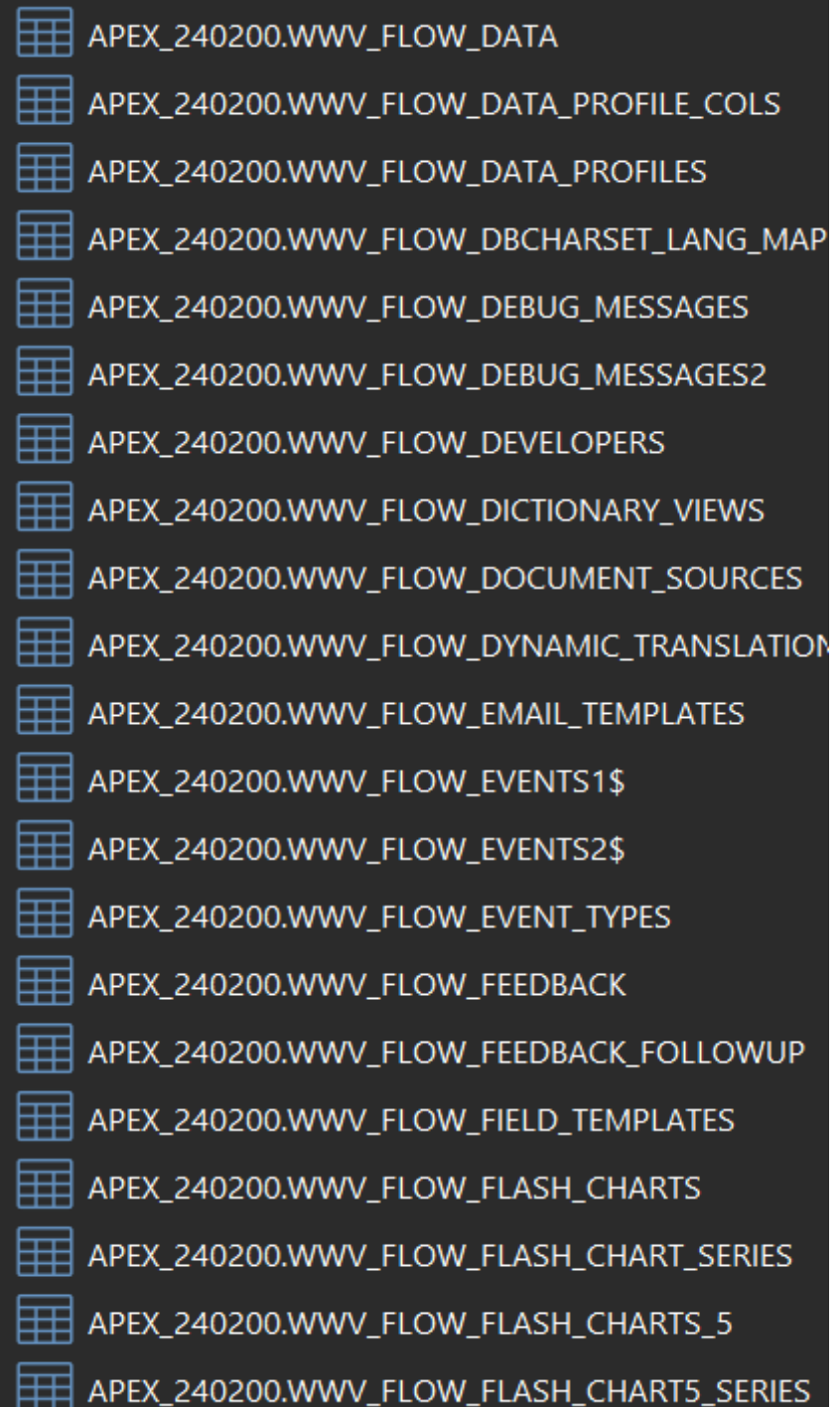 1. application_id
  2. page_id

- label

- display_sequence

```
select p.page_name

    ,p.page_id

from apex_application_pages p

where p.application_id = 133

order by page_name
```

```
select i.page_id, i.page_name, i.region, i.item_name, i.label

from apex_application_page_items i

join apex_application_page_regions r on r.region_id = i.region_id

where i.application_id = 133

order by i.page_name

    ,r.display_sequence

    ,i.display_sequence
```

