APEX internal Workspace

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Make IT

2018

ME

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- apex.world member of the month (march, 2016)
- OraOpenSource – APEX Text Messages

ABAKUS PLUS, d.o.o. - www.ABAKUS.si

```
History
    from 1992, ~20 employees

Applications:
    special (DB - Newspaper Distribution, FIS - Flight Information System)
    ARBITER - the ultimate tool in audit trailing
    APPM - Abakus Plus Performance and Monitoring Tool

Services:
    DBA,
    OS administration,
    Development (MediaWiki, APEX, Java, Forms / Reports)
    Networks (services, VPN, QoS, security),
    Open Source, Monitoring (Nagios, OCS, Wiki)

Hardware:
    servers, backup server, SAN storage, firewalls

Infrastructure:
    from 1995 GNU/Linux (20 years of experience!)
    Oracle on GNU/Linux: since RDBMS 7.1.5 & Forms 3.0 (before Oracle!)
    >20 years of experience with High-Availability!
```
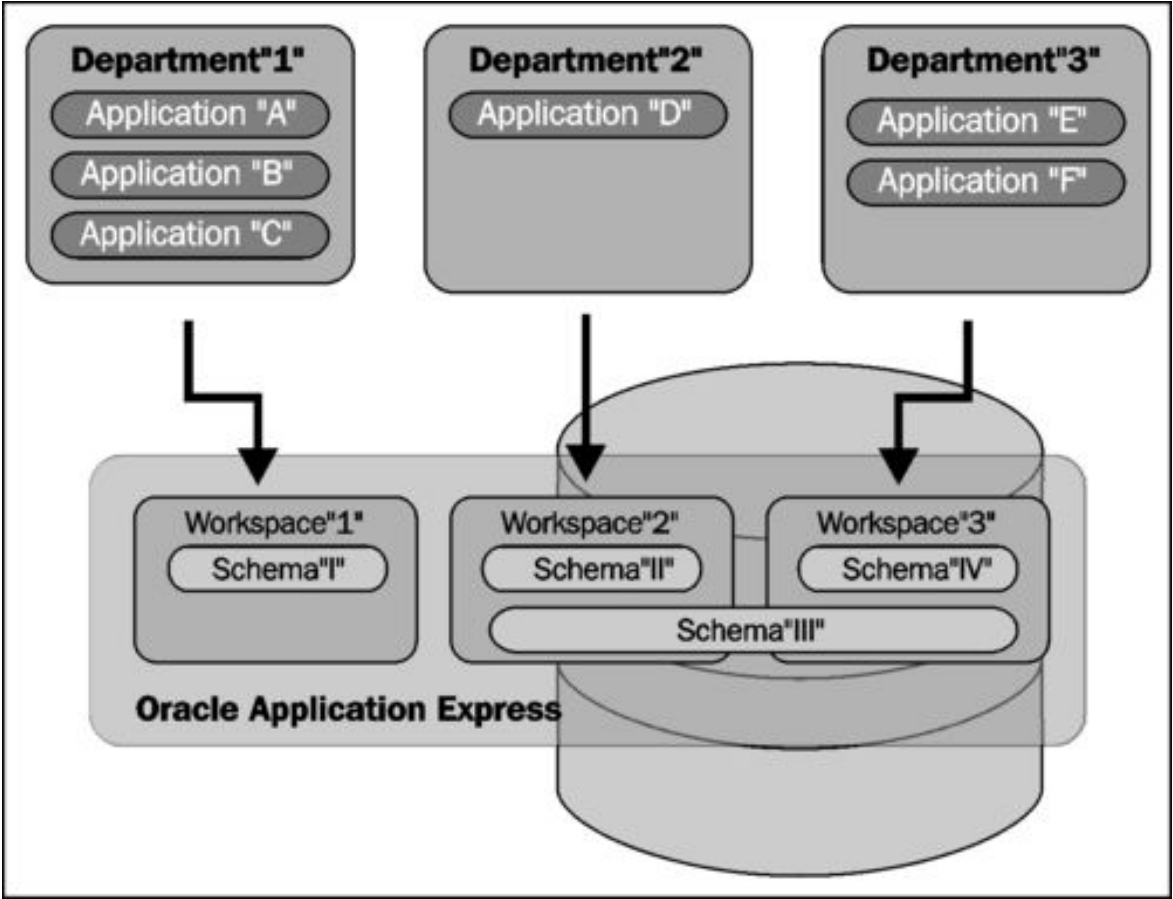
Workspace

When users log in to Oracle Application Express, they log in to a shared work area called a workspace. A workspace is a virtual private database allowing multiple users to work within the same Oracle Application Express installation while keeping their objects, data and applications private. Each workspace has a unique numeric ID and name.

