ORACLE

11

File Handling Concepts and Options

Objectives

After completing this lesson, you should be able to:

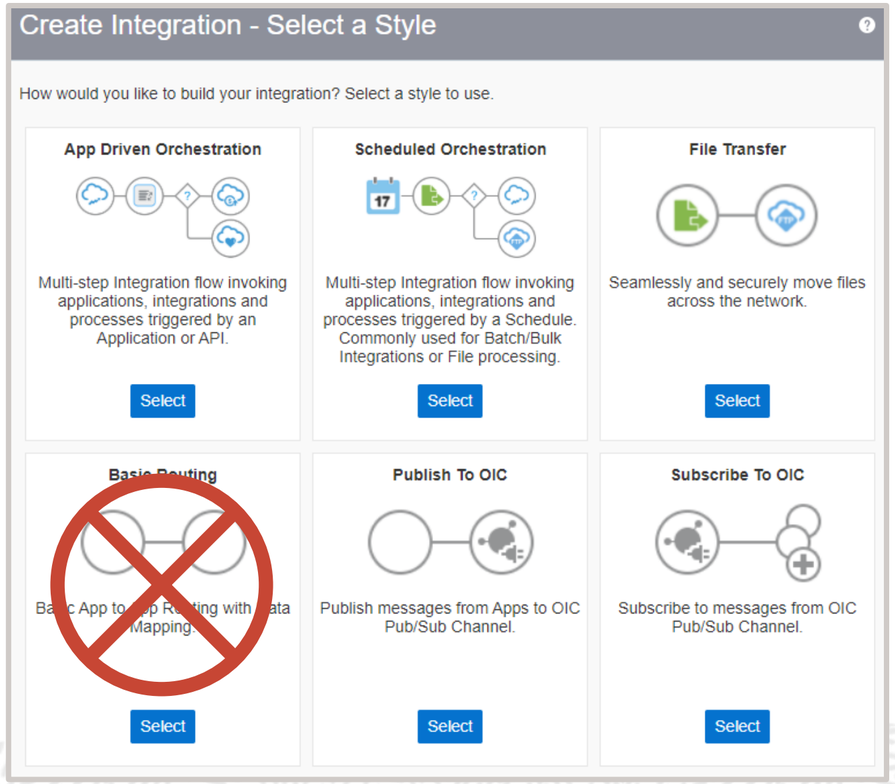
- Describe the tools and components in OIC to facilitate file processing
- Explain the capability differences between FTP and File adapters
- Explain the file operations available with the Stage File action
- Describe common file handling scenarios and how to handle them in OIC
- Be familiar with file handling design guidelines for SaaS Fusion Applications

Agenda

- Tools and Options for File Handling
- Common File Handling Questions
- Use Case Scenarios and Example Solutions
- Design Guidelines for Fusion Applications

Integration Style Options

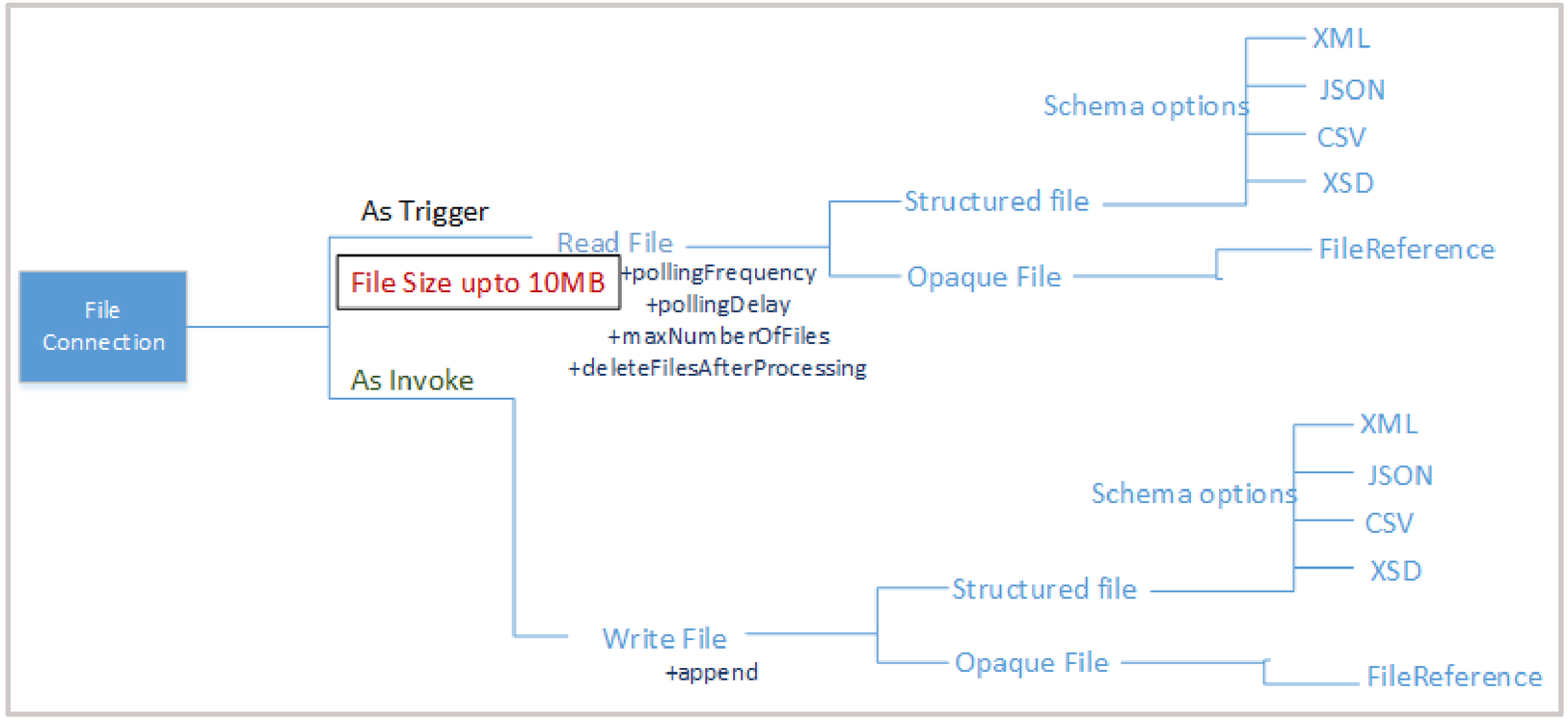
- Technically, any integration style can be used for handling and processing files.
- However, the advanced functionality of Stage File Action operations are provided only in the orchestration design canvas available in these styles:
  - App Driven Orchestration
  - Scheduled Orchestration
  - File Transfer *(same as Scheduled Orchestration)*
- The Publish/Subscribe styles can be used for simpler file handling use cases.



OIC Tools and Options for File Handling

- Built-in OIC adapters:
  - FTP and File
  - SOAP and REST *(leveraging file attachment features)*
  - Other SaaS Adapters that support file attachment options
- Stage File Action Operations *(available in Orchestration Style integrations)*
  - List File, Read Entire File, Read File in Segments, Unzip File, Write File, Zip File
- File-Based Mapper Functions
  - encodeReferenceToBase64, decodeBase64ToReference
- Scheduled Orchestration Schedule Parameters

File Adapter Options Summary



- The File Adapter allows integrating with remote file servers for reading and writing files.
- A remote file can be read using a File Adapter Trigger connection.
- Writing to a remote file can be configured using the File Adapter as an Invoke.

An on-premise connectivity agent is required when configuring a File Adapter Connection.