APEX Metadata don'ts

- never change APEX Metadata objects

- never create copy of objects

  ⇒ APEX Upgrade will fail

- never manipulate APEX Metadata

  ⇒ Relations to other attributes might be broken

- APEX Import validates Metadata

APEX_240200.WWV_FLOW_DATA
APEX_240200.WWV_FLOW_DATA_PROFILE_COLS
APEX_240200.WWV_FLOW_DATA_PROFILES
APEX_240200.WWV_FLOW_DBCHARSET_LANG_MAP
APEX_240200.WWV_FLOW_DEBUG_MESSAGES
APEX_240200.WWV_FLOW_DEBUG_MESSAGES2
APEX_240200.WWV_FLOW_DEVELOPERS
APEX_240200.WWV_FLOW_DICTIONARY_VIEWS
APEX_240200.WWV_FLOW_DOCUMENT_SOURCES
APEX_240200.WWV_FLOW_DYNAMIC_TRANSLATION
APEX_240200.WWV_FLOW_EMAIL_TEMPLATES
APEX_240200.WWV_FLOW_EVENTS1$
APEX_240200.WWV_FLOW_EVENTS2$
APEX_240200.WWV_FLOW_EVENT_TYPES
APEX_240200.WWV_FLOW_FEEDBACK
APEX_240200.WWV_FLOW_FEEDBACK_FOLLOWUP
APEX_240200.WWV_FLOW_FIELD_TEMPLATES
APEX_240200.WWV_FLOW_FLASH_CHARTS
APEX_240200.WWV_FLOW_FLASH_CHART_SERIES
APEX_240200.WWV_FLOW_FLASH_CHARTS_5
APEX_240200.WWV_FLOW_FLASH_CHART5_SERIES

Hyand

APEX_ADMINISTRATOR_ROLE

- It's a database role

- grant APEX_ADMINISTRATOR_ROLE to my_schema;

- access all APEX Metadata over all Workspaces

- Documentation
  App Builder User's Guide

  23.4 About Utilizing Database Reporting
  24.2.7 Controlling the Debug Level for an Instance
  21.1.3.10 Restricting Password Reuse

RESET_PASSWORD Procedure

March 5, 2025 • matches the current password or it is NULL and the owner of the calling PL/SQL code has **APEX_ADMINISTRATOR_ROLE**. If the value is not the user's password,

REMOVE_MENU_ENTRY Procedure

March 5, 2025 • Procedure This procedure removes an existing builder extension menu link entry. Requires the **APEX_ADMINISTRATOR_ROLE**. Syntax

APEX_INSTANCE_ADMIN

March 5, 2025 • can be executed by the SYS or SYSTEM database users and any database user granted the role **APEX_ADMINISTRATOR_ROLE**. Available Parameter Values

ADD_MENU_ENTRY Procedure

March 5, 2025 • ADD_MENU_ENTRY Procedure This procedure adds a builder extension menu link. Requires the **APEX_ADMINISTRATOR_ROLE**. Syntax

About Web Credentials and APEX_WEB_SERVICE

March 5, 2025 • database users that are not mapped to any workspace unless they have been granted the role **APEX_ADMINISTRATOR_ROLE**. Examples Example

APEX_MAIL

March 5, 2025 • database users that are not mapped to any workspace unless they have been granted the role **APEX_ADMINISTRATOR_ROLE**. Copy-- Example 1

Navigation on Metadata

Hyand

Navigation Menu - static

- Maintain relation between pages by hand

- Same child Page not possible multiple times

- Navigation "Name" and Page "Name" different

- Navigation and Page Authorization different

- One Navigation for multiple apps

List: Navigation Menu

Show All | Name | List Entries | Subscription | Configuration | Comments

Name

* Name: Navigation Menu ⓘ

List Entries

🔍 ▾ [_____] Go | 1. Primary Report ▾ | Actions ▾

Sequence	Icon	Name	Target	Level ↑≡	Parent Entry
10	fa-home	Sample Reports	Page 10	1	
20	fa-briefcase	Use Cases	Page 9	1	
30	fa-search-plus	SQL Examples	Page 39	1	
40	fa-flash	Analytic Functions	Page 21	1	
50	fa-gear	Administration	Page 36	1	
55		Interactive Report	Page 1	2	Sample Reports
60		Interactive Grid	Page 17	2	Sample Reports
63		Faceted Search	Page 42	2	Sample Reports
65		Cards	Page 41	2	Sample Reports
70		Classic Report	Page 3	2	Sample Reports
100		Drill Down Interactive Report	Page 6	2	Use Cases
105		Drill Down Interactive Grid	Page 40	2	Use Cases
110		Report Highlighting	Page 7	2	Use Cases
120		Interactive Report Query API	Page 11	2	Use Cases
130		Linking to Interactive Reports	Page 18	2	Use Cases
135		Linking to Interactive Grids	Page 37	2	Use Cases
140		Bind Variables	Page 15	2	Use Cases
150		Filtering	Page 5	2	Use Cases
160		Non-Tabular Templates	Page 13	2	Use Cases

