Oracle HCM Cloud with on-premises Oracle E-Business Suite running on IBM Power Systems

Proof of concept test demonstrating the value of integration

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# Table of contents

Abstract ........................................................................................................................................ 1  
Introduction ..................................................................................................................................... 1  
Prerequisites ..................................................................................................................................... 1  
Need for integration ............................................................................................................................ 1  
Employee integration use-case ........................................................................................................... 1  
Benefits of Oracle ICS .......................................................................................................................... 2  
System configuration and implementation .......................................................................................... 3  
  1. Creating Oracle Cloud account for ICS ................................................................................. 3  
  2. Configuring Oracle E-Business Suite Integrated SOA Gateway for REST services .............. 4  
  3. Deploying CreateEmployee REST service .............................................................................. 4  
  4. Configuring Metadata Provider for using ISG REST with ICS ................................................. 6  
  5. Creating Agent Group on ICS ..................................................................................................... 6  
  6. Installing Oracle ICS agent on x86 Server .................................................................................. 7  
  7. ICS create connections .................................................................................................................. 8  
  1. Connection to Oracle EBS on-premises ............................................................................. 8  
  2. Connecting to HCM Cloud ......................................................................................................... 10  
  3. Create the REST inbound connection ...................................................................................... 12  
  8. ICS Create Integration .................................................................................................................. 14  
  9. ICS Data Mapping ....................................................................................................................... 23  
  1. Map REST Payload to HCM CREATE EMPLOYEE .......................................................... 23  
  2. Map the “HCM CREATE EMPLOYEE” response to the “EBS CREATE EMPLOYEE” response ... 24  
Run the integration ................................................................................................................................. 25  
Checking the successful integration ..................................................................................................... 28  
Summary .................................................................................................................................... 32  
Resources .................................................................................................................................. 33  
About the authors ............................................................................................................................. 34  
Trademarks and special notices ........................................................................................................ 35
Abstract

This paper describes a proof of concept test in which we show how to configure a hybrid cloud environment with Oracle HCM Cloud services integrated with an on-premises deployment of Oracle E-Business Suite running on an IBM Power Systems™ S824 server.

Introduction

Oracle HCM Cloud provides a complete Human Capital Management solution that includes global human resources, payroll, payroll interface, time and labor, absence, benefits, compensation, and talent management. This solution helps to drive better resource plans, employee alignment, and regulatory compliance with integrated enterprise social networking tools, business intelligence, and mobile data access.

Oracle E-Business Suite (Oracle EBS) is an integrated set of business applications for automating customer relationship management (CRM), enterprise resource planning (ERP) and supply chain management (SCM) processes within organizations.

Many organizations experience tremendous benefits by splitting IT functions between cloud and on-premises technologies. Hybrid architectures draw from highly secured, industry-leading cloud capabilities and deep expertise in on-premises platforms to deliver unified security and infrastructure possibilities.

In this proof of concept test we show how Oracle HCM Cloud and Oracle EBS applications can be unified in a seamless integration between Oracle Cloud services and an on-premises deployment of Oracle EBS applications.

Prerequisites

The reader is expected to have knowledge of the following products:

- Oracle cloud
- Know how to install Oracle EBS
- Have an available Oracle EBS 12.2.7 or later for testing
- Have familiarity with Representational State Transfer (REST) web services

Need for integration

HCM Cloud primarily addresses the Human Resources domain, providing extensive functionalities such as employee on-boarding, feedback, learning & development, etc. On-premises Oracle EBS has strong finance and supply chain functions such as procurement, purchase order, sales order, etc. For seamless flow and completion of all enterprise-wide business processes and functionalities, these two applications need to be integrated.

Employee integration use-case

Oracle HCM (Human Capital Management) is one of the popular SaaS applications in Oracle Cloud. There are multiple scenarios where HCM Cloud needs to be integrated with other applications on-premises. This paper describes the complete steps that were involved in creating an employee use-case and the steps are briefly listed below and in Figure 1. Employee integration use-case.
Person is hired as an employee using "Hire a new person" process under HCM Cloud
Person is assigned a default expense account to track employee expenses
Relevant data elements for person are captured and interfaced with ERP Cloud - namely Business Unit, Job, Grade, Department, Assignment Category, Hourly/Salaried, Manager, Tax Reporting Unit
Employee is setup to have buyer and requestor access in the ERP system to enable him to approve requisitions/POs

**Oracle Integration Cloud Service (ICS)** is a simple and powerful integration PaaS platform used for integration of both SaaS and on-premises applications. In the create-employee use-case, Oracle ICS is used for integrating Oracle Cloud HCM with on-premises Oracle EBS applications.

