DOAG

DOAG 2024 Datenbank mit Exaday

Einsteigerstream / Nachwuchsstream: Ist man REST(los) glücklich?

Mittwoch, 15.05.2024 | 14:45 - 15:15 | Amsterdam 2

Robert Marz
DATABEE
Die IT-Architekten

Robert Marz – Independent Consultant

Primary Role

Senior Technical Architect
with database centric view of the world

DOAG (German Oracle User Group)

Active Member of Database Community
Responsible for Cloud Topics

DATABEE
Die IT-Architekten

Databees.

SYM

Oracle ACE Pro

@RobbieDatabee

robbie.databee.org

robert.marz@databee.org

robbiedatabee

Oracle ACE Program

500+ technical experts helping peers globally

The **Oracle ACE Program** recognizes and rewards community members for their technical and community contributions to the Oracle community

3 membership tiers

Oracle ACE Director | Oracle ACE Pro | Oracle ACE Associate

For more details on Oracle ACE Program:
ace.oracle.com

Oracle ACE

Nominate

yourself or someone you know:

ace.oracle.com/nominate

Connect: aceprogram_ww@oracle.com Facebook.com/OracleACEs @oracleace

_SYMPOSIUM 42

Created by the community, to support the community

Sharing of reliable knowledge
Supporting the various user groups and individuals

@sym_42

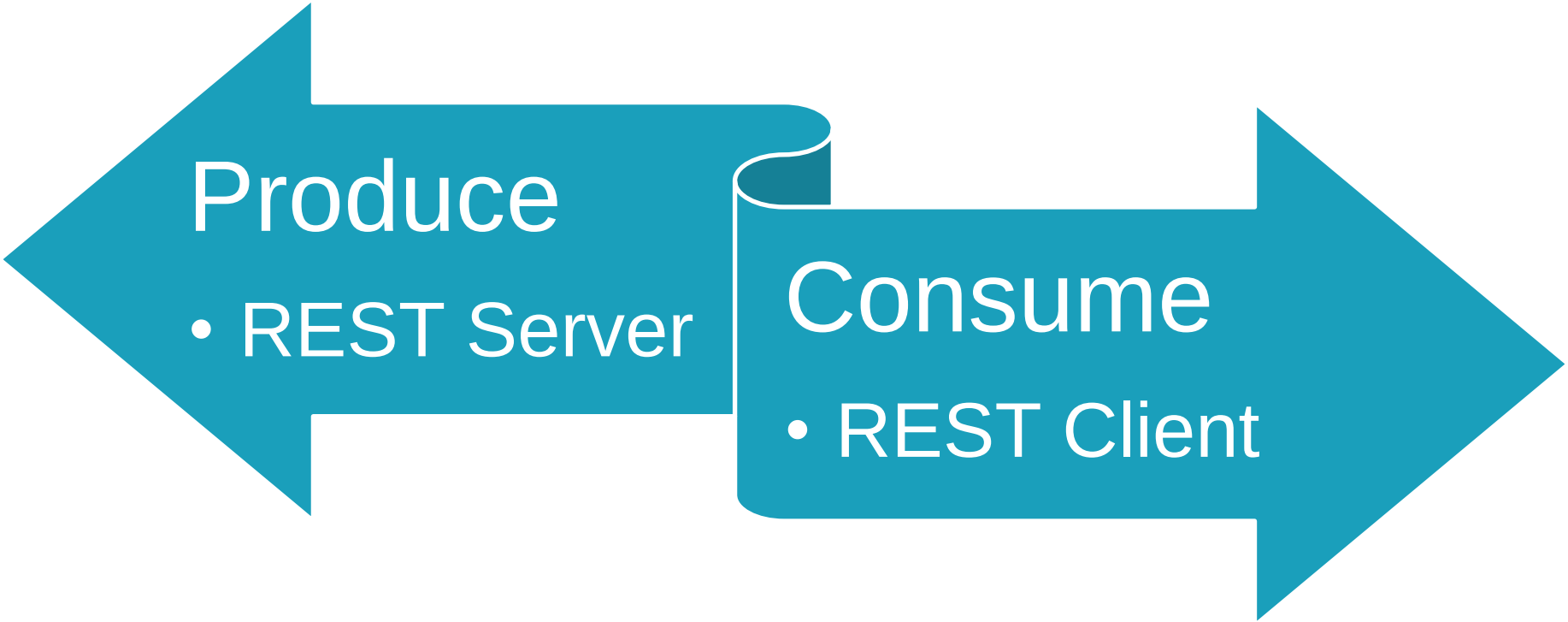
https://sym42.org/

REST Services

What is REST

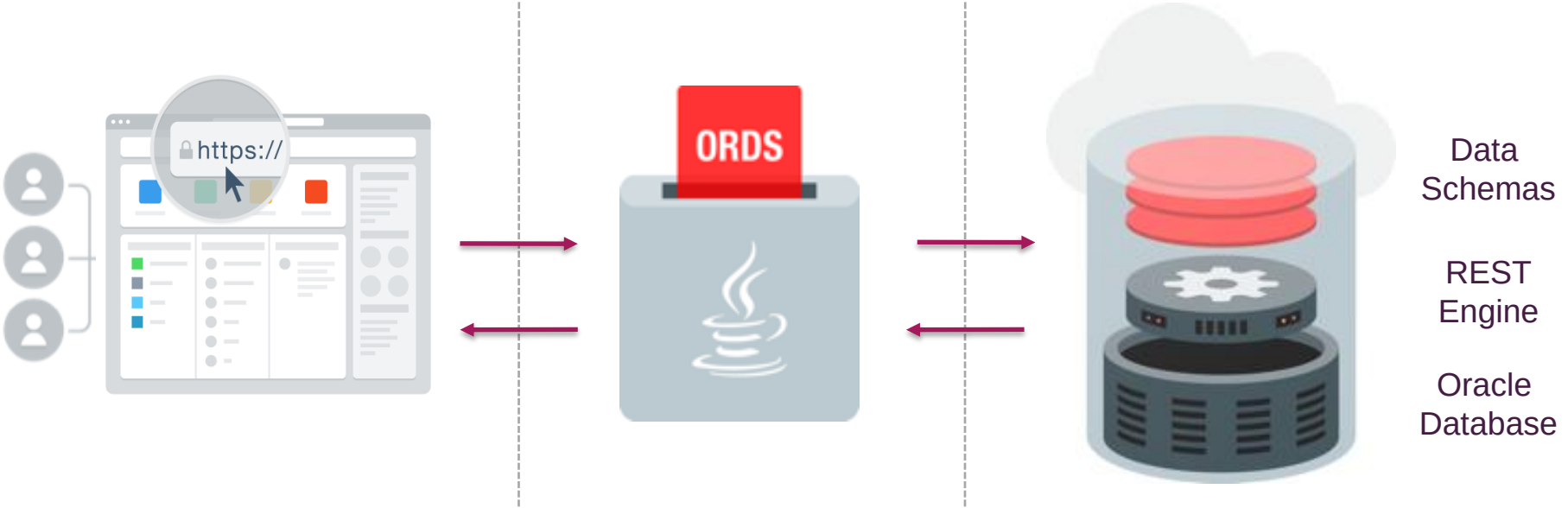
REST	**RE**presentational **S**tate **T**ransfer	doctoral dissertation
		by Roy Fielding, 2000
	programming paradigm	distributed systems
		Web services.
RESTful Applications	implements 6 constraints	**Uniform Interface (API via URIs)**
		Stateless, Client-Server, Layered System
		Cacheable, Code on Demand
Implementation	Transport protocol	http(s)
	content	JSON Documents

Giving and Receiving – the two sides of REST



Oracle RDBMS RESTful Apps: An Overview

Oracle REST Data Services: 3-Tier Architecture



Browser / REST Client

Mid Tier

Database Tier

ORDS = Oracle REST Data Services

Oracle REST Data Services (ORDS)