Navigation Menu dynamic self defined structure

- define a table like NAVIGATION

- define n-m relation if multiple occurrences needed

- activate and deactivate

- order your pages

- and more attributes

```
create table NAVIGATION
(
  navi_id                number not null,
  navi_parent_id         number,
  navi_text              varchar2(100 char),
  navi_app_page_id       number,
  navi_status            number not null,
  navi_position          number,
  navi_help_text         varchar2(255 char),
  navi_comment           varchar2(2000 char),
  navi_class             varchar2(100 char),
  navi_items             varchar2(4000 char),
  navi_item_values       varchar2(4000 char)
);
```

Navigation Dynamic
- table function -

- complex functionality encapsulated

- different menu structure by enduser

- custom highlighting

```sql
 1  select
 2   n.level_
 3  ,n.text              label
 4  ,n.target            target
 5  ,n.is_current        is_current_list_entry
 6  ,n.image             image
 7  ,'width0'            image_attribute
 8  ,null                imageAltValue
 9  ,null                attribute1
10  ,null                attribute2
11  ,null                attribute3
12  ,null                attribute4
13  ,n.html_classes      attribute5
14  from table(navigation_pkg.fk_tf_navigation(
15    pi_app_user       => :APP_USER
16   ,pi_app_type       => :AI_APP_TYPE
17   ,pi_app_id         => :APP_ID
18   ,pi_apex_page_id   => :APP_PAGE_ID
19   ,pi_apex_session   => :APP_SESSION
20   ,pi_debug          => :DEBUG)) n
```
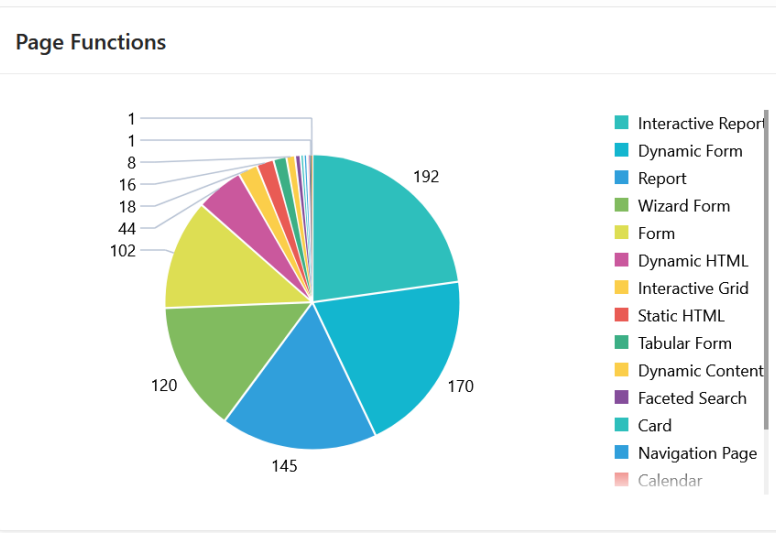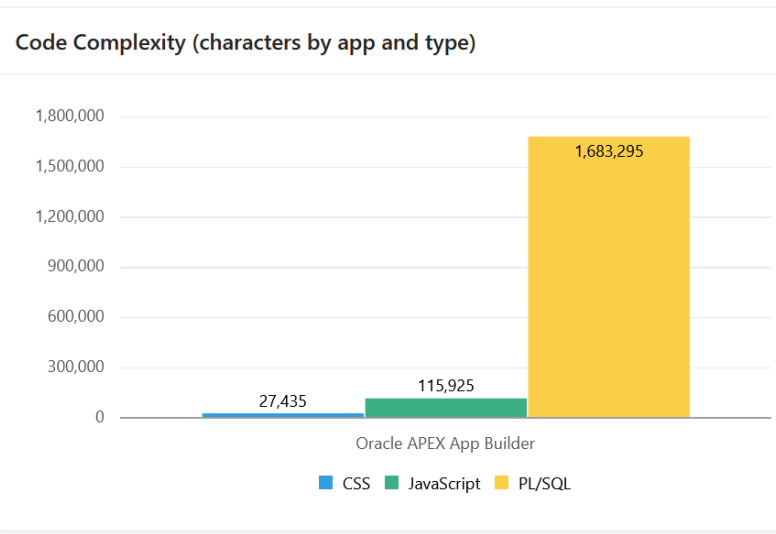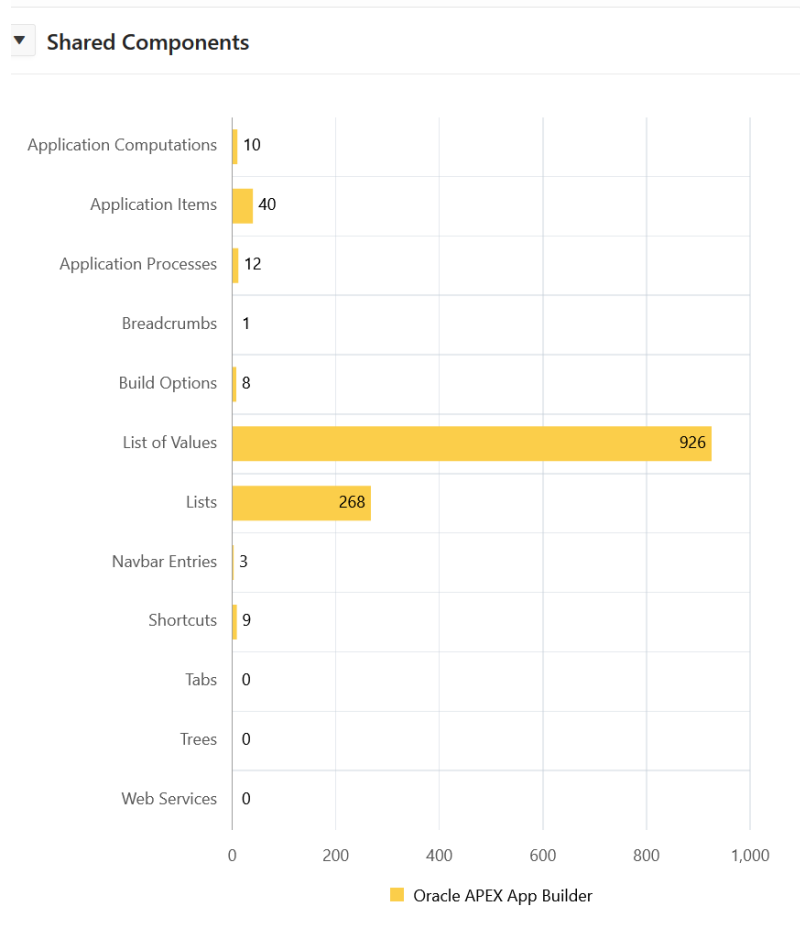
Settings on Metadata