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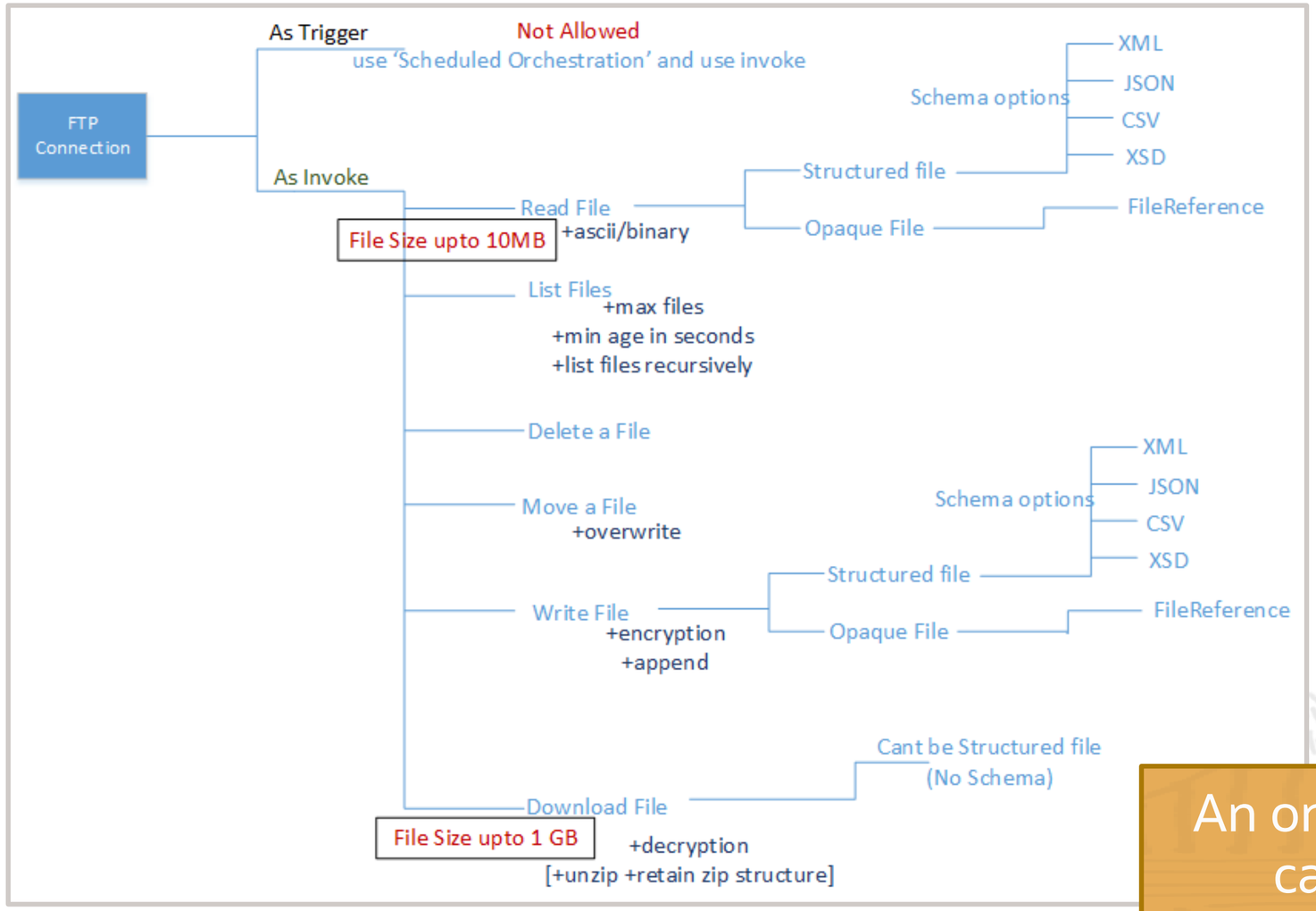
FTP Adapter Options Summary



- The FTP Adapter enables the integration of the File Transfer Protocol (FTP) and the Secure Shell (SSH) File Transfer Protocol (sFTP) into OIC.
- Using the FTP Adapter, OIC can retrieve files for processing in an integration instance and can upload files and messages from an instance to a directory on a remote FTP server.

An on-premise connectivity agent can also be used if needed.

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Differences Between File and FTP Adapters

File Adapter	FTP Adapter
Files processed from file system accessible from where an OIC Connectivity Agent is installed	Files processed from any FTP or sFTP server which is publicly accessible
Used to connect to file servers which have network access restrictions	An OIC Connectivity Agent can be used to access private FTP servers
Supports both Trigger and Invoke Connections	Supported only as an Invoke Connection unless configured with an OIC Connectivity Agent
Supported file operations: * Read * Write	Supported file operations: * Read * List * Move * Write * Delete * Download
Cannot create an encrypted file with adapter	Allows developer to create an encrypted file by using PGP cryptography
Cannot create a decrypted file with adapter	Allows developer to decrypt a file being read or downloaded using PGP cryptography

SOAP and REST Adapter Options

The SOAP Adapter supports:

- Inline attachments *(base64encoded string)* up to 10 MB
- Inbound MTOM attachments up to 512 MB
- Send/receive MTOM attachments up to 1 GB while invoking external SOAP APIs

The REST Adapter supports:

- Structured message requests/responses *(without attachments)* up to 10 MB
- Inbound multipart message attachments up to 512 MB
- Inbound JSON attachments up to 1 GB
- Send/receive attachments up to 1 GB while invoking external REST APIs

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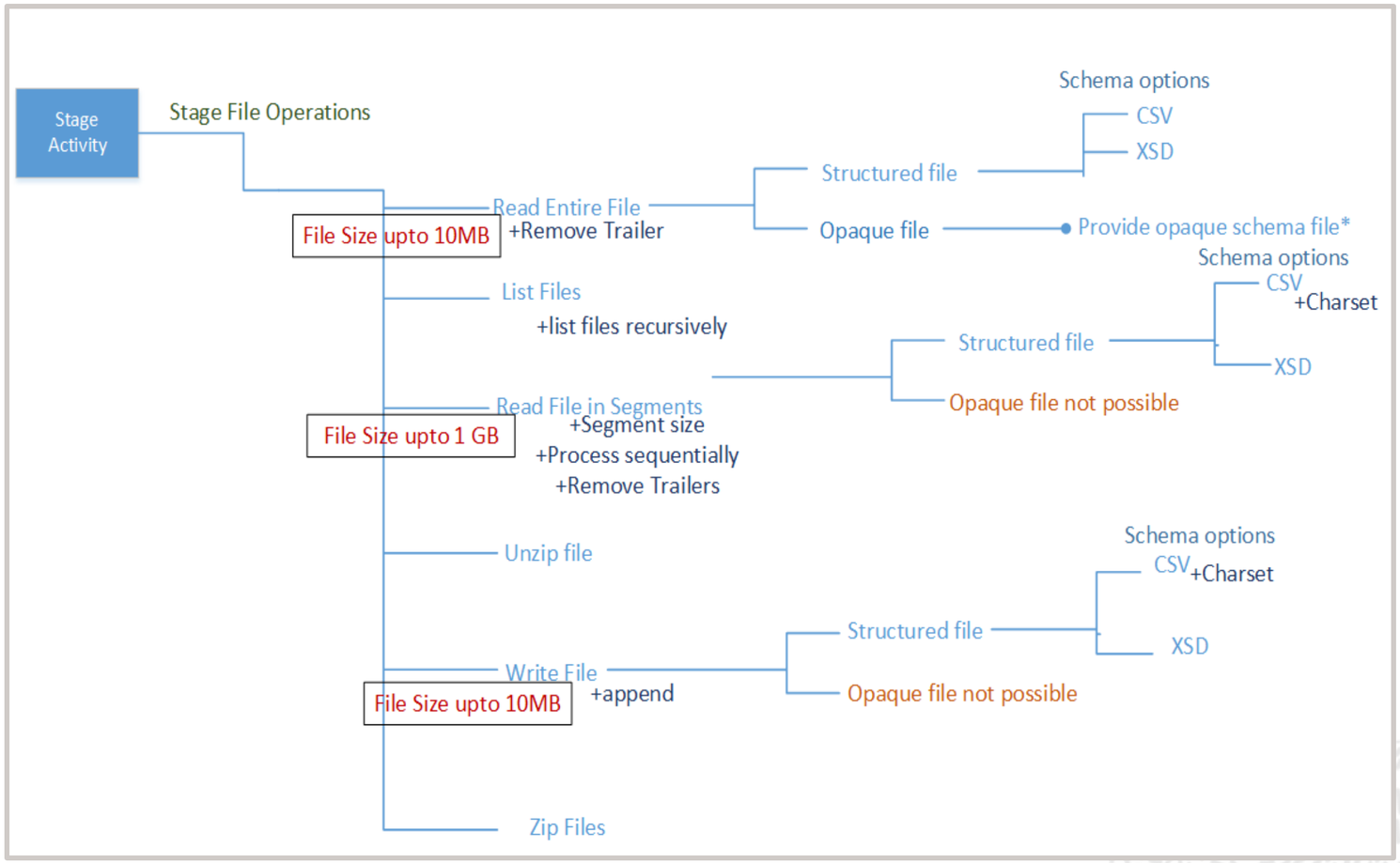
Stage File Action Operations Summary