Evolved

from APEX Listener

ords.war

Java Web Archive

Deploy in Application Server

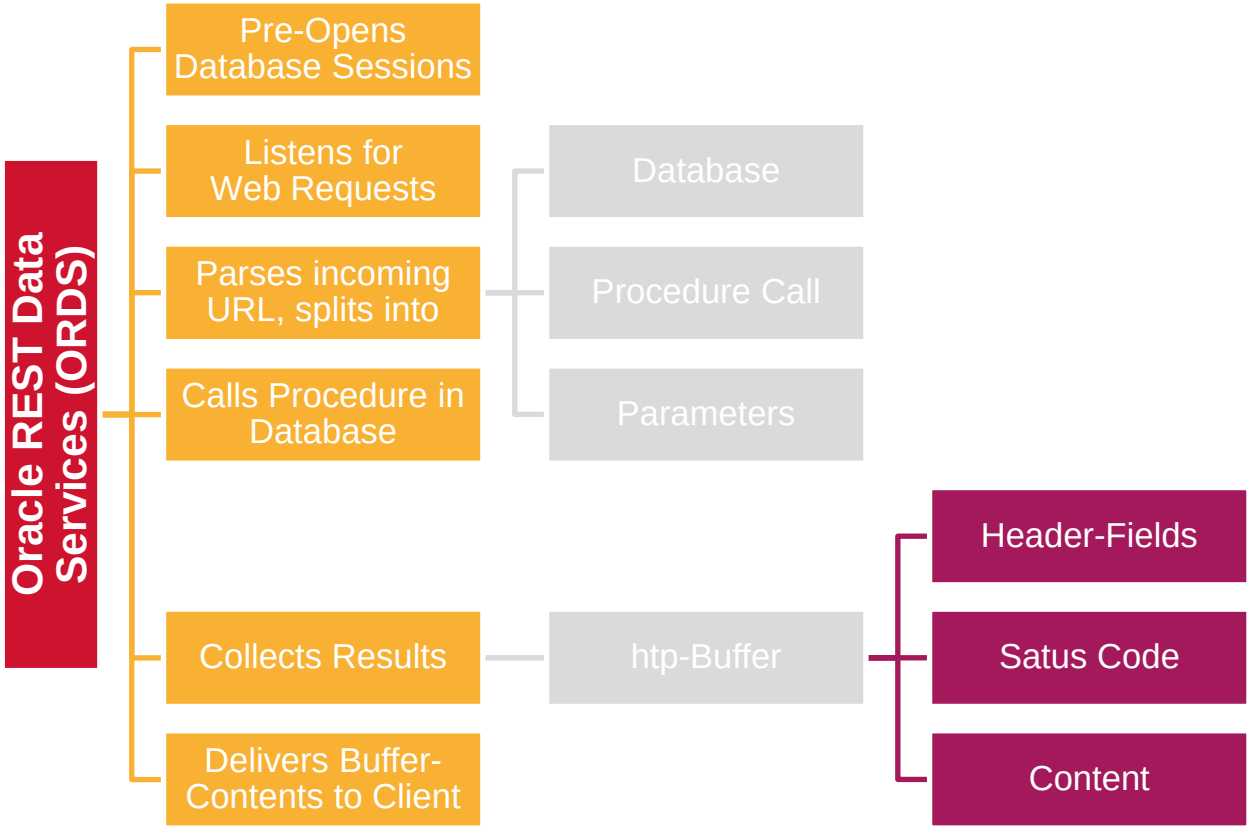
- Tomcat
- Glassfish (deprecated)
- WebLogic