Hyand

APEX Visualizer

- Open-Source Tool

- Metadata driven checks

- View Layer for APEX Metadata

- https://github.com/OliverLemm/apex-visualizer

APEX Visualizer – Live Demo

general application settings

* Compatibility Mode	**19.2**	
Theme Name	Universal Theme	
Include Legacy Javascript	No	

Session State Protection	Enabled
UT Version	21.1
Include jQuery Migrate	No

Runtime API Usage	This

QA (600)

code

40

20

0

0   1   2   3   4   5   6   7   8

number of javascript components

Place of JavaScript

5%

95%

- dynamic_action - na...
- page - javascript_co...

JavaScript in Page

change P600_INCLUDE_JQUERY_MIGRATE - setColorI - True (10) (dynamic_action - native_javascript_code)
var $trigger = $(this.triggeringElement);
var val = $trigger.val();

if (val == 'No') {
  $trigger.addClass("u-success");
  $trigger.removeClass("u-danger");
} else {
  $trigger.removeClass("u-success");
  $trigger.addClass("u-danger");
}

800
700   704
656
600
500   487
400
300   267 261 256 254
200
100   76   61   61   30 30 30 30 30 30 30 30   49
0

dynamic_action   page

- QA (600) - change P600_COMPATIBILITY_MODE - setColor - True (50)
- QA (600) - change P600_UT_VERSION - setColor - True (10)
- QA (600) - change P600_RUNTIME_API_USAGE - setColor - True (10)
- QA (600) - change P600_THEME_NAME - setColor show/hide P600_UT_REFRESHED - True (10)
- QA (600) - change P600_SESSION_STATE_PROTECTION - setColor - True (10)
- QA (600) - change P600_INCLUDE_LEGACY_JAVASCRIPT - setColorI - True (10)
- QA (600) - change P600_INCLUDE_JQUERY_MIGRATE - setColorI - True (10)
- Global Page - Desktop (0) - change APP_ID,PAGE_ID - set P0_PAGE_DESIGNER_LINK - True (40)
- APEX 23.2 (720) - page load - add icons by class - True (10)
- APEX 23.1 (715) - page load - add icons by class - True (10)
- Page (30) - JavaScript Function and Global Variable Declaration
- APEX 23.2 (720) - click refresh - refresh regions - True (10)
- APEX 23.1 (715) - change P0_APP_ID - refresh regions - True (10)
- APEX 23.1 (715) - click refresh - refresh regions - True (10)
- APEX 22.2 (710) - change P0_APP_ID - refresh regions - True (10)
- APEX 22.2 (710) - click refresh - refresh regions - True (10)
- APEX 22.1 (709) - change P0_APP_ID - refresh regions - True (10)
- APEX 23.2 (720) - change P0_APP_ID - refresh regions - True (10)
- APEX 22.1 (709) - click refresh - refresh regions - True (10)

Hyand

get all JavaScript

- You can find JavaScript in

    1. Page HTML Header
    2. Page HTML onload
    3. Page JavaScript
    4. Region Header
    5. Region Footer
    6. Dynamic Action – JavaScript Expression
    7. Dynamic Action – JavaScript Action
    8. Button – "Target" (redirect URL)
    9. Static Files - *.js
    10. Plugin Files - *.js

```sql
-- Page HTML Header
    select p.application_id
        ,p.page_id
        ,'Page HTML Header' component_name
        ,'page' component_type
        ,'page_html_header' js_code_type
        ,0 best_practice
        ,to_char(substr(p.page_html_header
                ,0
                ,3900)) js_code_vc2
        ,p.page_html_header js_code_clob
    from apex_application_pages p
    where p.page_html_header is not null
    and instr(p.page_html_header
        ,'<script') > 0
    union all
    -- Page HTML onload
    select p.application_id
        ,p.page_id
        ,'Execute when Page Loads' component_name
        ,'page' component_type
        ,'page_html_onload' js_code_type
        ,0 best_practice
        ,p.page_html_onload js_code_vc2
        ,to_clob(p.page_html_onload) js_code_clob
    from apex_application_pages p
    where p.page_html_onload is not null
    and instr(p.page_html_onload
        ,'<script') > 0
    union all
```

Quality Assurance on Metadata

Hyand

Quasto - https://github.com/mt-ag/quasto

Quasto

- APEX App & DB Schema

- define Metadata driven Queries

- call from other scheme
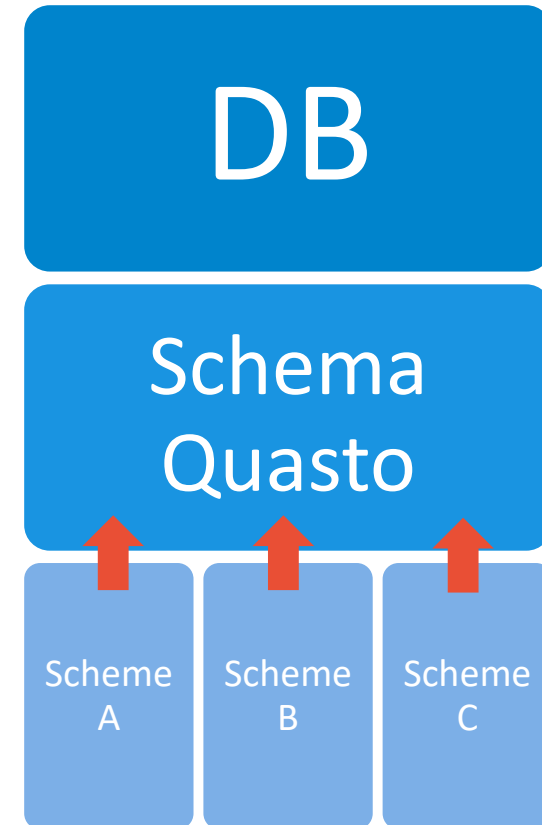
Maintain rules in APEX App

Add/Edit Rule ✕

Rule Number
1

Client Name
hyand

Name
Tables without PK

Category *
◯ APEX ◯ DATA ⦿ **DDL**

Layer *
◯ APPLICATION ⦿ **DATABASE** ◯ PAGE

Error Level *
⦿ **Error** ◯ Info ◯ Warning

Active *
🔵 (toggle on)

Comment

Error Message
The table has no Primary Key.