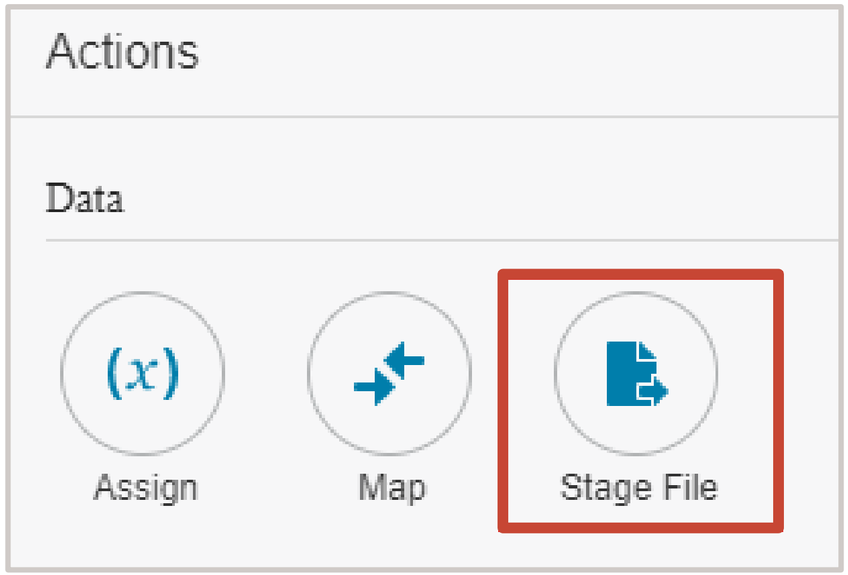


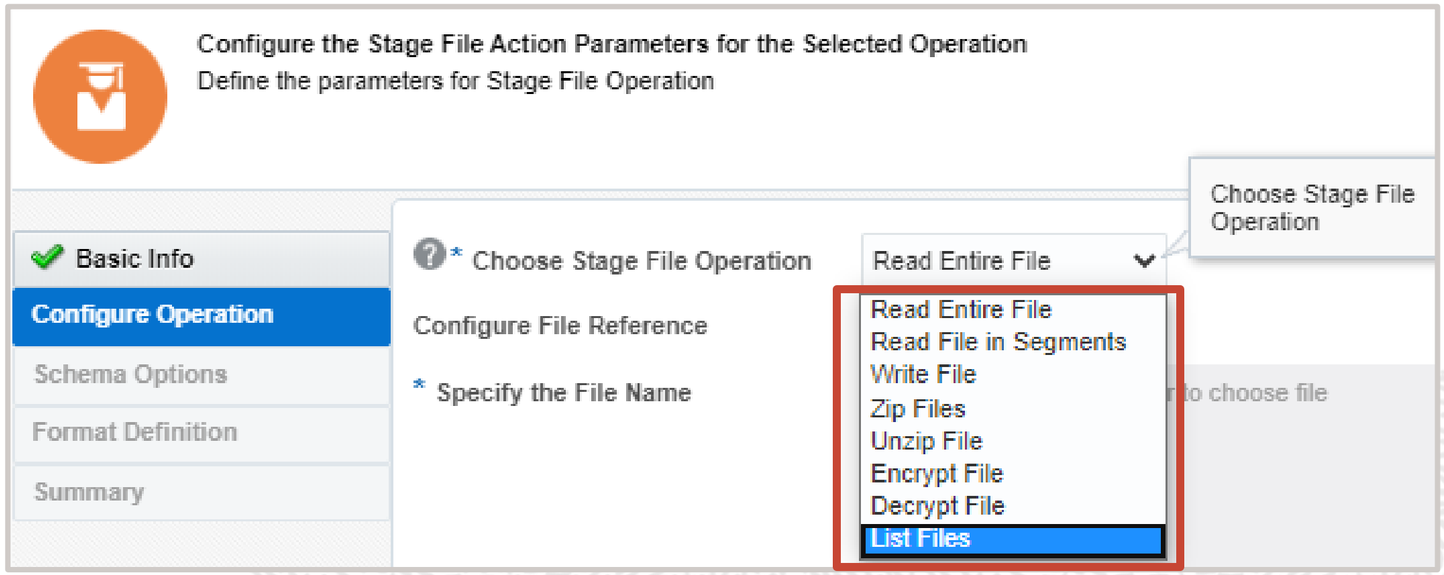
- Stage File is not an adapter and cannot be added as a Trigger or Invoke.
- Instead, it is an action used within an orchestration style integration to handle one of six file-based operations.
- Each operation has various configuration options exposed by the configuration wizard.

OIC automatically handles the creation, deletion, and cleanup of temporary files in the local file system.

Stage File Action

- It is available only in orchestration style integrations.
- The configuration wizard presents various options based on which file operation is chosen.
- The **Read File in Segments** operation is used to handle large files up to 1 GB.





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File-Based Mapper Functions

encodeReferenceToBase64

- Accepts a file reference within the VFS as input and returns a base64-encoded string.

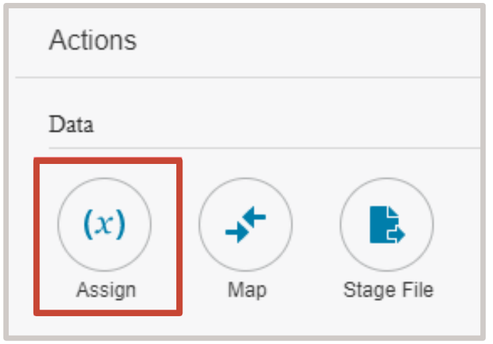
decodeBase64ToReference

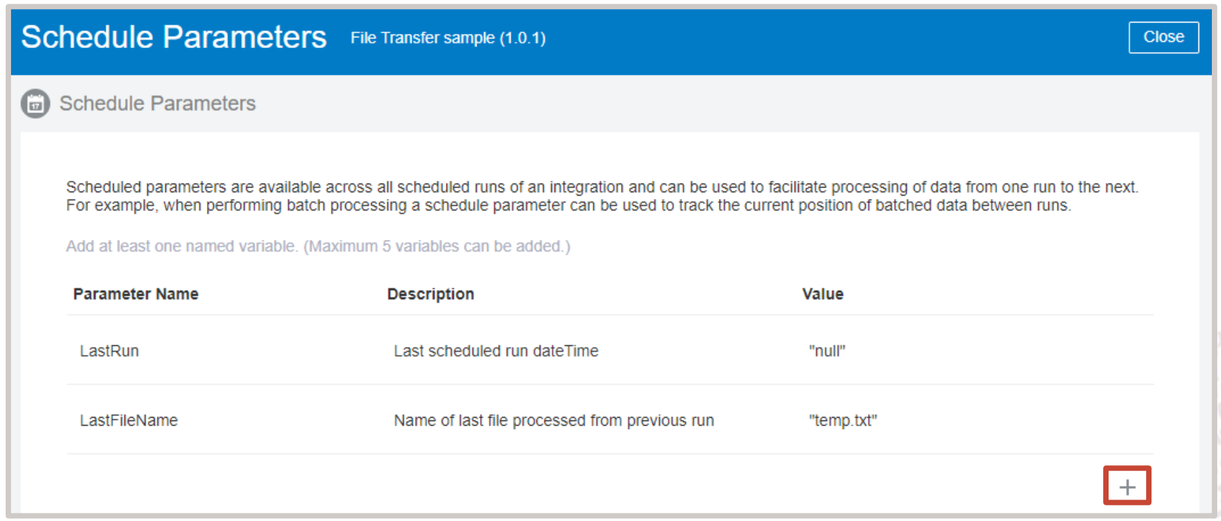
- Accepts a base64-encoded string as input. It decodes the string, writes it to a file in the VFS, and returns the underlying file reference.

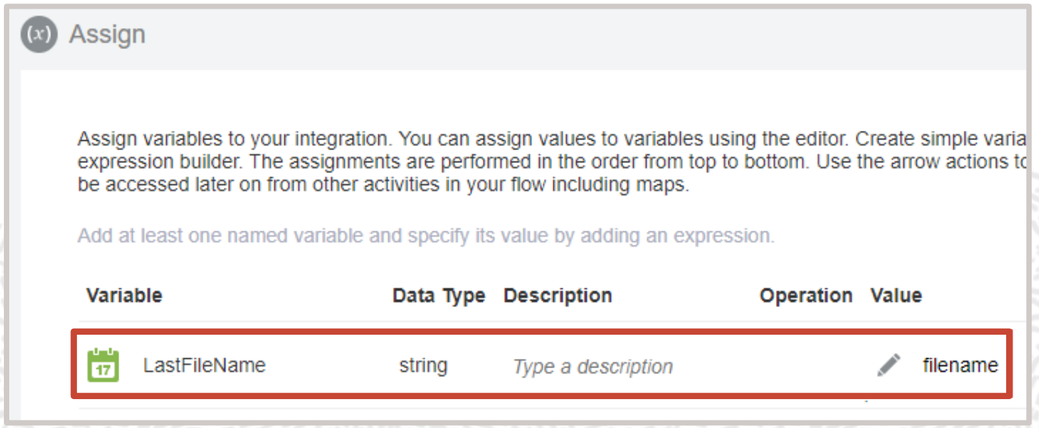
Scheduled Orchestration Parameters

When designing a Scheduled Orchestration style integration, you can use one or more Schedule Parameters to (*for example*):

- Assign the last run time to avoid duplicate processing of data.
- Define which file was last processed in a batch when limiting the number of files in each scheduled run.