Standalone mode

Brings own http-server
Supported for Production

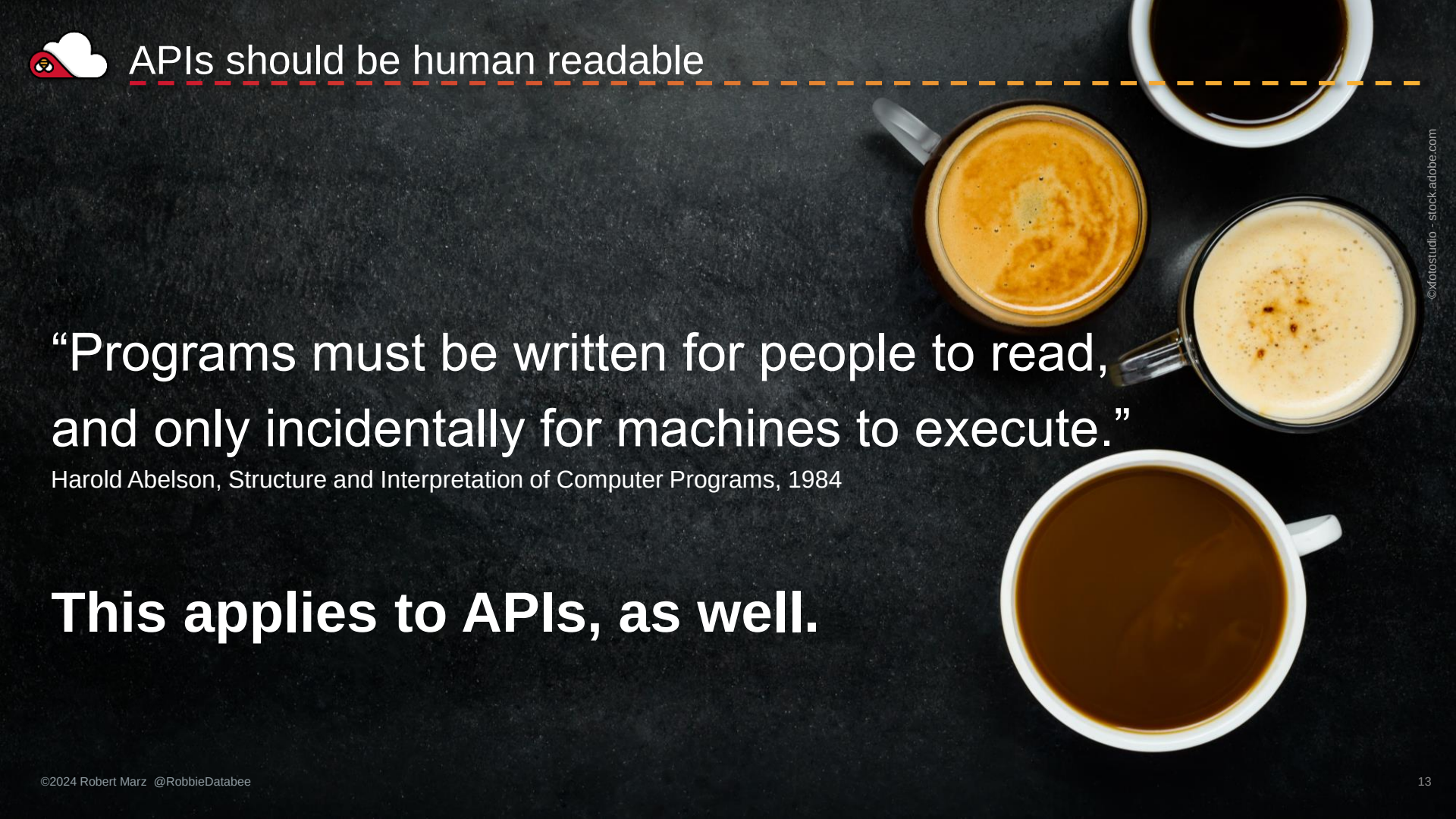
```
java -jar ords.war
```

What is ORDS' job?



Designing a REST API

APIs should be human readable



“Programs must be written for people to read, and only incidentally for machines to execute.”

Harold Abelson, Structure and Interpretation of Computer Programs, 1984

This applies to APIs, as well.

API Grammar

Nouns / What?