Object Types
TABLE

Exclude Objects

PROCESS, TABLE, VIEW, PACKAGE, PACKAGE BODY, ITEM
Use a colon (:) to separate each object type.

Use a colon (:) to separate each object.

SQL Statement
```
with param as
  (select :1 scheme
        ,:2 qaru_id
        ,:3 qaru_category
        ,:4 qaru_error_level
        ,:5 qaru_object_types
        ,:6 qaru_error_message
        ,:7 qaru_sql
   from dual)
select qa_rule_t(pi_qaru_id           => p.qaru_id
                ,pi_qaru_category      => p.qaru_category
                ,pi_qaru_error_level   => p.qaru_error_level
                ,pi_qaru_error_message => p.qaru_error_message
                ,pi_qaru_object_types  => p.qaru_object_types
                ,pi_qaru_sql           => p.qaru_sql
                ,pi_scheme_name        => p.scheme
                ,pi_object_id          => ao.object_id
                ,pi_object_name        => ao.object_name
                ,pi_object_details     => ao.object_name || ' without primary key'
                ,pi_object_type        => 'TABLE'
                ,pi_object_value       => null
                ,pi_object_updated_user => null
                ,pi_object_updated_date => ao.last_ddl_time)
from param p
cross join all_tables at
join all_objects ao on at.table_name = ao.object_name
where (ao.owner = p.scheme or p.scheme is null)
and not exists (select null
      from all_constraints cons
      join all_cons_columns cols on cols.constraint_name = cons.constraint_name
      where cols.table_name = at.table_name
      and cons.constraint_type = 'P'
      and cons.status = 'ENABLED')
```

Close

💾 Create

Example rule for Never Condition

Add/Edit Rule

Rule Number
3

Client Name
hyand

Name
Object with Never Condition

Category *
◉ APEX   ○ DATA   ○ DDL

Layer *
○ APPLICATION   ○ DATABASE   ◉ PAGE

Error Level *
○ Error   ○ Info   ◉ Warning

Active *
[toggle on]

Comment

Error Message
Your object has a never Condition. Use Build Option or remove the object.

Object Types
PROCESS,ITEM,VALIDATION,DYNAMIC_ACTION

Exclude Objects

PROCESS, TABLE, VIEW, PACKAGE, PACKAGE BODY, ITEM

Use a colon (:) to separate each object.

SQL Statement

```
pi.apex_page_id      => c.apex_page_id)
cross join (select 'ITEM' object_type
      ,pi.application_id
      ,pi.application_name
      ,pi.page_id
      ,pi.region_id
      ,pi.item_id object_id
      ,pi.item_name object_name
      ,pi.condition_type_code object_value
      ,pi.last_updated_by object_updated_user
      ,pi.last_updated_on object_updated_date
      ,pi.application_id as apex_app_id
      ,pi.page_id as apex_page_id
from apex_application_page_items pi
where pi.condition_type_code = 'NEVER'
union
select 'REGION' object_type
      ,pr.application_id
      ,pr.application_name
      ,pr.page_id
      ,pr.region_id
      ,pr.region_id object_id
      ,pr.region_name object_name
      ,pr.condition_type_code object_value
      ,pr.last_updated_by object_updated_user
      ,pr.last_updated_on object_updated_date
      ,pr.application_id as apex_app_id
      ,pr.page_id as apex_page_id
from apex_application_page_regions pr
where condition_type_code = 'NEVER'
union
select 'BUTTON' object_type
      ,pb.application_id
      ,pb.application_name
      ,pb.page_id
      ,pb.region_id
      ,pb.button_id object_id
      ,pb.button_name object_name
      ,pb.condition_type_code object_value
      ,pb.last_updated_by object_updated_user
      ,pb.last_updated_on object_updated_date
      ,pb.application_id as apex_app_id
      ,pb.page_id as apex_page_id
from apex_application_page_buttons pb
where pb.condition_type_code = 'NEVER'
union
```