File Sizes Support Summary

File Size (1)	Inbound Interface	File Processing Limitations	Outbound Interface	Outbound Payload
<= 1 MB	Any adapter	No	Any adapter (3)	BASE64 encoding or file attachment
1 – 10 MB	Any adapter	Yes*(2)	Any adapter	BASE64 encoding or file attachment
> 10 MB (4)	FTP/SOAP/REST Adapters (5)	Yes*(2)	FTP/SOAP/REST Adapters (5)	Attachments Only

(1) Based on decompressed file size
(2) No limitations for opaque pass-through files
(3) Provided that the outbound file size is <= 10 MB
*(4) Maximum file size up to 1 GB & I/O timeout considerations***
(5) Or any other adapter that supports file attachments

***** For any incoming or outgoing file, the upload/download automatically times out after 300 seconds.*

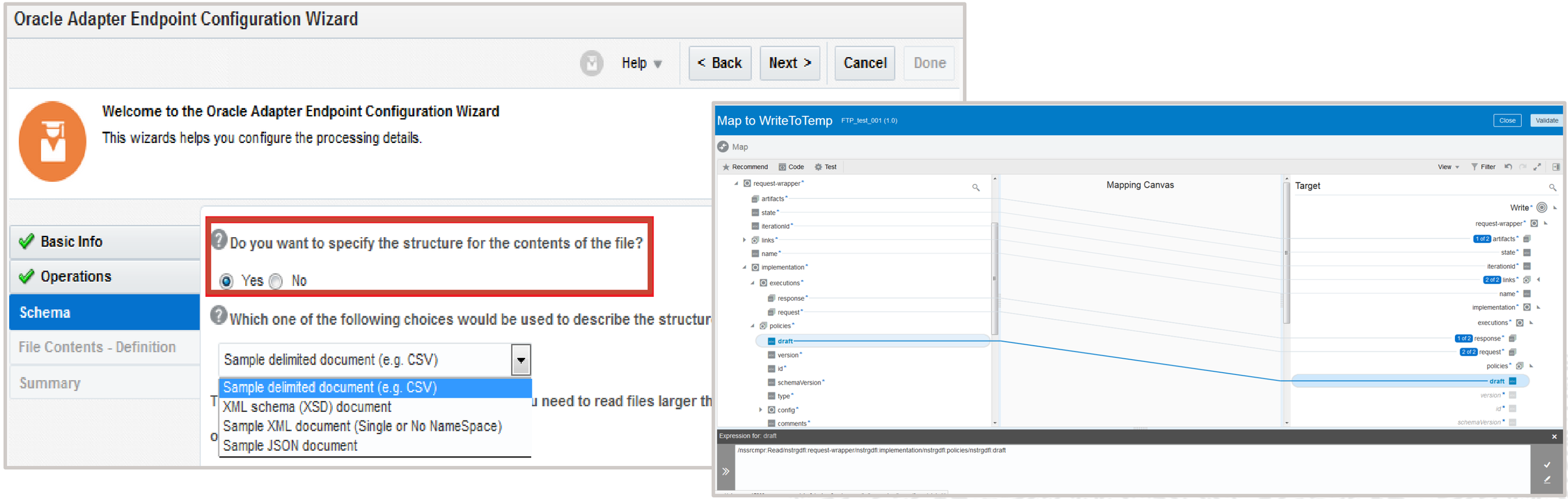
*** File Processing Limitations:**
- Only XML/JSON or CSV format supported
- Use Read File in Segments
  (Read Entire File not supported)

Agenda

- Tools and Options for File Handling
- Common File Handling Questions
- Use Case Scenarios and Example Solutions
- Design Guidelines for Fusion Applications

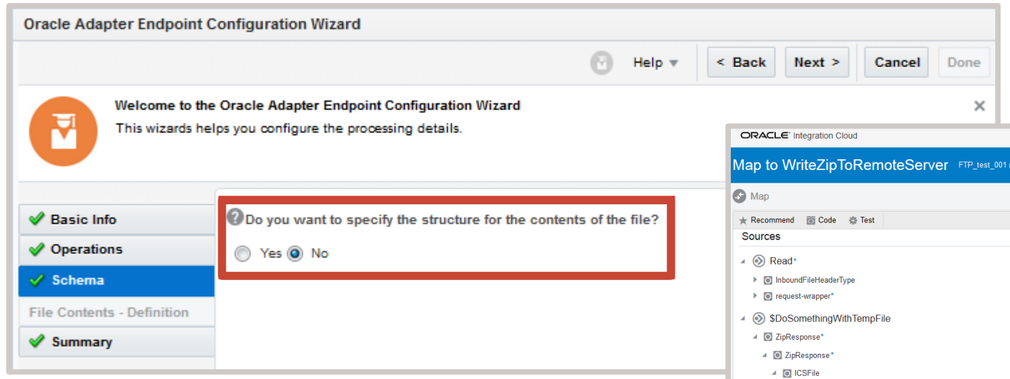
How to Read a Structured File?

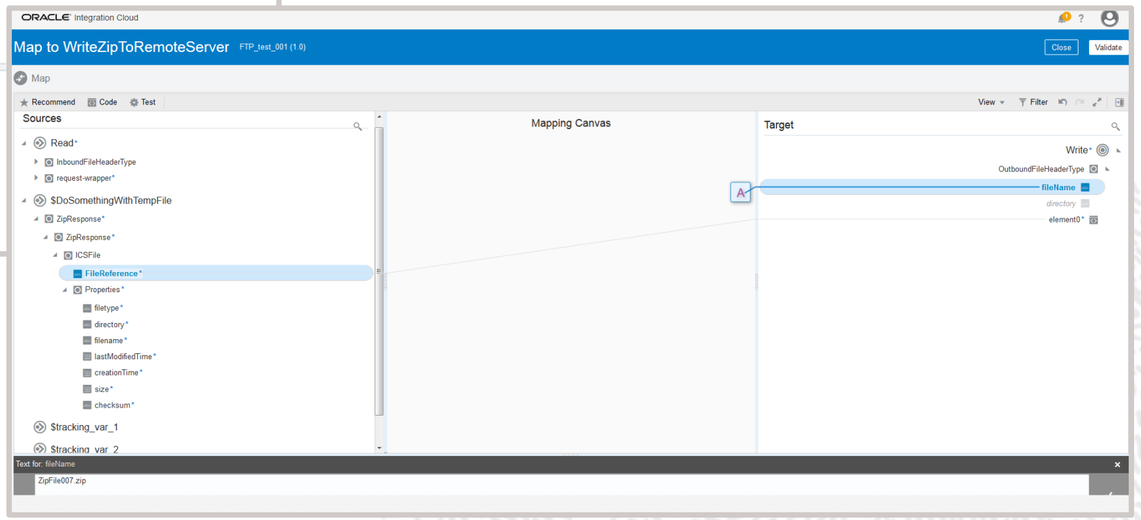
1. Use the File or FTP Adapter's **Read File** operation and specify the structure.
2. Perform a mapping of the structured elements in the Mapper tool as required.

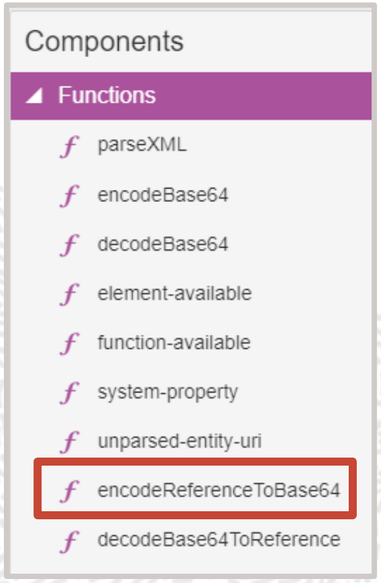


How to Read an Opaque File?

1. Use the File or FTP Adapter's **Read File** operation to return a reference to the file.
2. Perform a mapping of the FileReference in the Mapper tool as required.
   - Or, use the encode function to convert to base64 if required by target service.