**Benefits of Oracle ICS**

Oracle Integration Cloud Service is a complete, secure, and lightweight integration solution that enables connectivity between on-premises and cloud applications. Below are the advantages of using ICS:

- Let's you connect securely to applications and services both in the cloud and on-premises
- Offers Simplified UI for creating/monitoring integrations
- Provides Built-in Adapters for wider connectivity
- Enables faster time to market
- Point-and-Drag mapping capabilities; minimal coding; can be used by business-users
- Improves organizational performance through the power of unified data
- Provides a highly secure environment for physical security, an operating system and virtualization layer security, and tenant isolation
System configuration and implementation

The test environment used in our proof of concept testing includes:

- Oracle HCM Cloud
- On-premises Oracle EBS running on an IBM Power® S824 server with AIX® 7.2
- x86 server for installing Oracle ICS Agent on Red Hat Enterprise Linux® 7.6
- Oracle ICS, used for integrating various applications to form a hybrid cloud solution
- REST client used for sending create employee payload as input to ICS integration

Create Employee use-case is implemented using these steps:

1. Creating Oracle Cloud account for ICS
2. Configuring Oracle E-Business Suite Integrated SOA Gateway for REST services
3. Deploying Oracle EBS CreateEmployee REST service
4. Configuring Metadata provider for using ISG REST service with ICS
5. Creating AgentGroup on ICS
6. Installing ICS Agent on x86 server
7. ICS Create Connections
8. ICS Create Integration
9. ICS Data Mapping
10. Run Integration and verify Employee creation

1. Creating Oracle Cloud account for ICS

To use the Oracle Cloud, an account is required. There is the ability to have a trial license, which can possibly be used to reproduce this example. The trial license and overview for creating an ICS account can be found at:

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2. Configuring Oracle E-Business Suite Integrated SOA Gateway for REST services

Multiple Oracle documents help with the configuration and installation of the Oracle EBS Integrated SOA Gateway REST services (GTWYServices) within the Oracle EBS database. Here is a list of documents in the order we used them that helped us complete the installation of the GTWYServices:

- Using the Oracle E-Business Suite Adapter (Part No. E66534-07)
- Installing Oracle E-Business Suite Integrated SOA Gateway, Release 12.2 (Doc ID 1311068.1)
- Applying the Latest AD and TXK Release Update Packs to Oracle E-Business Suite Release 12.2 (Doc ID 1617461.1)
- Patch 27913724: ISG Consolidated Patch for 12.2 (18_2_2)

It is necessary to follow the documentation to enable the REST services within EBS.

3. Deploying CreateEmployee REST service

The REST service is deployed using the HR_EMPLOYEE_API package within Oracle EBS and the steps are listed below:

- Login to Oracle EBS as a SYSADMIN user and search for Internal Name “HR_EMPLOYEE_API”.

Figure 3. Oracle Integration Repository after login
• The HR_EMPLOYEE_API package is in the active state, as seen below in Figure 4 HR_EMPLOYEE_API package.

Figure 4. HR_EMPLOYEE_API package

• Select the Employee link and deploy the ‘Create Employee’ function as a REST service and grant execution to group “US Super HRMS Manager”.

Figure 5. Grant Execution to group
4. Configuring Metadata Provider for using ISG REST with ICS

Login to Oracle EBS as user SYSADMIN and search for “oracle.apps.fnd.rep.ws.service.EbsMetadataProvider” in the field “Internal Name” and “deploy” it and give grants to all methods of “All users”. Now you can use ISG REST services from ICS.

![Deploying oracle.apps.fnd.rep.ws.service.EbsMetadataProvider](image)

**Figure 6. Deploying oracle.apps.fnd.rep.ws.service.EbsMetadataProvider**

5. Creating Agent Group on ICS

Within Oracle Integration Cloud Service (ICS), create the agent group before installing the connectivity agent on an x86 server. Provide the agent group identifier during the connectivity agent installation. Only one connectivity agent can be associated with an agent group. For a single Oracle Integration Cloud Service instance, you can create up to five agent groups. Creating the agent group also creates the necessary artifacts required for message exchange.

1. Login to ICS.
2. Go to Designer page and select Agents.
3. Click on Create Agent and provide group name.
6. Installing Oracle ICS agent on x86 Server

The following tasks are performed during this step:

- All on-premises adapters are registered.
- A Java® database is installed.
- The JRF domain is created.
- The on-premises agent is deployed.