Workspace Administrators

Within a workspace, End users can only run existing database or Websheet application. Developers can create and edit applications, monitor workspace activity, and view dashboards. Oracle Application Express includes two administrator roles:

- Workspace administrators are users who perform administrator **tasks specific to a workspace**.
- **Instance administrators** are super users that manage an entire hosted Oracle Application Express instance which may contain multiple workspaces.

Instance Administrator

Instance administrators have all the rights and privileges available to developers and workspace administrators. In addition, instance administrators are responsible for managing an entire Oracle Application Express instance using the **Oracle Application Express Administration Services application**. Instance administrators manage workspace provisioning, configure features and instance settings, and manage security.

Login to...administration services

http://hostname:port/apex/apex_admin

Administration Services

username

password

Sign In to Administration

Login to...internal workspace

http://hostname:port/apex/

But First

```
sqlplus / as sysdba

SQL> @apxchpwd
=====================================================================
This script can be used to change the password of an Application Express
instance administrator. If the user does not yet exist, a user record will be
created.
=====================================================================

Enter the administrator's username [ADMIN] admin_aljaz
User "admin_aljaz" does not yet exist and will be created.
Enter admin_aljaz's email [admin_aljaz] aljaz.mali@abakus.si
Enter admin_aljaz's password []
Created instance administrator ADMIN_ALJAZ.
```

Oracle Application Express Administration Services

ORACLE APEX | Manage Requests ⌄ | Manage Instance ⌄ | Manage Workspaces ⌄ | Monitor Activity ⌄

Instance Administration

Create Workspace ›

Manage Requests

Manage Instance

Manage Workspaces

Monitor Activity

System Message ✎

Pending Requests	›
Provisioning Mode: Self-Service Provisioning	

0	0
New Service	Service Change

Workspace Summary	›
Workspaces	1
Schemas	1
Applications	2
Users	1
Mail Queue Entries	0
Websheets	0

First few Minutes

Manage Instance -> Feature Configuration
- Create demonstration objects in new workspaces (use Sample Datasets)
- Create Websheet objects in new workspaces
- Enable RESTful Services

Messages
- Define Login Message, Define System Message, Site-Specific Tasks

Security
- Password Policy: http://password-checker.online-domain-tools.com/
- Delay after failed login attempts in Seconds

Create a workspace and an user and off we go!

CRᴇᴀᴛᴇ ᴀ ᴡᴏʀᴋsᴘᴀᴄᴇ

- Create a single or multiple tablespaces
- Workspace ID!
  - https://joelkallman.blogspot.com/2010/07/apexapplicationinstall.html
- If creating also a schema, do check what happend
  - Workspace TEST provisioned with administrator aljaz. Database user TEST created with default tablespace APEX_4319377218651212 using datafile C:\ORACLE\ORADATA\ORCL\APEX_4319377218651212.DBF
  - select * from dba_sys_privs where grantee = 'ALJAZ_TEST';

```
1  SELECT
2      *
3  FROM
4      dba_sys_privs
5  WHERE
6      grantee = 'ALJAZ_TEST';
```

Query Result ✕

SQL | All Rows Fetched: 14 in 0,015 seconds

	GRANTEE	PRIVILEGE	ADMIN_OPTION	COMMON	INHERITED
1	ALJAZ_TEST	CREATE JOB	NO	NO	NO
2	ALJAZ_TEST	CREATE MATERIALIZED VIEW	NO	NO	NO
3	ALJAZ_TEST	CREATE TABLE	NO	NO	NO
4	ALJAZ_TEST	CREATE OPERATOR	NO	NO	NO
5	ALJAZ_TEST	CREATE VIEW	NO	NO	NO
6	ALJAZ_TEST	CREATE TYPE	NO	NO	NO
7	ALJAZ_TEST	CREATE SYNONYM	NO	NO	NO
8	ALJAZ_TEST	CREATE CLUSTER	NO	NO	NO
9	ALJAZ_TEST	CREATE DIMENSION	NO	NO	NO
10	ALJAZ_TEST	CREATE TRIGGER	NO	NO	NO
11	ALJAZ_TEST	CREATE SESSION	NO	NO	NO
12	ALJAZ_TEST	CREATE INDEXTYPE	NO	NO	NO
13	ALJAZ_TEST	CREATE PROCEDURE	NO	NO	NO
14	ALJAZ_TEST	CREATE SEQUENCE	NO	NO	NO