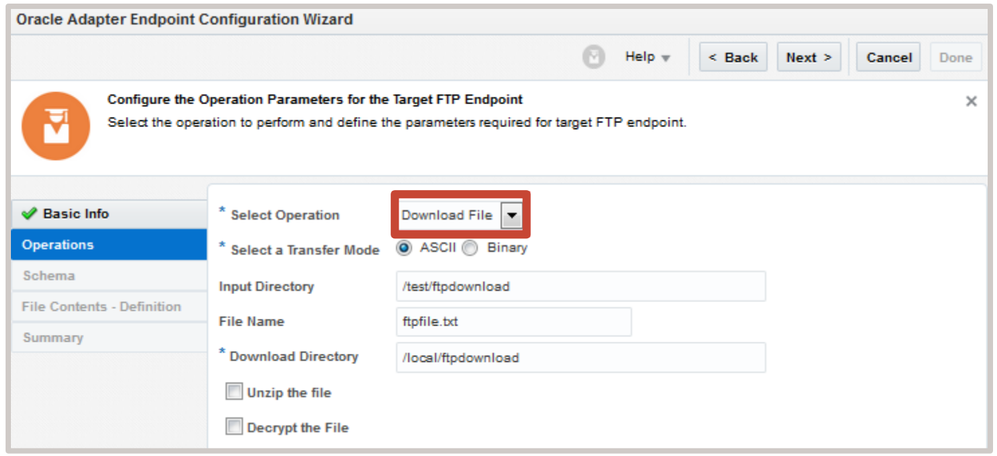


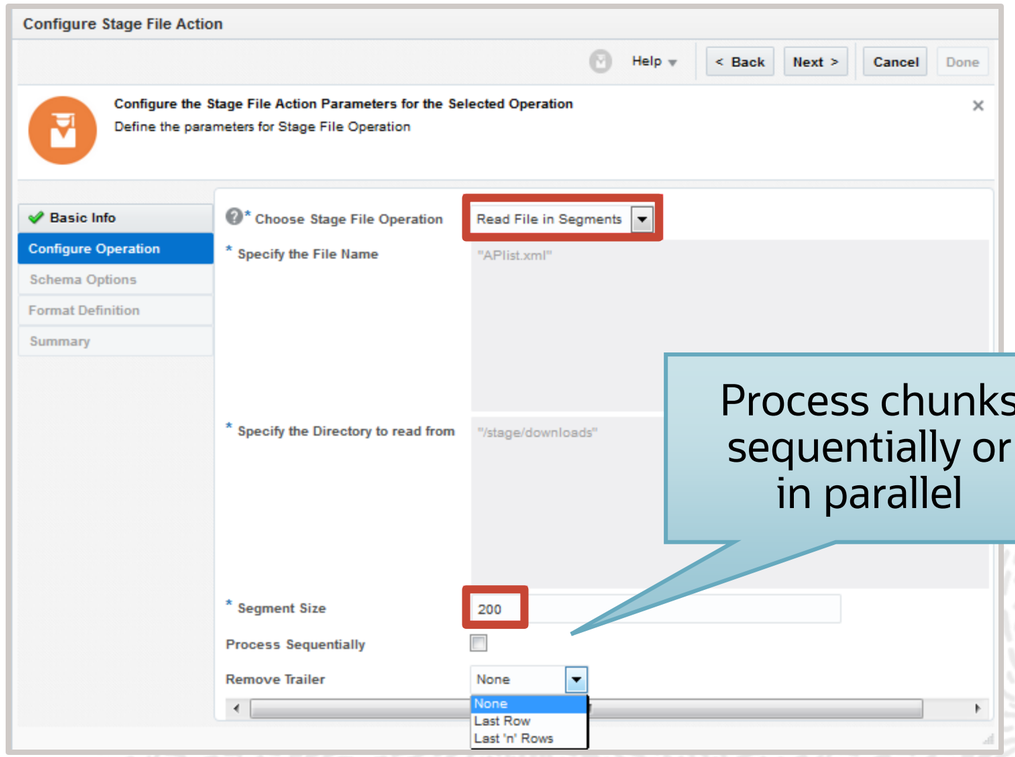




How to Process Large Files? (up to 1 GB)

1. Use the **Download File** operation of the FTP Adapter Connection.
2. Choose the **Read File in Segments** operation of the Stage File action.

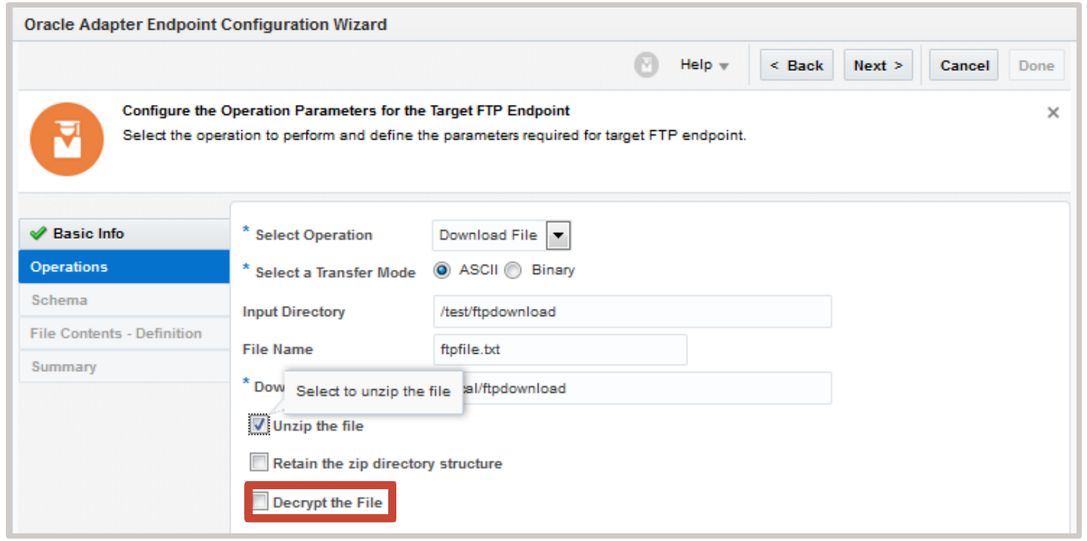




The **Read File in Segments** operation creates a stage file action that includes a scope part.

This enables you to drag actions inside the scope (such as for-each actions, additional stage file actions, and others) for more complex scenarios.

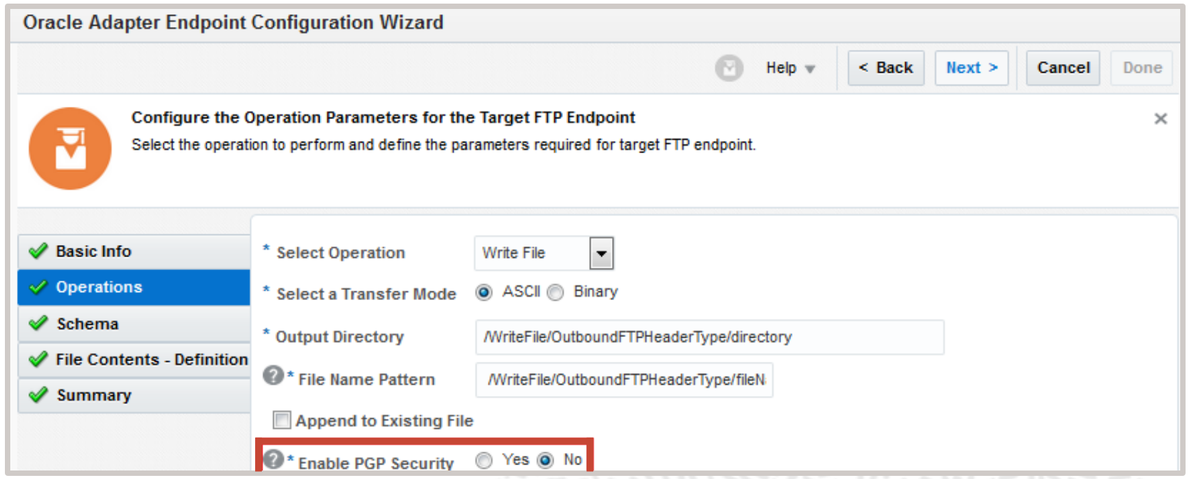
How to Decrypt and Encrypt Files?



The **Download File** operation effectively provides an opaque file.

After the file is downloaded and decrypted, a **Read** or **Read File in Segments** operation can be used to parse structured data within the file.

PGP private and/or public keys are uploaded when configuring the FTP Adapter Connection.