Download the agent installer from the Oracle Integration Cloud Service and run the installer on the local on-premises x86 server running RHEL. Specify the agent group identifier during the installation.

At the first login to ICS, go to the Agent page and download the connectivity agent.
Set the JAVAHOME parameters by adding the two changes to the environment.

```
export JAVA_HOME= /usr/java/jdk1.8.0_181
export PATH=$JAVA_HOME/bin:$PATH
```

Add executable permission and run the downloaded .bsx file as an executable.

```
chmod +x cloud-connectivity-agent-installer.bsx
./cloud-connectivity-agent-installer.bsx -h=https://xxxxxx.oraclecloud.com:443 -u='xxxx@xxxx.com' -p='Blu3g0ld' -ad=EBS_AGENT_GROUP -aport=7001 -au=weblogic -ap=welcome1
```

Check if the Derby database is running.

```
ps -ef | grep "derby"
```

Start the ICS agent.

```
nohup ./startAgent.sh -u=XXXX@XXXX.com -p=XXXXX &
```

Once the agent is up and running go to ICS console and check the Agent Group, and the number of agents has changed from 0 to 1.

![Figure 9 ICS Console EBS Agent Group](image)

### 7. ICS create connections

Connections represent information about the instances of each configuration that are used in integration. Oracle Integration Cloud Service provides a set of predefined adapters which are used for making connections to various cloud applications as well as on-premises applications.

For implementing the CreateEmployee use case, three connections are created:

1. A connection to Oracle EBS on-premises.
2. A connection to HCM.
3. A REST adapter connection.

#### 1. Connection to Oracle EBS on-premises

This connection is used for connecting to on-premises Oracle EBS which is running on an IBM Power S824 server with AIX 7.2. The ICS Oracle EBS adapter is required for establishing the connection. The steps for creating the connection are:

a. Logon to ICS, click on ‘Create Connection’ and select ‘Oracle E-Business Suite Adapter’.
Figure 10. Selecting Oracle EBS adapter

b. Provide the connection name, and identifier.

Figure 11. Creating a new connection to Oracle EBS

c. Configure the connection properties by supplying the URL of Oracle EBS and the "hrms" user credentials. Finally select the agent group that has been created earlier.
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2. Connecting to HCM Cloud

This connection is used for connecting to the Oracle HMC Cloud. The ICS Oracle HCM Cloud adapter is required for establishing the connection. The Oracle HCM Cloud Adapter enables customers to easily integrate their on-premises or SaaS applications with Oracle HCM Cloud without having any knowledge of objects involved in the integration. Below are the steps for creating the connection.

a. Logon to ICS, click on ‘Create Connection’ and Select ‘HCM Cloud Adapter’.

d. Test the connection by clicking on the “Test” button.
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11

Figure 14. Creating connection using HCM Cloud Adapter

b. Provide the connection name and identifier for the HMC Cloud connection.

Figure 15. HCM Cloud connection name and identifier

c. Step 3: Grab the service catalog WSDL URL from the Oracle HCM Cloud. The WSDL URL will be of the format:

"https://XXXXX.oraclecloud.com/fndAppCoreServices/ServiceCatalogService?WSDL".

Configure the connection properties by specifying the WSDL URL and configure the security details by specifying the HCM Cloud user credentials.
Figure 16. HCM Cloud connection properties

d. Test the connection by clicking the “Test” button.

Figure 17. Testing HCM Cloud Connection

3. Create the REST inbound connection

This connection is used for sending ‘create employee’ payloads from any REST client. The ICS Oracle REST adapter is used for establishing the connection. The integrations can be exposed as REST APIs by configuring the REST adapter connection as a trigger. REST APIs are protected using basic authentication and OAuth token-based authentication. Below are the steps for creating the REST connection.

a. Logon to ICS, click on the ‘Create Connection’ and then select the ‘REST Adapter’.
b. Provide the connection name and Identifier.

c. Configure the connection properties by mentioning the connection type and the connection URL. Since it is an inbound connection to ICS, specify the ICS URL.
d. Test the REST connection by clicking the “Test” button.

Figure 20. REST connection properties

Figure 21. Testing the REST connection

8. ICS Create Integration

An integration uses connections that are created for applications and defines how information is shared between those applications. An integration consists of at least a trigger (source) connection (for
requests sent to Oracle Integration Cloud Service), and an invoke (target) connection (for requests sent from Oracle Integration Cloud Service to the target) and the field mapping between those two connections. There are four integration patterns – Orchestration, Map Data, “Publish to ICS” and “Subscribe to ICS”. An Orchestration type integration is used in this create employee use case.