use of global page

- run Metadata Queries on global Page

- only for testing purposes
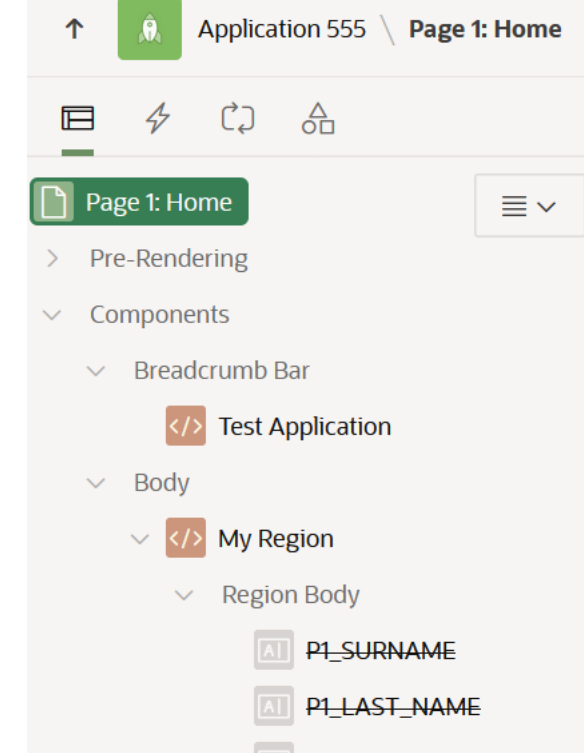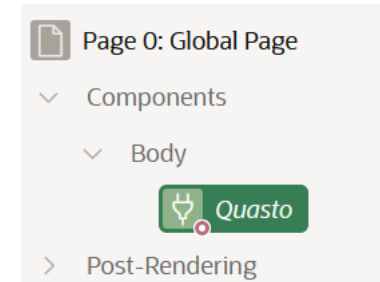
- use developer session as condition

Page 1: Home

- Pre-Rendering
- Components
  - Breadcrumb Bar
    - Test Application
  - Body
    - My Region
      - Region Body
        - P1_SURNAME
        - P1_LAST_NAME

Page 0: Global Page
- Components
  - Body
    - Quasto
- Post-Rendering

Server-side Condition

Type	Expression
Language	PL/SQL

PL/SQL Expression

`APEX_Application.g_edit_cookie_session_id IS NOT NULL`

My Region

Birthday
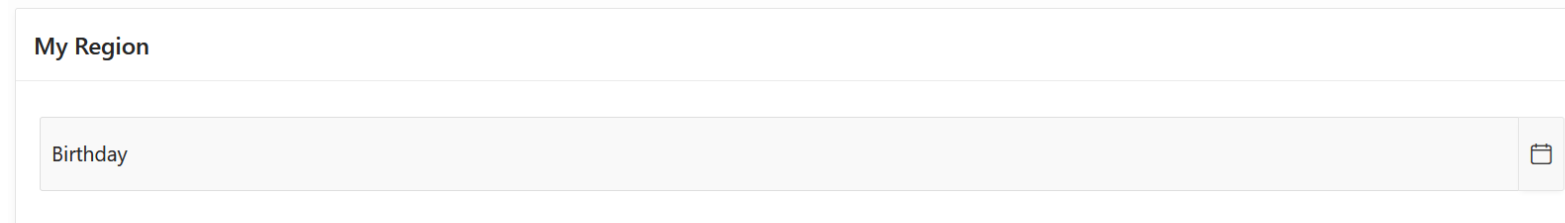
Quasto

#	Error Level	Rule Number	Rule Name	Object Type	Object Name	Details
1	2	Object with Never Condition	3	ITEM	P1_SURNAME	The Item P1_SURNAME on Page 1 in Test Application has a never condition!
2	2	Object with Never Condition	3	ITEM	P1_LAST_NAME	The Item P1_LAST_NAME on Page 1 in Test Application has a never condition!
3	2	Object with Never Condition	3	ITEM	P1_LOCATION	The Item P1_LOCATION on Page 1 in Test Application has a never condition!
4	2	Object with Never Condition	3	ITEM	P1_COUNTRY	The Item P1_COUNTRY on Page 1 in Test Application has a never condition!

Hyand

All about APEX

Export / Import and Metadata

Hyand

Authentication Scheme check

- Developing Apps by changing Authentication Scheme

- ensure not to run apps with Open Door or any other false setting?