Creating a Workspace Manually

```
ALTER SESSION SET CURRENT_SCHEMA = APEX_180100


BEGIN
    APEX_INSTANCE_ADMIN.ADD_WORKSPACE (
        p_workspace_id => 8675309,
        p_workspace => 'MY_WORKSPACE',
        p_primary_schema => 'SCOTT',
        p_additional_schemas => 'SCOTT' );
END;
```

Automating service creation in Oracle APEX

https://joelkallman.blogspot.com/2018/08/scripting-service-creation-in-oracle.html

And here we go...

```
1   set define '^' verify on
2   set concat on
3   set concat .
4
5   Rem
6   Rem    Title:  Demo_of_Provisioning.sql
7   Rem
8   Rem    Description:  This script will demonstrate use of all of the APIs and SQL statements necessary
9   Rem                  to create tablespaces, data files, database users, and APEX workspaces.  From this
10  Rem                  example, it is assumed that the Academy team will be able to develop their own custom
11  Rem                  provisioning process and no longer rely upon custom extensions to the
12  Rem                  Oracle Application Express software.
13  Rem
14  Rem    Notes:  It is assumed that this script is run as user SYSTEM.
15  Rem
16  Rem
17  Rem    MODIFIED    (MM/DD/YYYY)
18  Rem    jkallman    08/19/2018 - Created
19
20
21  column foo1 new_val LOG1
22  select 'Demo_of_Provisioning_'||to_char(sysdate,'YYYY-MM-DD_HH24-MI-SS')||'.log' as foo1 from sys.dual;
23  spool ^LOG1
24
25  timing start "Create demonstration tablespaces, schemas and workspaces"
```

Workspace to schema assignments

↑   Manage Workspaces \ Manage Workspace to Schema Assignments \ **Add Schema**

Add Schema

● ────────── ○ ────────── ○ ────────── ○

New or Existing

The schema is: ⦿ **Existing**   ○ New   ?

Schema
Specify whether you would like to add an existing schema, or a new schema to workspace mapping. Choosing new schema will create the database user for you.
Click **Next** to continue.

Cancel   **Next ›**

HOW DOES APEX EXECUTES SQL STATEMENTS

- DBMS_SYS_SQL through a package WWV_DBMS_SQL_APEX_180100

- https://dsavenko.me/how-apex-executes-sql-statements-without-having-permissions/

- https://www.youtube.com/watch?v=W8sjFfIq8Wc

  "And remember - with great power comes great responsibility!"

Security settings

- Workspace isolation

- Disable login

- Session Cloning

- Unhandled errors

- Response headers

Security Settings

Security

Configure service level security settings typically used to lock down a production service.

Disable Administrator Login	Yes
Disable Workspace Login	No
Allow Public File Upload	Yes
Restrict Access by IP Address	
Instance Proxy	
Checksum Hash Function	Most Secure
Rejoin Sessions	Enabled for Public Sessions
Unhandled Errors	Show Error Page

Workspace isolation

Specify which DNS aliases of the web server can be used with applications

Incoming HTTP request URL's hostname part must match one of the listed hostnames

You can configure more specific values that override this one at workspace level

Workspace isolation

- instance value: www.example.com

- WS HR: hr.example.com

- Same Origin security policy provides a client-side barrier between HR applications and other applications

Workspace isolation

Workspace Isolation

Configure isolation and resource limitation default values for all workspaces. Override these default values at workspace level.

Allow Hostnames	apollo.abakus.si
Resource Consumer Group	
Maximum Concurrent Workspace Requests	
Maximum Concurrent Session Requests	
Concurrent Session Requests Kill Timeout	
Maximum Size of Files in Workspace	
Maximum Web Service Requests	1000