1. Login to ICS and navigate to the Integrations page of the designer section. Then click on “Create New Integration”. Select integration type “Orchestration”.

![Create Integration: Selecting Integration type as Orchestration](image)

**Figure 22. Selecting Integration type as Orchestration**

2. Provide the integration name and click on the create button.

![Create New Integration: Create new integration](image)

**Figure 23. Create new integration**
3. To develop the orchestration, drag the previously created REST, Oracle EBS and HCM connections one after the other, into the integration.

![Figure 24. Dragging connections into integration](image1)

4. Drag and drop the REST connection onto the startup trigger since the REST connection is used for sending the “Create Employee JSON” payload from the REST client to ICS. Provide the endpoint name and select the POST method.

![Figure 25. Configuring REST Endpoint](image2)

Select JSON and upload the sample JSON payload used for creating Employee on HCM Cloud.
The summary section of the configuration wizard shows all the details from the previous steps. Click on “Done” to complete the endpoint configuration.
Figure 27 summary of REST endpoint configuration

5. Drag and drop the HCM connection which acts as the invoke trigger for the previous REST trigger. Provide the endpoint name and relevant description.

![Configure Oracle HCM Cloud Endpoint](image)

Figure 28. Configuring HCMCreate_Employee endpoint

Oracle’s HCM Cloud REST APIs are under controlled availability, fill in the template for the REST ATOM CA Program available on My Oracle Support (document ID 2060899.1).

Access all the HCM REST resources using this URI format:

```
https://<host>:<port>/hcmRestApi/resources/<version>/<resourcename>
```

- ‘host:port’ identifies the server that hosts the service and the port that this server uses to communicate with the REST APIs.
- ‘version’ is the version number of Oracle HCM Cloud release.
- ‘resourcename’ is the specific resource.
- Example URLs: https://<host>:<port>/hcmRestApi/resources/xx.xx.xx.x/emps

To access the REST APIs, user roles must have security privileges. For the Employee REST Service, the user should have “PER_REST_SERVICE_ACCESS_EMPS_PRIV”.

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Select the “REST Business Resources” and Emps business object. Select the ‘create’ method type.

Figure 29. Selecting Emps business object

As part of the integration, the Oracle HCM Cloud endpoint configuration is completed. The summary section of the configuration wizard shows all the details from the previous steps. Click on “Done” to complete the endpoint configuration.
6. Drag and drop the Oracle EBS connection which takes the payload from Oracle HCM Cloud Endpoint. Provide endpoint name and relevant description under “Basic info”.

Next select the product family as “Human Resource Suite” and product as “Human Resource”. Enter the API as Employee. This use case will use the CREATE_EMPLOYEE method of the HR_EMPLOYEE_API package.
This part of the integration, Oracle EBS Endpoint configuration is completed. The summary section of the configuration wizard shows all the details of EBS endpoint configuration.
Configuration of the source and target endpoints are complete, the next step involves data mapping between connection endpoints.

Figure 32. Summary section of the EBS_Create_Employee endpoint

Figure 33. Displaying completed configured source and target endpoints
9. ICS Data Mapping

ICS provides a visual mapper that enables mapping of fields between applications with different data structures by dragging source fields onto target fields. The map icon is automatically added in App Driven Orchestration integrations.

In this create employee use case orchestration there are two data mappings:

- Map REST Payload to HCM CREATE EMPLOYEE
- Map HCM CREATE EMPLOYEE response to EBS CREATE EMPLOYEE

1. Map REST Payload to HCM CREATE EMPLOYEE.

Click on the existing "HCMCREATE_EMPLOYEE" mapper icon and then click edit.

![Figure 34. Clicking on data mapper icon for HCMCREATE_EMPLOYEE](image)

Mapping is straightforward, simply drag the REST payload JSON attributes and drop them onto the HCM REST Emps attributes.

![Figure 35. Data mapping example](image)
2. Map the “HCM CREATE EMPLOYEE” response to the “EBS CREATE EMPLOYEE” response

Click on the existing “EBS_CREATE_EMPLOYEE” mapper icon and then click edit.

