Integrating with Oracle Cloud Applications Using Web Services

Richard Bingham
Oracle Applications Development / Developer Relations
Agenda

1. The Integration Landscape
2. Lowering Complexity
3. SOAP Web Services
4. REST Web Services
5. Security
6. Summary & Questions
Safe Harbor Statement

The following is intended to outline our general product direction. It is intended for information purposes only, and may not be incorporated into any contract. It is not a commitment to deliver any material, code, or functionality, and should not be relied upon in making purchasing decisions. The development, release, and timing of any features or functionality described for Oracle’s products remains at the sole discretion of Oracle.
Integration Volume & Diversity
More Important Than Ever

Yesterday  Today  Tomorrow

IoT  SaaS  CX  Loyalty  Social  Mobile
“SaaS and/or mobile integration is the $500 billion integration pain point”

“Integration to be the most time-consuming element of customer implementation, with 79.3 percent of respondents saying that integration is highly time-consuming or somewhat time-consuming.”

“Over 80 percent SaaS adopters have either embarked on an API strategy or felt strongly that there should be one as part of their company’s overall IT strategy”

“A survey of 350 IT executives showed that 67 percent cited data integration problems as a challenge with SaaS business applications. And as with traditional systems, integration can add hidden costs to your project if you ignore it.”

75% of large enterprise SaaS deployments have at least 5 touchpoints with on-premise applications.
75% of large enterprise cloud deployments have 5 or more integration points. **But only...**

4% are fully integrated

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77% of companies plan to increase their spending on SaaS in the next two years.  
- Gartner

By 2019, the cloud software model will account for $1 of every $4.59 spent on software.  
- Transparency Market Research

The worldwide cloud software market reached $48.8 billion in revenue in 2014, representing a 24.4% year-over-year growth rate.  
- IDC

By 2018, 59% of all cloud workloads will be SaaS based, up from 41% in 2013.  
- Statistica

In 2016, nearly 90% of ISVs said they offer SaaS, an increase of over 60% from 2014.  
- IT Europa

The global SaaS market will expand at a CAGR of 27.9% between 2015 and 2022.  
- TMR

67% of employees use their own devices to access both company and personal data.  
- Microsoft
1 in 2
Abandoned a cloud app in last 3 years due to integration problems

54%
Of businesses have missed project deadlines in last 6 months due to cloud integration problems

42%
Have seen a data security breach in their department directly associated with cloud applications

Half
Of cloud adopters have tried and failed at cloud integration

Source: Dynamic Markets
So ... First Choice = Low Complexity

- **Native**: *Procure to Pay, Order to Cash...*
- **Apps Prepackaged**: Loaders and Features
- **Integration Cloud Service using** **Cloud Adapters**
  - Applications: HCM, ERP, Sales Cloud + EBS, JDE, Netsuite, SalesForce, SAP.
  - Technology: REST/SOAP, FTP, File, JMS, MySQL, Oracle Database etc.
  - Custom Adapters: Build-your-own / Marketplace

- **SOA Cloud Service**
  - Low Code Development
  - Adapter support (HCM Cloud, Sales Cloud, RightNow, Eloqua, SalesForce)
  - Extensible, Scalable, Manageable
Cloud Adapters Today
Evolving

• Simplicity
• Maturity
• Cloud Estate Aware
Prebuilt Mapping - Recommendations

- Known & Tested
- Pre-populated
- Alternatives
- Customizable
SOAP Services
SOAP: An Established Catalog

- Process Services
  - SOA Composites
- Business Object Services
  - SDO
  - CRUD
- Active and Supported
- Proven
- Extensive

Service Data Object

Attributes:
- Name
- startDate
- status

Service Operations:
- create
- update
- delete
- process
SOAP: Developer Connect

Online Catalog

- Refresh to collect more data
- Search & List
- Lifecycle:
  - Active | Deprecated | Obsolete
- Drill for Detail
Click the WSDL link