- run Script

  before export

  or

  after import

```
SET VERIFY OFF
WHENEVER SQLERROR EXIT SQL.SQLCODE
declare
  l_count            number;
  e_no_http_header_error exception;
begin
  select count(1)
  into l_count
  from apex_application_auth a
  where a.application_id = &1
  and a.is_current_authentication = 'Y'
  and a.scheme_type_code in ('NATIVE_HTTP_HEADER_VARIABLE',
'NATIVE_SAML');

  if l_count = 0
  then
    raise_application_error(-20002,'No HTTP Header Variable as
Authentication scheme selected.');
  end if;
end;
/
```

Invalid Objects check

- Ensure App Deployment with valid Database Objects

- Integrate recompile

- run Script after import

```
begin
 select count(1) into l_new_invalid from user_objects where status <> 'VALID';

 l_old_invalid := l_new_invalid + 1;
 while l_new_invalid < l_old_invalid and l_new_invalid <> 0
 loop
  dbms_output.put_line('recompile run ' || (l_round + 1));
  l_round := l_round + 1;
  dbms_utility.compile_schema(schema      => l_schema_name ,compile_all => false);
  l_old_invalid := l_new_invalid;

  select count(1) into l_new_invalid from user_objects where status <> 'VALID';
 end loop;

 if l_new_invalid <> 0
 then
  dbms_output.put_line(l_new_invalid || ' objects cannot be made valid');

  for o in (select object_name, object_type
        from user_objects u
        where u.status = 'INVALID'
        order by object_name)
  loop
   dbms_output.put_line(o.object_name || ' (' || o.object_type || ') is invalid');
  end loop;

  raise e_objects_not_valid;

 else
  dbms_output.put_line('all objects are valid');
 end if;
```

Pre Version check

```
select a.version
      ,a.flow_status_code
      ,a.availability_status
from apex_applications a
where a.application_id = 133
```

- Query your App Version

- Query your App Status

- Query your Environment

VERSION	FLOW_STATUS_CODE	AVAILABILITY_STATUS
Release 1.0	AVAILABLE_W_EDIT_LINK	Available with Developer Toolbar

VERSION	FLOW_STATUS_CODE	AVAILABILITY_STATUS
Release 1.1	DEVELOPERS_ONLY	Available to Developers Only

```
select i.name, i.value
from apex_instance_parameters i
where i.name like 'ENV_BANNER_LABEL'
```

NAME	VALUE
ENV_BANNER_LABEL	PROD

Activate Automations (on production)

```
PROMPT >> Activating APEX Automations
DECLARE
 c_app_id constant number := apex_application_install.get_application_id;
begin
 if glb_db_umgebungen_pkg.fc_ist_prod
 then
  for a in (select aaa.static_id, aaa.name
                          from apex_appl_automations aaa
              where aaa.polling_status_code is not null
                          and aaa.polling_status_code = 'DISABLED'
                          and aaa.application_id = c_app_id)
  loop
   dbms_output.put_line('Enable Automation: ' || a.name);
   apex_automation.enable(p_application_id => c_app_id,
            p_static_id     => a.static_id);
  end loop;
 else
  dbms_output.put_line('No Production Environment, no Automations will be activated.');
 end if;
end;
/
```

Publish Translations

```
PROMPT >> Publish Translated Applications
declare
 c_app_id constant number := apex_application_install.get_application_id;
 l_count_translations number := 0;
begin
 -- Next call might fail if we do not set NUMERIC_CHARACTERS
 execute immediate q'[alter session set NLS_NUMERIC_CHARACTERS='.,']';

 for l in ( select translated_app_language
        from apex_application_trans_map
        where primary_application_id = c_app_id)
 loop
  dbms_output.put_line('Translation: ' || l.translated_app_language);
  apex_lang.publish_application(p_application_id => c_app_id,
                              p_language      => l.translated_app_language );
  l_count_translations := l_count_translations + 1;
 end loop;

 if l_count_translations = 0
 then
  dbms_output.put_line('No Translation available.');
 end if;
end;
/
```

Hyand

NL.OUG
NL ORACLE USER GROUP

Please fill in your evaluations
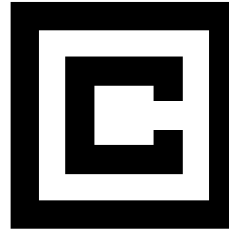
Say Hy_

+49 (0) 2102 30 961-0
oliver.lemm@hyand.com
X [@OliverLemm](https://x.com/OliverLemm)
[@oliverlemm.bsky.social](https://bsky.app/profile/oliverlemm.bsky.social)