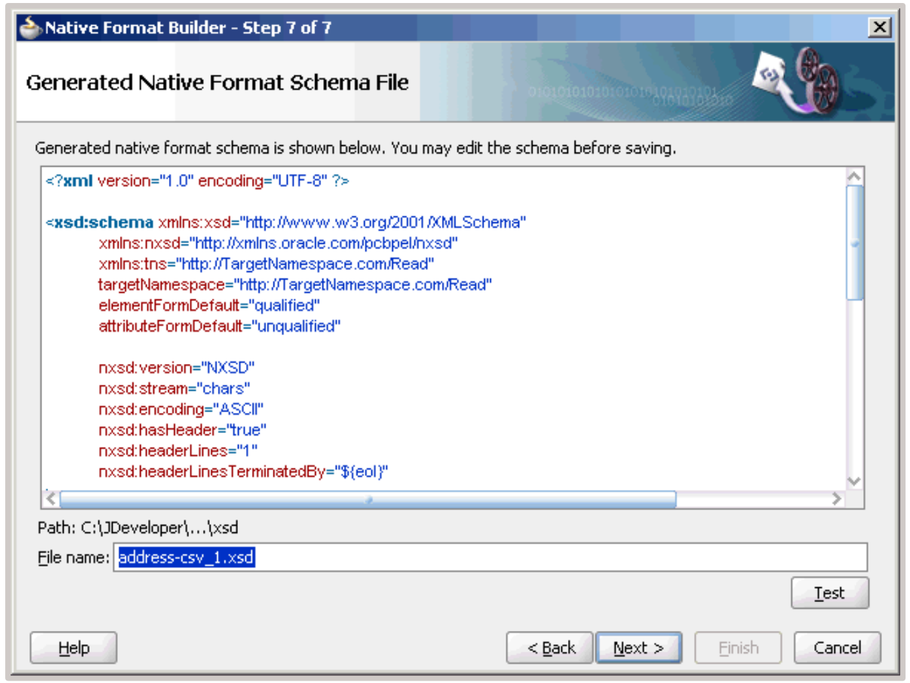


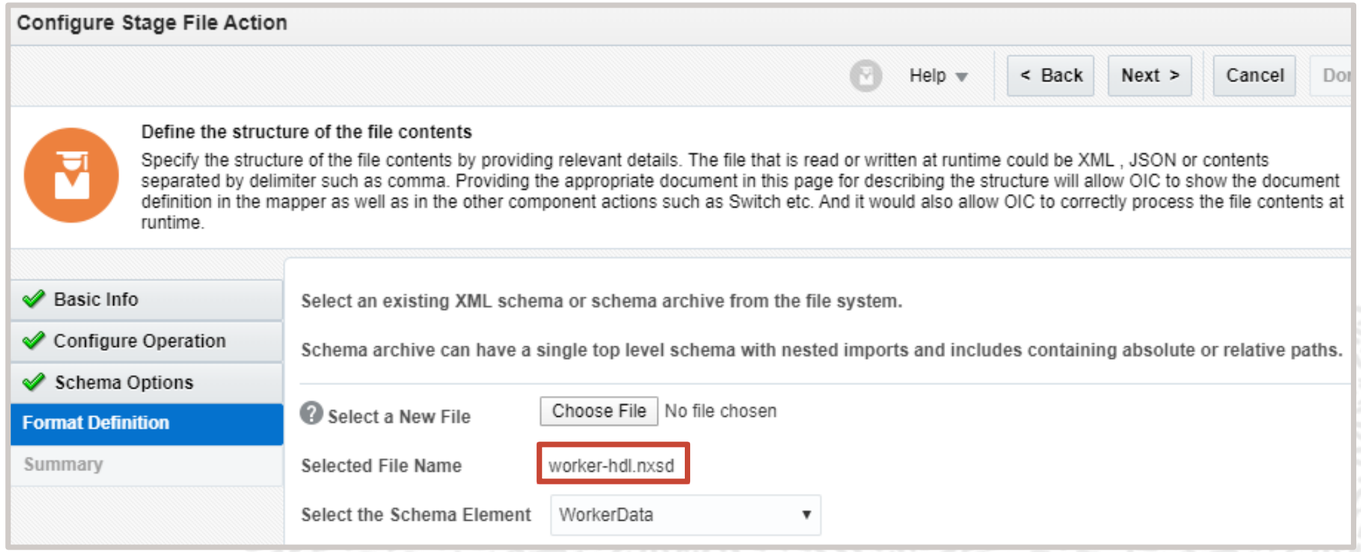
Both structured and opaque files can be encrypted using the **Enable PGP Security** option of the **Write File** operation.

How to Read/Write Native File Formats?

Native file formats need to be represented by a corresponding native schema (nxsd).

1. Create an NXSD file by using the **Native Format Builder** Wizard.
2. Provide the schema in the **Format Definition** page of the **Read** or **Write** operation.





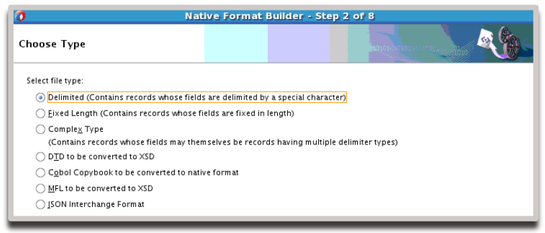
Using the Native Format Builder Wizard

Available within:

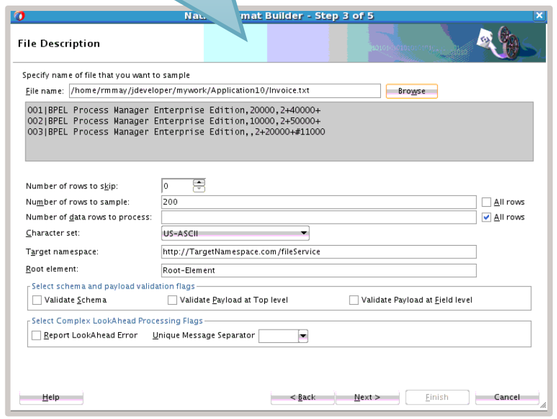
- **JDeveloper** (w/ SOA Composite Editor extension)
- **Oracle Enterprise Pack for Eclipse** (OEPE)

File formats include:

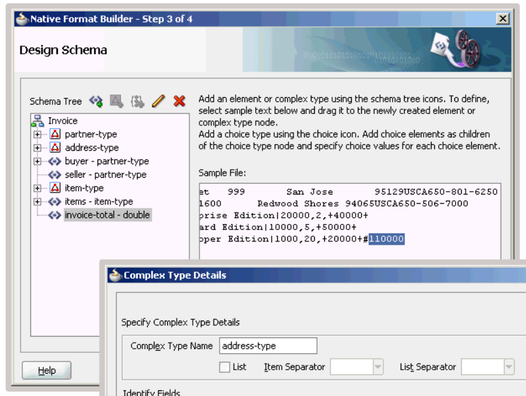
- Delimited
- Fixed Length
- Complex Type