- Machine Readable
- Available Online
- Source Definitions
  - Operations
  - Data
- Links to XSD’s
SOAP: Operations

- CRUD Methods
- Links to SDO
Service Data Objects

Objects the service uses

- Hierarchy
- Attribute detail
Sample Payloads

- Operations
- Add your own

<table>
<thead>
<tr>
<th>Operation Name</th>
<th>Payload XML</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>createAccount</td>
<td></td>
<td>Creates a new prospect account with an organization name and contact phone number. This payload contains the minimum information to create a new account.</td>
</tr>
<tr>
<td>findAccount</td>
<td></td>
<td>Finds all accounts with a given criteria.</td>
</tr>
<tr>
<td>updateAccount</td>
<td></td>
<td>Updates an existing account.</td>
</tr>
<tr>
<td>deleteAccount</td>
<td></td>
<td>Deletes an existing account.</td>
</tr>
<tr>
<td>getAccount</td>
<td></td>
<td>Retrieves an existing account.</td>
</tr>
</tbody>
</table>
### SOAP: Standard Operations

- **CRUD**
- **Find**
- **Process**

<table>
<thead>
<tr>
<th>Operation</th>
<th>Method Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>create Operation</td>
<td>createServiceDataObjectName</td>
<td>Creates a service data object and its descendants.</td>
</tr>
<tr>
<td>delete Operation</td>
<td>deleteServiceDataObjectName</td>
<td>Deletes a business object.</td>
</tr>
<tr>
<td>get Operation</td>
<td>getServiceDataObjectName</td>
<td>Retrieves a single business object by the primary key.</td>
</tr>
<tr>
<td>find Operation</td>
<td>findServiceDataObjectName</td>
<td>Finds and returns a list of business objects that meet the specified search criteria.</td>
</tr>
<tr>
<td>find by additional predefined search criteria Operation</td>
<td>findServiceDataObjectNameSearchCriteriaName</td>
<td>Finds and returns a list of business objects that meet the specified search criteria and the additional predefined search criteria.</td>
</tr>
<tr>
<td>update Operation</td>
<td>updateServiceDataObjectName</td>
<td>Updates a business object.</td>
</tr>
<tr>
<td>merge Operation</td>
<td>mergeServiceDataObjectName</td>
<td>Updates a business object, if it exists. Otherwise creates a new business object.</td>
</tr>
<tr>
<td>process Operation</td>
<td>processServiceDataObjectName</td>
<td>Performs create, update, delete, or merge operation on a list of business objects. The specified operation is applied to all the objects in a given list.</td>
</tr>
<tr>
<td>process change summary Operation</td>
<td>processCSServiceDataObjectName</td>
<td>Performs create, update, or delete operations on a list of business objects. Allows you to specify different operations for different objects.</td>
</tr>
</tbody>
</table>
SOAP: The *find*[BusinessObject] Operation

- **Use Case:** Return data from my Oracle Cloud Fusion Application
  - But I don’t know ID’s or other internal-only values

- **Use the generic `findCriteria`** to issue Queries
  - Sales Cloud
  - HCM Cloud
  - ERP Cloud

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<table>
<thead>
<tr>
<th>findJob</th>
<th>Operation to find an existing job.</th>
</tr>
</thead>
<tbody>
<tr>
<td>findCriteria</td>
<td>Criteria used to limit your query result, such as the filter (where clause), fetch size, and others.</td>
</tr>
<tr>
<td>findControl</td>
<td>Find Control. Not currently used.</td>
</tr>
<tr>
<td>return</td>
<td>Result of the operation containing the list of job records.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parameter Name</th>
<th>Description</th>
<th>Is Return</th>
<th>Is Mandatory</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>findCriteria</td>
<td>Criteria used to limit your query result, such as the filter (where clause), fetch size, and others.</td>
<td>no</td>
<td>Yes</td>
<td>oracle.jbo.common.service.types.FindCriteria</td>
</tr>
<tr>
<td>findControl</td>
<td>Find Control. Not currently used.</td>
<td>no</td>
<td>Yes</td>
<td>oracle.jbo.common.service.types.FindControl</td>
</tr>
<tr>
<td>return</td>
<td>Result of the operation containing the list of job records.</td>
<td>yes</td>
<td></td>
<td>oracle.apps.hcm.workstructures.jobs:JobServiceV2.JobResult</td>
</tr>
</tbody>
</table>
Find the following:

- Up to 50 Locations
- The Country = US or IE
- Sort the result by Country descending
- Return only Country, State, Province, and City.
- Do not return any translated values.
Find where:
Location.Country = IE
AND
Location.LocationProfile.AddressLine2 CONTAINS ‘Address’
SOAP + PaaS Example:
REST Services
The API Catalog Cloud Service is free to Oracle Cloud subscribers.

<table>
<thead>
<tr>
<th>Product</th>
<th>Price</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>API Catalog Cloud Service</td>
<td>Free</td>
<td>Browse Oracle's APIs using hierarchical categories, with full-text search functionality</td>
</tr>
</tbody>
</table>

[https://apicatalog.oraclecloud.com](https://apicatalog.oraclecloud.com)
API Catalog Cloud Service

**Platform (PaaS)**
- Application Development
- Business Analytics
- Content and Collaboration
- Data Management
- Integration
- Security

**Applications (SaaS / DaaS)**
- Adaptive Intelligent Apps
- Customer Experience
- Data
- Enterprise Resource Planning
- Human Capital Management
- Internet of Things Applications
- Supply Chain Management
API Catalog

• No login required to browse
  – SaaS and PaaS Products/Services

• Sign in using your Oracle Cloud credentials to
  – publish APIs to the API Catalog and share them with members of your team
  – Test APIs using your environments

<table>
<thead>
<tr>
<th>Platform (PaaS)</th>
<th>Applications (SaaS / DaaS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Development</td>
<td>Adaptive Intelligent Apps</td>
</tr>
<tr>
<td>Business Analytics</td>
<td>Customer Experience</td>
</tr>
<tr>
<td>Content and Collaboration</td>
<td>Data</td>
</tr>
<tr>
<td>Data Management</td>
<td>Enterprise Resource Planning</td>
</tr>
<tr>
<td>Integration</td>
<td>Human Capital Management</td>
</tr>
<tr>
<td>Security</td>
<td>Internet of Things Applications</td>
</tr>
<tr>
<td></td>
<td>Supply Chain Management</td>
</tr>
</tbody>
</table>
API Catalog

• Category Support
  – Browse Oracle's APIs using hierarchical categories

• Full Search
  – Conduct full-text searches on APIs using our public REST API

• APIs
  – Zero in on the functionality you need to further integration with Oracle PaaS and SaaS services

• Free Choice
  – Use the Open API (formerly Swagger) with code generation tools of your choice to create code stubs from the API descriptions
  – The API Catalog provides machine-readable definitions for public APIs--as well as several Oracle REST APIs--and enables you try out a REST API’s operations .
  – The references on Oracle Help Center describe the Oracle REST APIs in plain language. The two resources are meant to be used together.
API Catalog

Resources

GET /emps
POST /emps
GET /emps/{empsUniqID}
PATCH /emps/{empsUniqID}

Methods / Operations

GET /accounts
POST /accounts
DELETE /accounts/{PartyNumber}
GET /accounts/{PartyNumber}
PATCH /accounts/{PartyNumber}

Child Resources
API Catalog

- Understand
  - Attributes
  - Parameters
  - Content Type

employees: The emps resource includes a list of all employees as of the specified date. By default, the current date is retained.