Workspace isolation

Edit Workspace Information

Cancel   **Apply Changes**

| Show All | Edit Workspace Inform... | Workspace Appearance | Login Control | Component Availability | Session Timeout | Workspace Isolation |
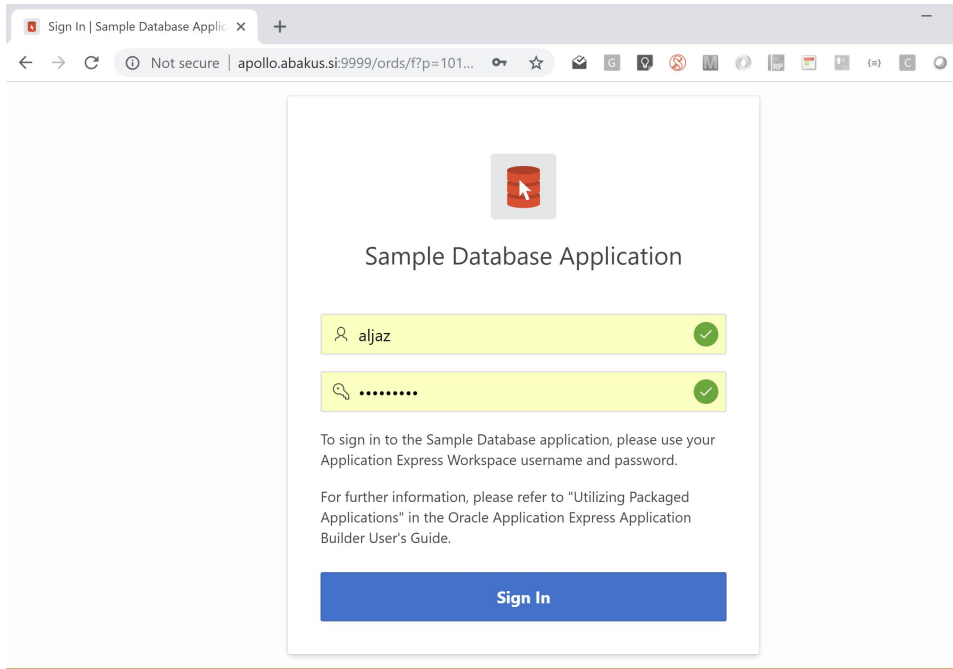
Workspace Isolation

Allow Hostnames   apollo.abakus.si   ⓘ

Workspace isolation

Manage Instance \ Security

Disable admin/Workspace login

A possible alternative to Runtime Development Environment

Disable Administrator Login   No

Disable Workspace Login   No
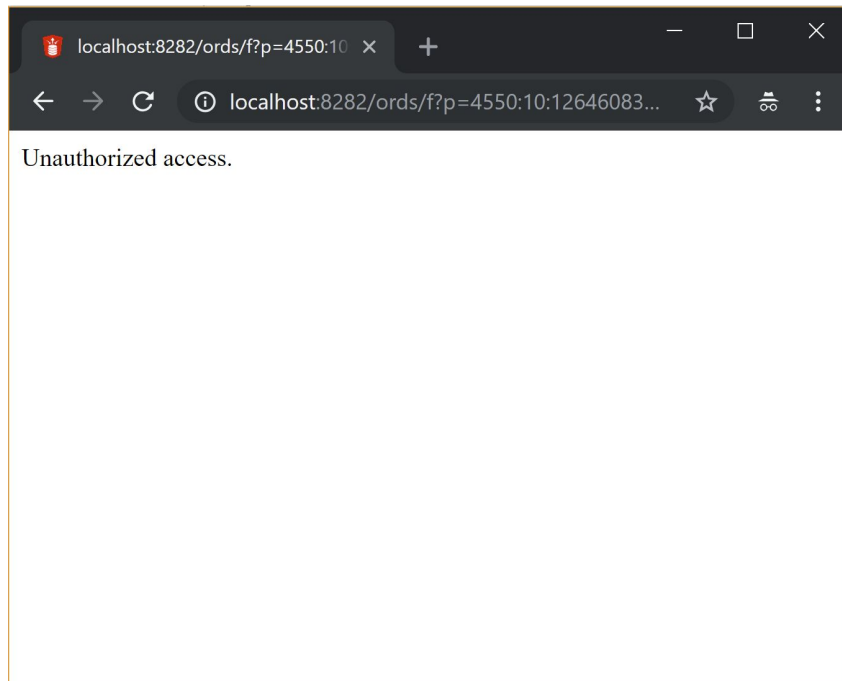
localhost:8282/ords/f?p=4550:10

localhost:8282/ords/f?p=4550:10:12646083...

Unauthorized access.

Disable admin/Workspace login

```
ALTER SESSION SET CURRENT_SCHEMA = APEX_180100;

BEGIN

  APEX_INSTANCE_ADMIN.SET_PARAMETER('DISABLE_ADMIN_LOGIN', 'N');

  commit;

END;

/
```

APEX_INSTANCE_ADMIN

The **APEX_INSTANCE_ADMIN** package provides utilities for managing an Oracle Application Express runtime environment. You use the **APEX_INSTANCE_ADMIN** package to get and set email settings, Oracle Wallet settings, report printing settings and to manage schema to workspace mappings. **APEX_INSTANCE_ADMIN** can be executed by the **SYS**, **SYSTEM**, and **APEX_180100** database users and any database user granted the role **APEX_ADMINISTRATOR_ROLE**.