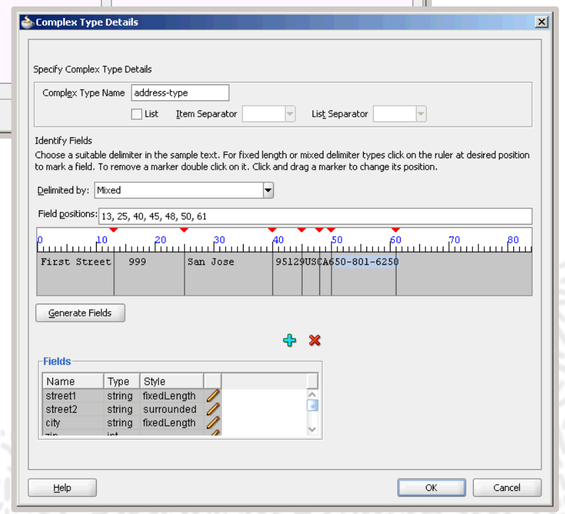


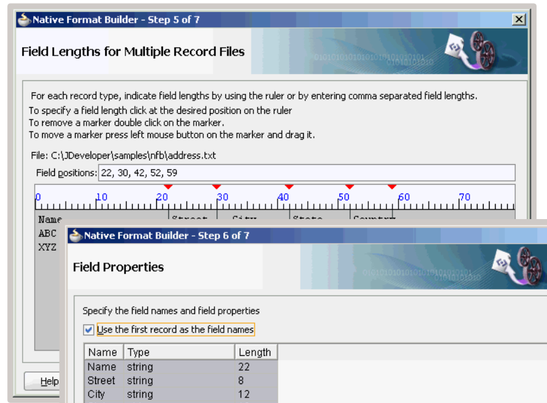
Provide a sample file

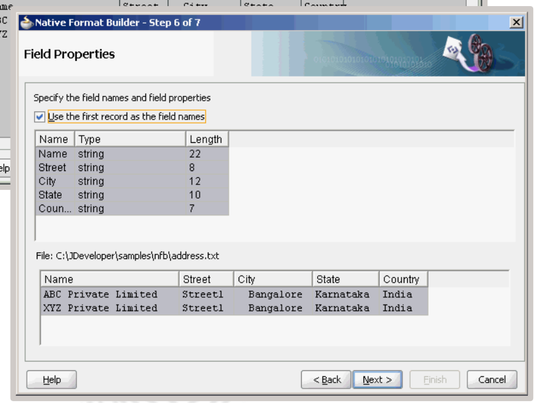


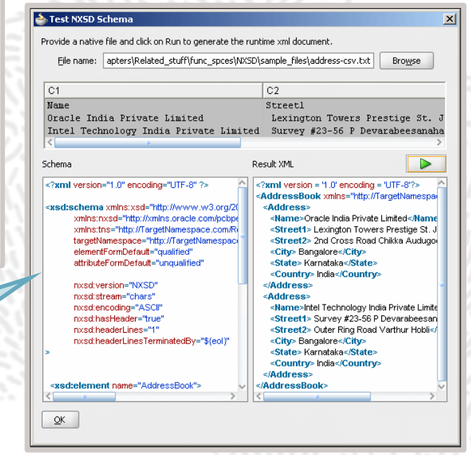
Build the schema











Built-in testing tool

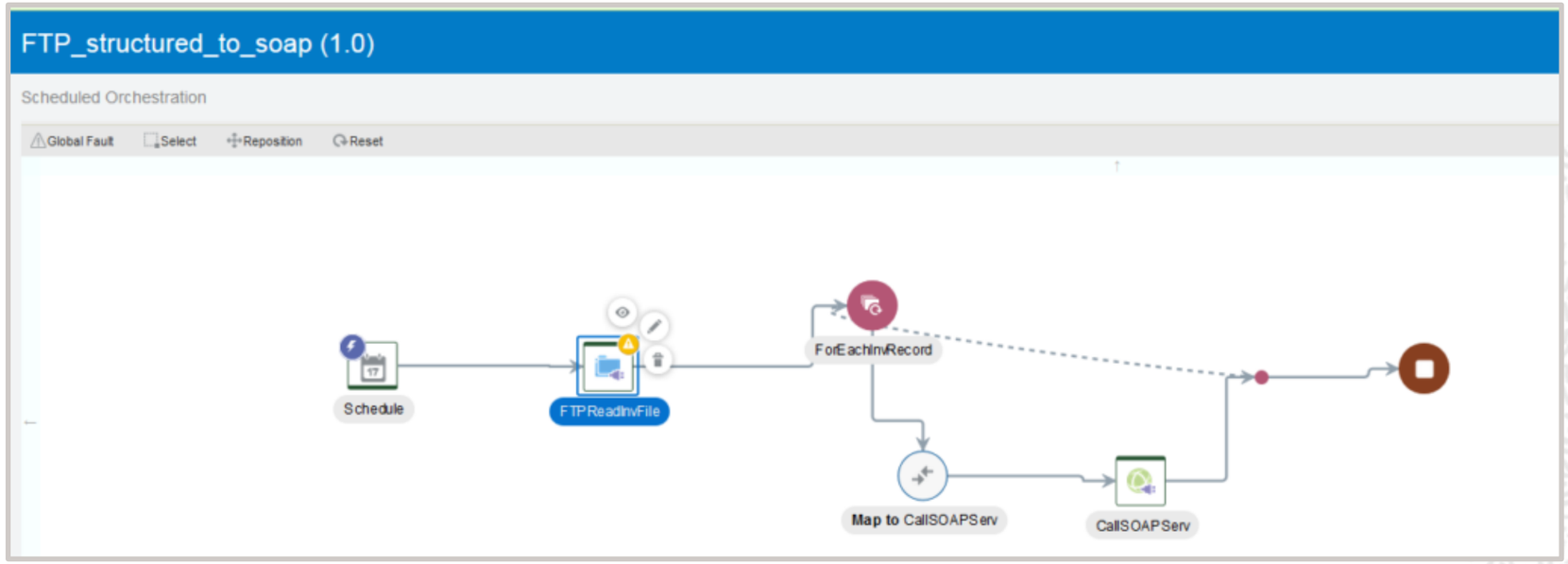
Native files that are not flat (*such as Master-Detail records*) can be handled by further editing the nxsd file manually.

Agenda

- Tools and Options for File Handling
- Common File Handling Questions
- Use Case Scenarios and Example Solutions
- Design Guidelines for Fusion Applications

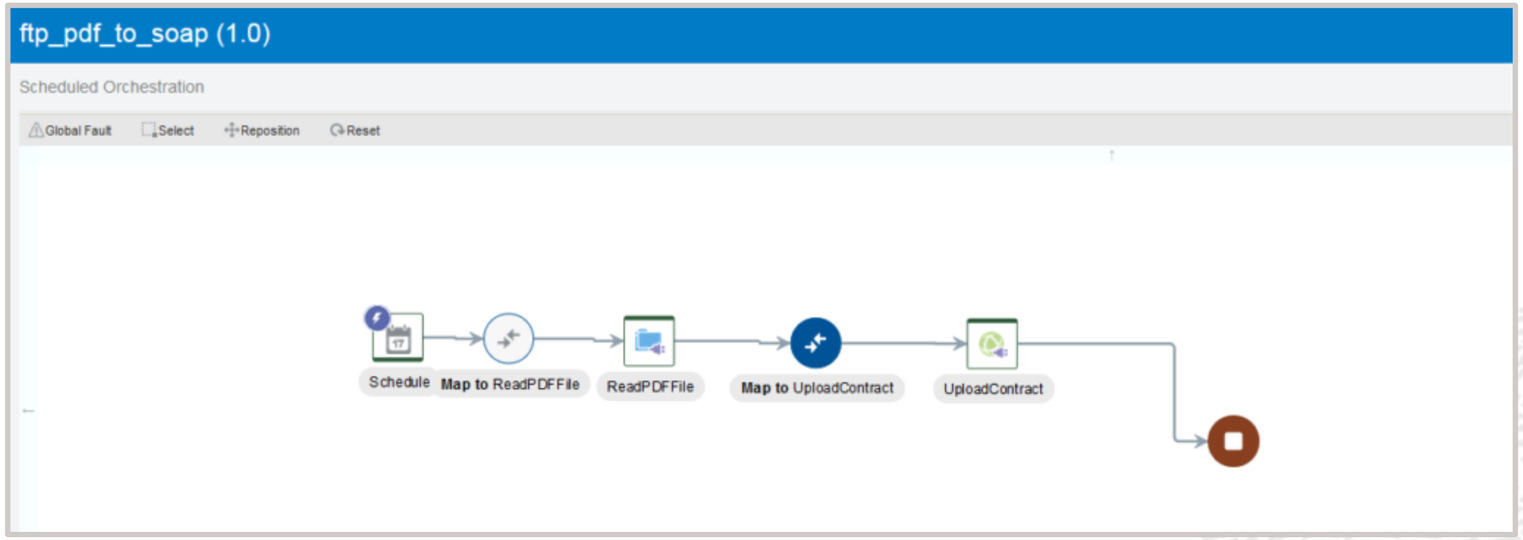
1. Inventory Source File to SOAP Web Service

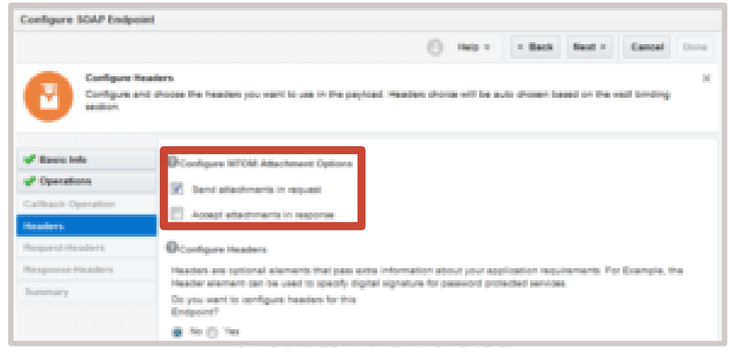
1. Create a Scheduled Orchestration style integration.
2. Use an FTP **Read File** operation specifying the schema of inventory records.
3. Use a For-Each action to loop through each record:
   - Map data to the SOAP target web service
   - Invoke the web service

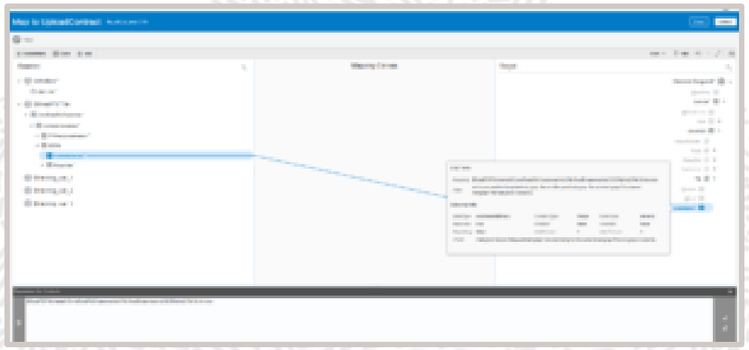


2. PDF File to SOAP Service as MTOM Attachment

1. Create a Scheduled Orchestration style integration.
2. Use an FTP **Read File** operation as unstructured (opaque) to return a FileReference.
3. Configure the SOAP Connection to send MTOM attachment.
4. Map the FileReference directly to the MTOM attachment.