Your API Objects
  e.g. contracts, cars, VirtualMachines, …
  GET /products
  GET /VirtualMachines/4711

Verbs / How?

http Methods
  e.g GET, POST, PUT, DELETE

Relations

Sub-resources
  e.g DELETE
    /VirtualMachines/4711/VMDiskMapping/5

HTTP methods: The Verbs

HTTP Methods

Actions	part of http-request
	→ what function is executed
Common Methods	GET, POST, PUT, DELETE
	OPTIONS, HEAD, TRACE
	CONNECT
Expandable	Make up your own

The HTTP-Protocol - methods

Server

```
# Listens on Port 8080 like a Webserver
nc -l 8080

GET /ords/VM/4711 HTTP/1.1
Host: localhost:8080
User-Agent: curl/7.58.0
Accept: */*


POST /ords/VM/4711 HTTP/1.1
Host: localhost:8080
…

TRALALLA /ords/VM/4711 HTTP/1.1
...
```

Client

```
curl \
    http://localhost:8080/ords/VM/4711



curl --request POST \
    http://localhost:8080/ords/VM/4711


curl --request TRALALLA \
     http://localhost:8080/ords/VM/4711
```

http Status Codes

HTTP Status Codes

1xx Informational „Hold on“	100 Continue
	101 Switching Protocols
	102 Processing
2xx Success „Here you go“	200 OK
	201 Created
	208 Already Reported
3xx Redirection „Go away“	301 Moved Permanently
	304 Not modified
	307 Temporary Redirect
4xx Client Error „You fucked up“	400 Bad Request
	401 Unauthorized
	404 Not Found
5xx Server Error „I fucked up“	500 Internal Server Error
	502 Bad Gateway
	503 Service Unavailable

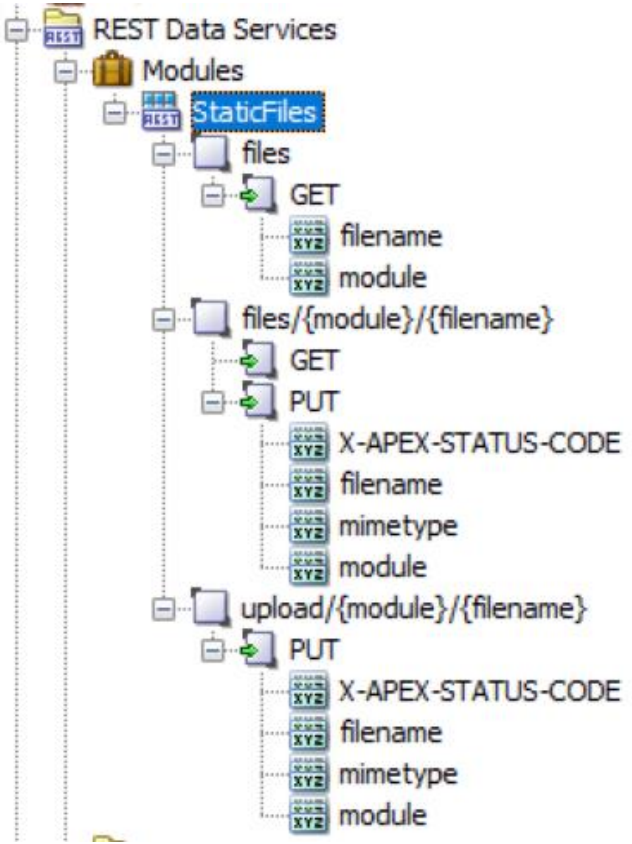
API Design Best Practices

- Try it, Test it
- Be redundant
- Use nouns, but no verbs, Nouns are plural
- GET method should never alter states
- Use HTTP headers
- Use **H**ypermedia **a**s **t**he **E**ngine **o**f **A**pplication **S**tate (HATEOAS)
- Provide Filtering, Sorting, Field Selection & Paging

Modules, Template & Handlers

REST Data Service

Module	logically groups a set of URLs	Like a PL/SQL Package
	Name	Include API Version# In Name & URI Prefix
	URI Prefix	Part of the URL
Template	URI Pattern	following URI Prefix from Module may contain parameters
Handler	http-Methods	GET, POST PUT, DELETE one per Template
	Parameters	http-header URI
	Your Code	goes here