https://tinyurl.com/ydzywbww

Available Parameter Values

https://tinyurl.com/y7vqxrvh

```
APEX_INSTANCE_ADMIN.SET_PARAMETER(
    p_parameter     IN VARCHAR2,
    p_value         IN VARCHAR2 DEFAULT 'N');
```

You must issue a **commit** for the parameter change to take effect.

```
APEX_INSTANCE_ADMIN.GET_PARAMETER(
    p_parameter     IN VARCHAR2)
RETURN VARCHAR2;
```

SESSION CLONING

Two (or more) independent APEX sessions running in the same browser

```
apex_instance_admin.set_parameter(
    p_parameter => 'CLONE_SESSION_ENABLED',
    p_value     => 'Y'

);
```

https://joelkallman.blogspot.com/2016/07/apex-session-isolation-across-multiple.html

https://svenweller.wordpress.com/2017/02/08/apex-5-1-session-cloning/

Unhandled Errors

Use this attribute to control how Application Express displays the results of unhandled errors. When Application Express encounters an unhandled error during processing, an error page will be displayed to the end user of the application. From a security standpoint, it is often better to not display these messages and error codes to the end user and simply return a HTTP 400 (Bad Request) error code to the client browser.

Unhandled Errors

- **Show Error Page**: This is the default behavior. For any error or exception which is not handled by the error processing of an application, display to the end user the specific error and error code on an error page.

- **Return HTTP 400**: When an unhandled error is encountered, return an HTTP 400 status to the client browser of the end user.

Security

Configure service level security settings typically used to lock down a production service.
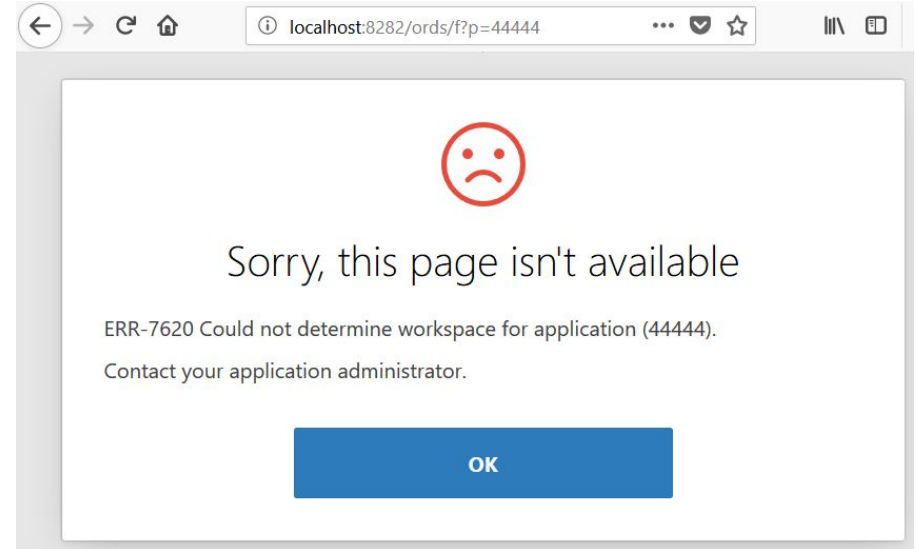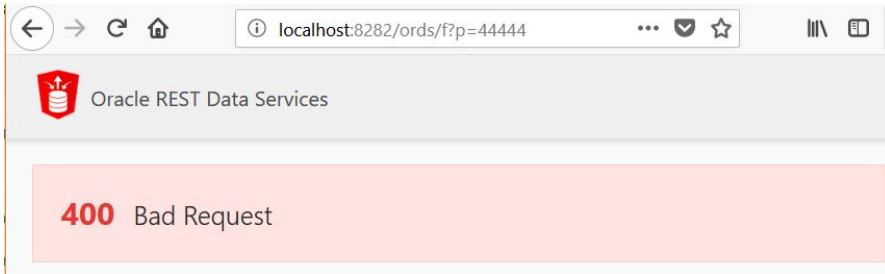
Unhandled Errors   Show Error Page   ⌄   ?

Unhandled Errors

HTTP Response headers

https://scotthelme.co.uk/hardening-your-http-response-headers/

https://securityheaders.io/

```
X-Frame-Options: SAMEORIGIN
Content-Security-Policy: default-src 'self' 'unsafe-inline' 'unsafe-eval'
#CDN#; object-src 'self'; img-src 'self' data:;
strict-transport-security: max-age=31536000; includeSubDomains
Referrer-Policy: no-referrer
```

HTTP Response headers

HTTP Protocol

Warning: *Require HTTPS* will make Application Express unreachable by the HTTP protocol. Before enabling this setting, ensure that the HTTPS protocol is enabled and configured correctly on your server.