Drag the “HCM Create Employee JSON” response attributes and drop them to the “EBS Create Employee JSON” request attributes.
Figure 38. Data mapping example

Now all the mapping has been done and integration data mapping is completed. Activate the integration by clicking the activation button on the Integration page. Save the endpoint URL of the integration by clicking on the “I” information icon. The URL will be used later.

https://XXXXXXX.us2.oraclecloud.com:443/integration/flowapi/rest/HCM_CREATE_EMP/v01/metadata

Figure 39. completed data mapping of integration

Run the integration

To run the integration, open a REST test client ARC (Advance REST Client from google chrome) and provide all the necessary details from the endpoint URL. Under Authentication header provide the ICS username and password.

These parameters will be needed:
- Base URL:
  https://XXXXX.us2.oraclecloud.com:443/integration/flowapi/rest/HCM_CREATE_EMP/v01/
- REST Suffix: /hcm/resources/11.13.18.05/emps/
- URL For Test Client:
  https://XXXXX.us2.oraclecloud.com:443/integration/flowapi/rest/HCM_CREATE_EMP/v01/hcm/resources/11.13.18.05/emps/
- REST Method: POST
- Content-Type: application/json

Example REST Payload for creating employee in Oracle HCM Cloud:

```json
{
  "Salutation": "MR.",
  "LegalEntityId": "300000001577116",
  "FirstName": "Scott",
  "MiddleName": "Wan",
  "LastName": "Styris",
  "DisplayName": "Scott Wan Styris",
  "NationalIdExpirationDate": "4712-12-31",
  "WorkEmail": "styriswas.k@example.com",
  "City": "San Francisco",
  "Region": "California",
  "Country": "US",
  "CitizenshipStatus": "A",
  "CitizenshipLegislationCode": "US",
  "AddressLine1": "Example Corporation",
  "AddressLine2": "500 Parkway",
  "AddressLine3": null,
  "DateOfBirth": "1990-09-09",
  "Gender": "M",
  "MaritalStatus": "S",
  "NationalIdCountry": "US",
  "NationalId": "554-78-3025",
  "NationalIdType": "SSN",
  "UserName": "sstyris",
  "AssignmentName": "Sstyris_Assignment_1",
  "BusinessUnitId": "300000001615164",
  "WorkingAtHome": "N",
  "WorkingAsManager": "N",
  "SalaryCode": "H",
  "WorkingHours": "12",
  "Frequency": "D",
  "ActionCode": "HIRE",
  "ActionReasonCode": "NEWHIRE",
  "AssignmentStatus": "ACTIVE"
}
```

Click on the "send" button of "Advance REST Client (ARC)" to send create employee payload to ICS.
Figure 40. Submitting the JSON payload
A successful execution shows a “202 Accepted” message as the response from the REST client.

Figure 41. Receiving successful response from REST payload

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Checking the successful integration

If the integration was successful, the new employee should exist within the HCM cloud environment and within Oracle EBS. Let’s check if this is the case.

Logon to HCM Cloud and the Oracle EBS console, check the new employee details. Check that the employee details in Oracle HCM Cloud, Employee “Scott Styris” was created on the Oracle HCM Cloud.

Figure 42. Newly created employee in HCM
Checking the employee details within the EBS console, it is seen that the employee “Scott Styris” was created and found within the Oracle EBS database, validating that the data was propagated to EBS.
Figure 44. Newly created employee is found within EBS
Thus, the new “Employee details” have been added to both the Oracle HCM Cloud and the on-premises Oracle EBS instance which is running on the Power S824 server (AIX operating system).
Summary

This proof of concept testing has successfully demonstrated the ability to integrate Oracle HCM Cloud using the Oracle Integration Cloud Service with an on-premises deployment of Oracle EBS resulting in a hybrid model deployment. Our Oracle Cloud HCM and on-premises Oracle EBS on AIX are then synchronized with updates to employee data. This hybrid deployment proof of concept provides a starting point for a much richer integration of disparate products working within the AIX Power Systems and Oracle Cloud environments.

Many related resources were used to deliver these successful test results. See the Resources section for a list of the resources used.
Resources

These Web sites provide useful references to supplement the information contained in this document:

- Using EBS Adapter in Integration Cloud Service – Part 2: Configure and Test ISG REST Services

- Integration Cloud Service (ICS) On-Premise Agent Installation
  http://www.ateam-oracle.com/integration-cloud-service-ics-on-premise-agent-installation/

- Using Oracle Integration Cloud Service

- REST API for Oracle HCM Cloud

- IBM eServer pSeries [System p] Information Center
  http://publib.boulder.ibm.com/infocenter/pseries/index.jsp

- IBM Publications Center

- IBM Redbooks
  http://www.redbooks.ibm.com/
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