REST Services – PL/SQL enable schema

```
ORDS.ENABLE_SCHEMA(
    p_enabled             => TRUE,
    p_schema              => 'APEX_USER',
    p_url_mapping_type    => 'BASE_PATH',
    p_url_mapping_pattern => 'util',
    p_auto_rest_auth      => FALSE);
```

REST Services – PL/SQL handle GET all Files

```
ORDS.DEFINE_MODULE(
    p_module_name    => 'StaticFile
    p_base_path      => '/static/',
    p_items_per_page =>  25,
    p_status         => 'PUBLISHED'
    p_comments       => NULL);
```

```
ORDS.DEFINE_TEMPLATE(
    p_module_name    => 'StaticFile
    p_pattern        => 'files',
    p_priority       => 0,
    p_etag_type      => 'HASH',
    p_etag_query     => NULL,
    p_comments       => NULL);
```

```
ORDS.DEFINE_HANDLER(
    p_module_name    => 'StaticFiles',
    p_pattern        => 'files',
    p_method         => 'GET',
    p_source_type    => 'json/query',
    p_items_per_page =>  50,
    p_mimes_allowed  => '',
    p_comments       => NULL,
    p_source         =>
'select ''files/''||module||''/''||filename pk_uri
     , module
     , filename
     , mimetype
     , modified
  from static_files'
    );
```

REST Services – PL/SQL handler PUT File

```
ORDS.DEFINE_TEMPLATE(
      p_module_name    => 'StaticFiles',
      p_pattern        => 'files/{module}/{filename}',
      p_priority       => 0,
      p_etag_type      => 'HASH',
      p_etag_query     => NULL,
      p_comments       => NULL);
  ORDS.DEFINE_HANDLER(
      p_module_name    => 'StaticFiles',
      p_pattern        => 'files/{module}/{filename}',
      p_method         => 'PUT',
      p_source_type    => 'plsql/block',
      p_items_per_page =>  0,
      p_mimes_allowed  => 'application/octet-stream',
      p_comments       => NULL,
      p_source         =>
'begin
 merge into static_files dst
   using (select :module module
                , :filename filename
                , :mimetype mimetype
                , :body content
                , sysdate modified
            from dual) src
   on ( dst.module = src.module
    and dst.filename = src.filename )
when matched then update
 set dst.mimetype = src.mimetype
   , dst.content  = src.content
   , dst.modified = src.modified
when not matched then
 insert (module, filename, mimetype, content, modified)
             values ( src.module, src.filename, src.mimetype, src.conter
;
 :status := 201;
end;'
      );
```

```
ORDS.DEFINE_PARAMETER(
    p_module_name         => 'StaticFiles',
    p_pattern             => 'files/{module}/{filename}',
    p_method              => 'PUT',
    p_name                => 'X-APEX-STATUS-CODE',
    p_bind_variable_name  => 'status',
    p_source_type         => 'HEADER',
    p_param_type          => 'INT',
    p_access_method       => 'OUT',
    p_comments            => NULL);
ORDS.DEFINE_PARAMETER(
    p_module_name         => 'StaticFiles',
    p_pattern             => 'files/{module}/{filename}',
    p_method              => 'PUT',
    p_name                => 'mimetype',
    p_bind_variable_name  => 'mimetype',
    p_source_type         => 'HEADER',
    p_param_type          => 'STRING',
    p_access_method       => 'IN',
    p_comments            => NULL);
```

Conclusion

Wanna Try? – Oracle Cloud Free Tier

Always Free cloud services

Services you can use for an unlimited time.

Databases

Two Oracle Autonomous Databases 20GB Data
Oracle APEX, ORDS and SQL Developer

Compute

Two AMD Compute VMs
Up to 4 instances of ARM Ampere A1 Compute with
3,000 OCPU hours and 18,000 GB hours per month

A lot More

Block, Object, and Archive Storage
Load Balancer and data egress
Monitoring and Notifications

REST & JSON: Backbone of Oracle Based modern Apps

ORDS RESTful Services

Powerful & Flexible

AutoREST

Custom PL/SQL

Build complex APIs