Require HTTPS   `Application specific ▾`   ?

Require Outbound HTTPS   `No ▾`   ?

HTTP Response Headers
```
X-Frame-Options: SAMEORIGIN
Content-Security-Policy: default-src 'self' 'unsafe-inline' 'unsafe-eval' #CDN#;
object-src 'self'; img-src 'self' data:;
strict-transport-security: max-age=31536000; includeSubDomains
Referrer-Policy: no-referrer
```

HTTP Response headers

Manage Instance \ Security

Security Report Summary

R

Redirect:	[Click here](#) to follow the redirect to https://app.abakus.si/ox/f?p=500:1::::::.
Site:	https://app.abakus.si/ox/f?p=500
IP Address:	84.255.254.147
Report Time:	14 Oct 2018 09:00:30 UTC
Headers:	✔ X-Content-Type-Options ✔ X-XSS-Protection ✘ Strict-Transport-Security ✘ Content-Security-Policy ✘ X-Frame-Options ✘ Referrer-Policy ✘ Feature-Policy

HTTP Response headers

Security Report Summary

R

Redirect:	Click here to follow the redirect to https://app.abakus.si/ox/f?p=500:1::::::.
Site:	https://app.abakus.si/ox/f?p=500
IP Address:	84.255.254.147
Report Time:	14 Oct 2018 09:02:55 UTC
Headers:	✔ X-Content-Type-Options ✔ X-XSS-Protection ✔ X-Frame-Options ✔ Content-Security-Policy ✔ Referrer-Policy ✖ Strict-Transport-Security ✖ Feature-Policy
Warning:	Grade capped at A, please see warnings below.

REST Administration Interface API

- Application Express API Reference
  - https://tinyurl.com/y7jja2ku

Perform administrative functions in an Application Express instance **over REST and HTTP protocols.** This is particularly useful for machine-to-machine communication when **SQL*Net** connections are **not possible**, for instance in cloud environments.

REST Administration Interface API

To provide the REST administration interface, Oracle Application Express creates the database user APEX_INSTANCE_ADMIN_USER during installation. This schema is low-privileged. It only has the CREATE SESSION system privilege. The service modules for the REST administration interface are being stored in the APEX_INSTANCE_ADMIN_USER schema.

REST Administration Interface API

Instance Settings

Feature Configuration

Security

Instance Settings

Workspace Purge Settings

REST Administration Interface

REST Administration Interface API

REST Administration Interface API

```
set serverout on
begin
    apex_web_service.oauth_authenticate(
        p_token_url =>      'http://localhost:8282/ords/apex_instance_admin_user/oauth/token',
        p_client_id =>      'cLXGCDx0QvNJzIWFl7gfPQ..',
        p_client_secret =>  'mmPzLpf0BoSR-SlGsy08dA..'
    );
    dbms_output.put_line( 'The token is: ' || apex_web_service.oauth_get_last_token );
end;
/
```

REST Administration Interface API

https://tinyurl.com/y7ftzsrf

Filtering is possible for each of the JSON attributes by appending a query to the request URL as follows:

```
select apex_web_service.make_rest_request(
  p_url =>
    'http://localhost:8282/ords/apex_instance_admin_user/stats/latest/instance?q='
    || utl_url.escape('{"log_day": {"$gt": {"$date": "2016-08-01T00:00:00Z"}}}'),
  p_http_method => 'GET',
  p_scheme =>      'OAUTH_CLIENT_CRED' )
from dual;
```

REST Administration Interface API

REST Administration Interface API

Application 108 \ Shared Components \ Web Source Modules \ **WS Stats**

Web Source Module

| Show All | Web Source Module | Subscription | Data Profile | Operations |

Web Source Module

* Name `WS Stats` (?)

* Web Source Type `Oracle REST Data Services (Legacy Syntax)` ∨ (?)

* Remote Server `WS Stats` ∨ (?)

Base URL **http://localhost:8282/ords/apex_instance_admin_user/**

* URL Path Prefix `/stats/latest/workspace/aljaz` (?)

REST Administration Interface API

Managing LOGS

- Deleting SQL Workshop Logs
- Deleting Page View Activity Log Entries
- Deleting Developer Activity Log Entries
- Delete Developer Activity Log entries.
- Managing Developer Log Retention
- Deleting Click Counting Log Entries
- Deleting Web Service Log Entries
- Deleting the Login Access Log
- Managing Log Intervals
- Archiving the Activity Log

LOG INTERVALS

Set the minimum number of days to retain the log information for the specified logs. The maximum value that can be specified is 180 days, with a default value of 14 days. Keeping log information for longer periods can degrade runtime performance.