This resource is currently under controlled availability.

```
employees (string, optional): First line of the primary mailing address,
AddressLine2 (string, optional): Second line of the primary mailing address,
AddressLine3 (string, optional): Third line of the primary mailing address,
CitizenshipId (integer, optional): System-generated primary key. Surrogate key.
CitizenshipLegislationCode (string, optional): Legislation code derived from the legal entity,
```

Response Content Type: application/vnd.oracle.adf.resourcecollection+json

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
</table>
| expand    |       | This parameter is provided, the specified children are included in the resource. Specify "all" or ".". More than one child can be specified using commas as a separate child can be provided following the syntax "child nested child" (example: "exp: (Example: Employees.Managers)"). If no child is provided, all children will be processed implicitly. For example: "exp: Employees.Managers" (which will expand Employees and Managers) or "exp: Employees.Employees.Managers:EmployeeName" (which will only return the "EmployeeName" in a list of resource attributes).
| fields    |       | This parameter filters the resource attributes. Only the specified attributes are returned. Attributes are returned (useful to get only the latest). If an indirect child resource is provided, the specified children will be processed implicitly. For example: "fields=Employees.Employees.Managers.EmployeeName" (which will only return the "EmployeeName" in a list of resource attributes). The attribute can be a direct (Example: Employees) or in combination with expand query parameter. If both are provided, only fields will be considered.
OpenAPI Definitions

- Aka Swagger
- JSON “Schema”
- Download/URL
The /describe Document

- Accessible via a URL
- Machine Readable
  - E.g. VBCS
- The full Definition
  - Just like the SOAP WSDL
  - Methods
  - Attributes
  - Properties...

```json
{  "Resources":
  {  "leads": {
    "name": "LeadNumber",
    "type": "string",
    "updatable": false,
    "mandatory": false,
    "queryable": true,
    "allowChanges": "inCreate",
    "precision": 30,
    "hasDefaultValueExpression": true,
    "title": "Lead Number",
    "maxLength": "30",
  }
}
```

https://[Server].com/salesApi/resources/latest/leads/describe
REST Example

• GET – all records
• Get single record with ID
  – /crmCommonApi/resources/latest/Vehicle_c/{id}

Vehicle

<table>
<thead>
<tr>
<th>Vehicle Name</th>
<th>Last Update Date</th>
<th>Created By</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ford Transit</td>
<td>12/1/17</td>
<td><a href="mailto:richard.bingham@oracle.com">richard.bingham@oracle.com</a></td>
</tr>
<tr>
<td>Renault Movano</td>
<td>12/1/17</td>
<td><a href="mailto:richard.bingham@oracle.com">richard.bingham@oracle.com</a></td>
</tr>
</tbody>
</table>
Example

• Get using q= Query
• Most Attributes
Example

- POST required attribute values
- `application/vnd.oracle.adf.resourceitem+json`
Summary
WS Security Overview

• SOAP
  – Global server-side policy:
    • oracle/wss11_saml_or_username_token_with_message_protection_service_policy
  – 2-Way Certificate Import for SSL/SAML
    • WSDLs contain an X509 certificate. Imported into the client key store.
    • Client generated certificate imported into the Cloud keystore.

• REST
  – Global server-side policy: oracle/multi_token_over_ssl_rest_service_policy
  – Basic Authentication | SAML 2.0 https header token | JWT https header token

• PLUS: Apps Security / RBAC:
  – Job Role with authorization to access the corresponding object/resource and its data.
Summary

• Validate the Requirement
  – Now and In The Future
  – Simplified

• Use Prebuilt When Possible

• SOAP vs REST – it depends

• Be Secure

• Use ALL the Resources Available
My Team

**READ:** http://blogs.oracle.com/FADevRel
Over 400 expert technical articles, whitepapers, etc.

**SEE:** http://www.youtube.com/FADeveloperRelations
Over 200 demo how-to videos

**ASK:** http://bit.ly/CustForum
Over 600 questions answered

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QUESTIONS?