Logs are implemented using two underlying tables, with a switch between the log tables after the number of days specified in "Log Switch After Days".

Page View Activity Logs

Oracle Application Express uses two logs to track user activity. At any given time, one log is designated as current. For each rendered page view, the Application Express engine inserts one row into the log file. A log switch occurs at the interval listed on this page. At that point, the Application Express engine removes all entries in the noncurrent log and designates it as current.

- Log 1: wwv_flow_activity_log1$

- Log 2: wwv_flow_activity_log2$

Archiving the Activity Log

Archiving the Activity log takes the Oracle Application Express Activity log, summarizes it, and writes the results to an archived activity log.

from:APEX_WORKSPACE_ACTIVITY_LOG

to:APEX_WORKSPACE_LOG_ARCHIVE

https://www.talkapex.com/2009/05/apex-logs-storing-log-data/

EXPORT / IMPORT

- GUI

- APEXExport

- SQLcl

- APEX_EXPORT

APEXExport

```
cd C:\apex_ins
set CLASSPATH=%ORACLE_HOME%\jdbc\lib\ojdbc8.jar;C:\apex_inst\apex\utilities


java oracle.apex.APEXExport

java oracle.apex.APEXExport -db localhost:1521:ORCL -user aljaz -password
aljaz -expWorkspace -workspaceid 4287439682024231
```

SQLcl

```
apex export -expWorkspace -workspaceid 4287439682024231
```

APEX_EXPORT

```
function get_workspace (
    p_workspace_id           in number,
    p_with_date              in boolean default false,
    p_with_team_development  in boolean default false,
    p_with_misc              in boolean default false )
    return wwv_flow_t_export_files;
```

APEX_EXPORT

```
create table tmp_files (  name     varchar2(255)
                          ,contents clob );

declare
    l_files apex_t_export_files;
begin
    l_files := apex_export.get_workspace(
              p_workspace_id => 4287439682024231);

    insert into tmp_files values
      (l_files(1).name,l_files(1).contents );
end;
/
```
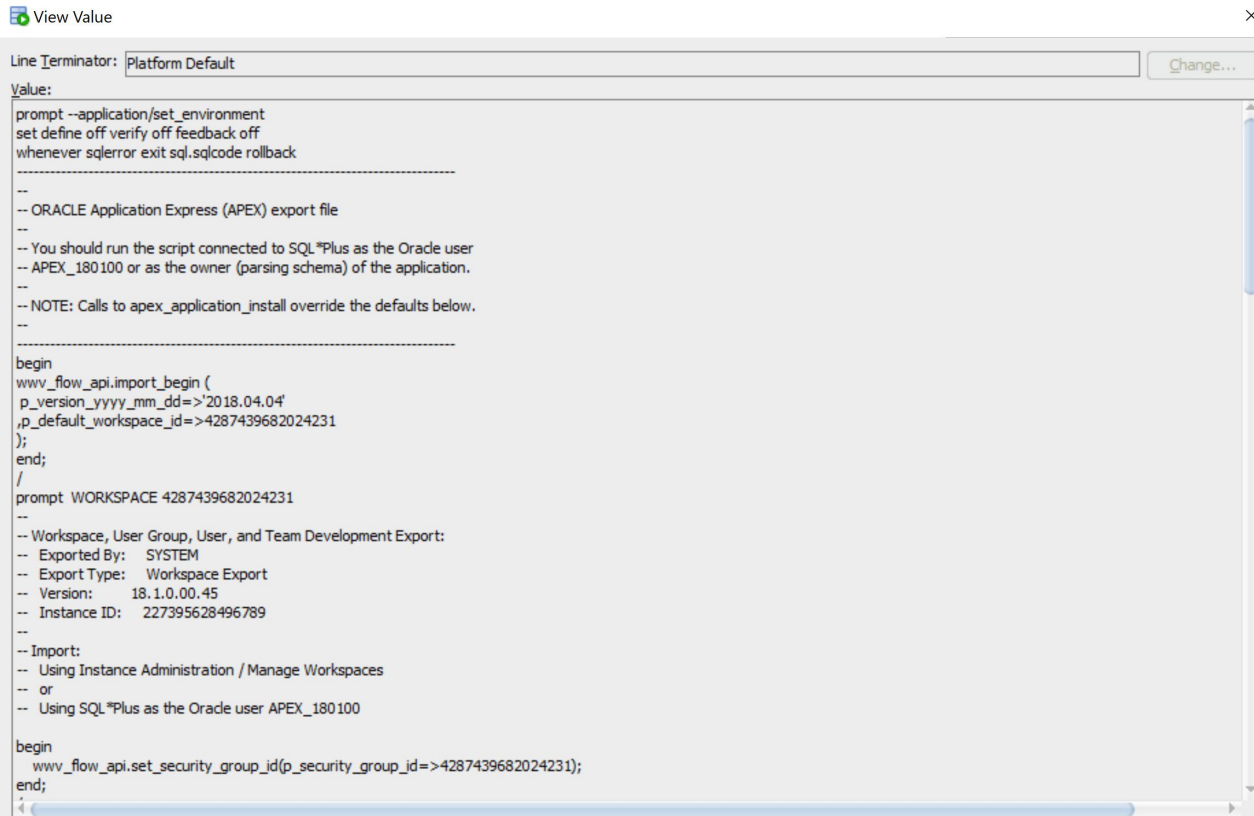
APEX_EXPORT

View Value   ×

Line Terminator: Platform Default   Change...

Value:

```
prompt --application/set_environment
set define off verify off feedback off
whenever sqlerror exit sql.sqlcode rollback
--------------------------------------------------------------------------------
--
-- ORACLE Application Express (APEX) export file
--
-- You should run the script connected to SQL*Plus as the Oracle user
-- APEX_180100 or as the owner (parsing schema) of the application.
--
-- NOTE: Calls to apex_application_install override the defaults below.
--
--------------------------------------------------------------------------------
begin
wwv_flow_api.import_begin (
 p_version_yyyy_mm_dd=>'2018.04.04'
,p_default_workspace_id=>4287439682024231
);
end;
/
prompt  WORKSPACE 4287439682024231
--
-- Workspace, User Group, User, and Team Development Export:
--   Exported By:   SYSTEM
--   Export Type:   Workspace Export
--   Version:       18.1.0.00.45
--   Instance ID:   227395628496789
--
-- Import:
--   Using Instance Administration / Manage Workspaces
--   or
--   Using SQL*Plus as the Oracle user APEX_180100

begin
   wwv_flow_api.set_security_group_id(p_security_group_id=>4287439682024231);
end;
```

Import

- Connect as APEX_180100, SYS, SYSTEM, or any schema to which the role APEX_ADMINISTRATOR_ROLE has been granted.

- Run the workspace import file.

- If the workspace export file was created with a version of Oracle Application Express lower than 3.2, you must connect as APEX_180100.

Manage Meta DATA

- Session State
  - Recent Sessions
  - Purge Sessions
  - Session State Statistics

- Mail Queue

- Interactive Report Subscriptions

- Installed Translations

Installed translations

You must run load_lang.sql script to run a translated version of Oracle Application Express.

The installation scripts are located in subdirectories identified by a language code in the unzipped distribution **apex/builder**. For example, the **German** version is located in **apex/builder/de** and the **Japanese** version is located in **apex/builder/ja**. Within each directory, there is a language loading script identified by the language code (for example, **load_de.sql** or **load_ja.sql**).

INSTALLED TRANSLATIONS

```
set NLS_LANG=American_America.AL32UTF8

SYSTEM_DRIVE:\ sqlplus /nolog

SQL> CONNECT SYS as SYSDBA

Enter password: SYS_password

ALTER SESSION SET CURRENT_SCHEMA = APEX_180100;

@load_de.sql
```

MANAGE SHARED COMPONENTS

↑ **Manage Instance**

- Packaged Applications

- Public Themes

Monitor ACTIVITY

Top Applications

Top Workspaces

Activity Summary

Packaged App Installs

DBMS_SCHEDULER Jobs

- **ORACLE_APEX_PURGE_SESSIONS**
  - Purges sessions older than 12 hours (the default). This job runs every hour.
- **ORACLE_APEX_MAIL_QUEUE**
  - Sends mail that is in the mail queue every 5 minutes.
- **ORACLE_APEX_WS_NOTIFICATIONS**
  - Determines Websheet notifications that must be sent every 30 minutes.
- **ORACLE_APEX_DAILY_MAINTENANCE**
  - Performs nightly maintenance, every day at 0100. This job archives the activity summary and runs the workspace purge process.

Service REQUESTS

Controls the ability for workspace administrators to make service requests from Workspace Administration. Service Requests include the ability to request

- a new schema
- request storage
- request termination of their workspace

Communication between Instance and Workspace administrators

Service SIGNUP WIZARD

Request a Workspace

Type

What type of workspace would you like to request?

Application Development

Packaged Apps Only

Cancel

Next ›

APEX internal Workspace

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