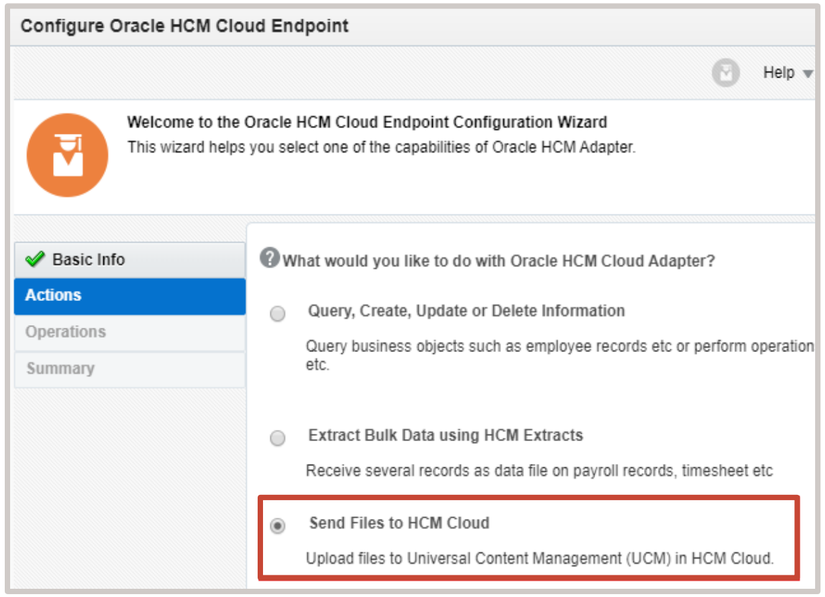






3. HDL File to Oracle HCM as Inline Attachment

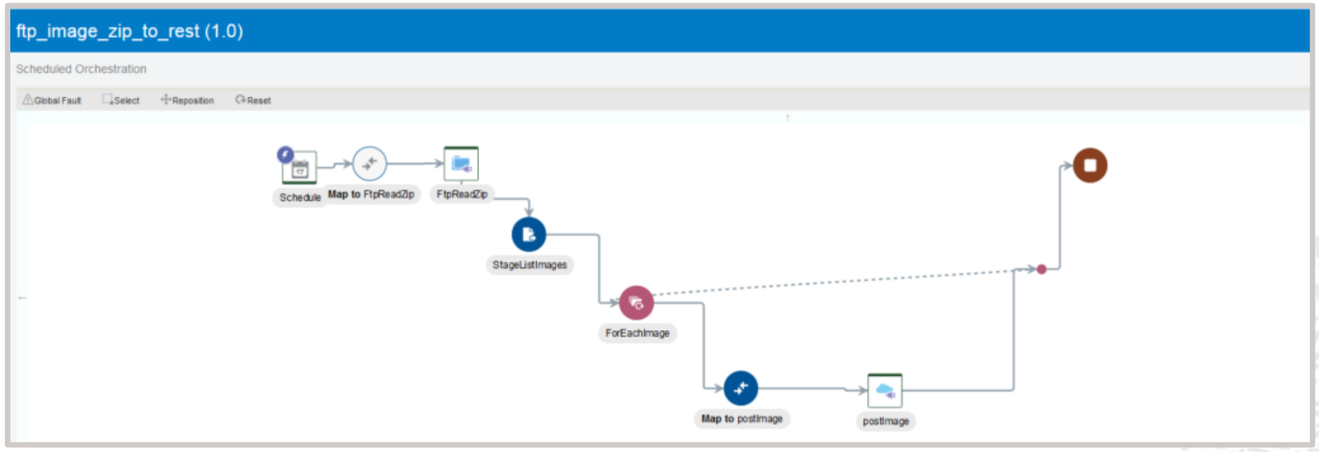
1. Same integration pattern as in Scenario #2.
2. Configure the Oracle HCM Connection using the UCM web service.
   - *Requires an inline attachment*
3. Use the encodeReferenceToBase64 function and map to the target service element.

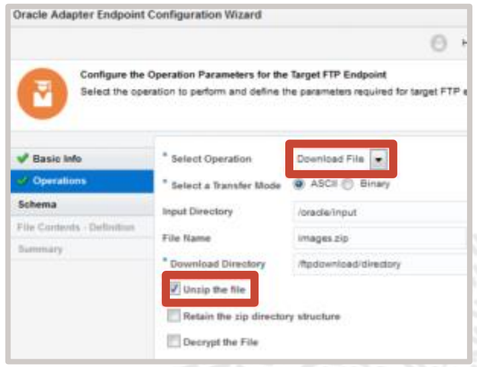


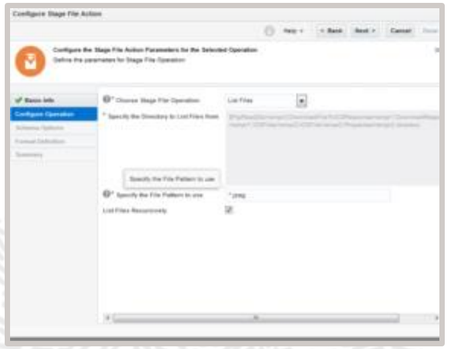
4. Images From Zip File Uploaded to a REST Service

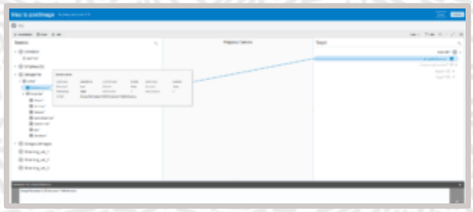
1. Use the FTP Download File operation with the **Unzip** file option.
2. Add a Stage File action using the **File List** operation.
3. Add a For-Each action, mapping and then posting each image to the REST Connection as raw payload *(application/octet-stream)*.

The same approach could be used passing each image file as a multipart attachment.



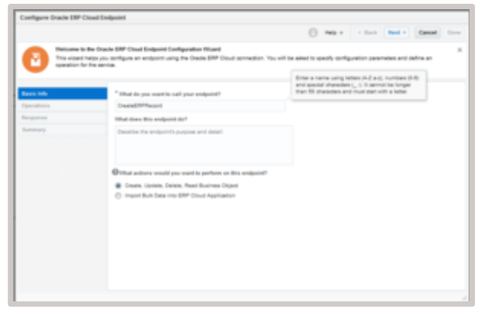


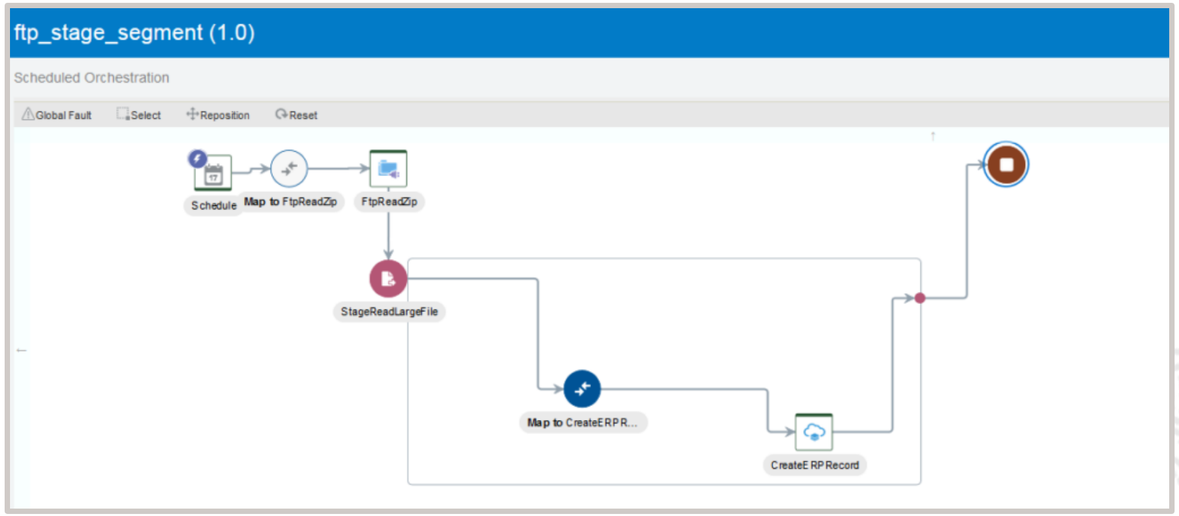


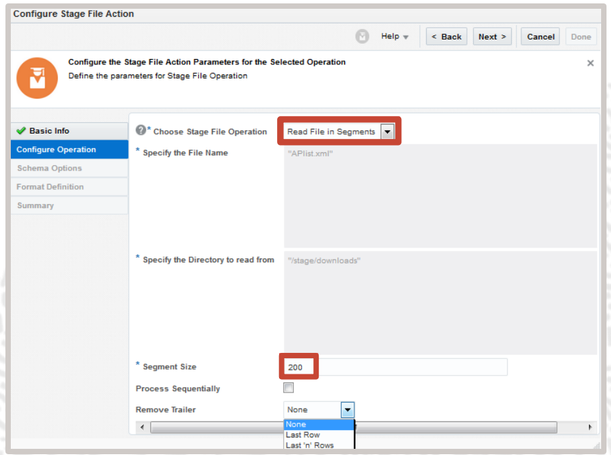


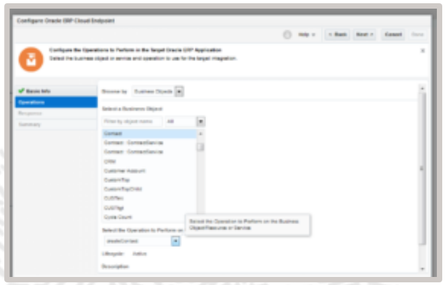
5. Read Large File & Process All Records to ERP

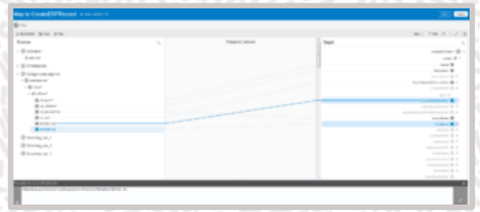
1. Use the FTP **Download File** operation.
2. Add a Stage File action using the **Read File in Segments** operation.
3. Configure the Oracle ERP Connection using the appropriate ‘CRUD’ operation with choice of ERP Business Object.
4. Map the read segment records to the ERP payload.





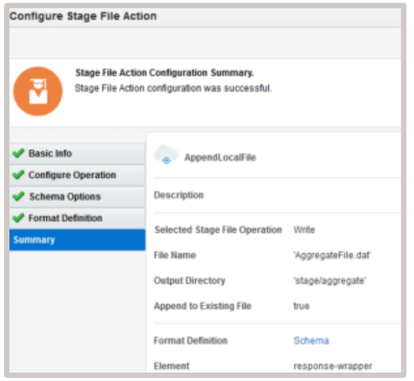


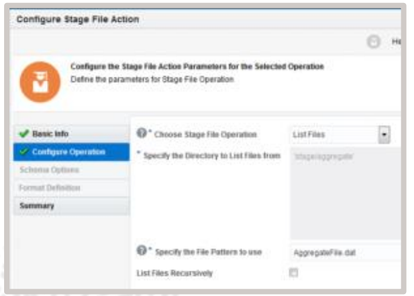


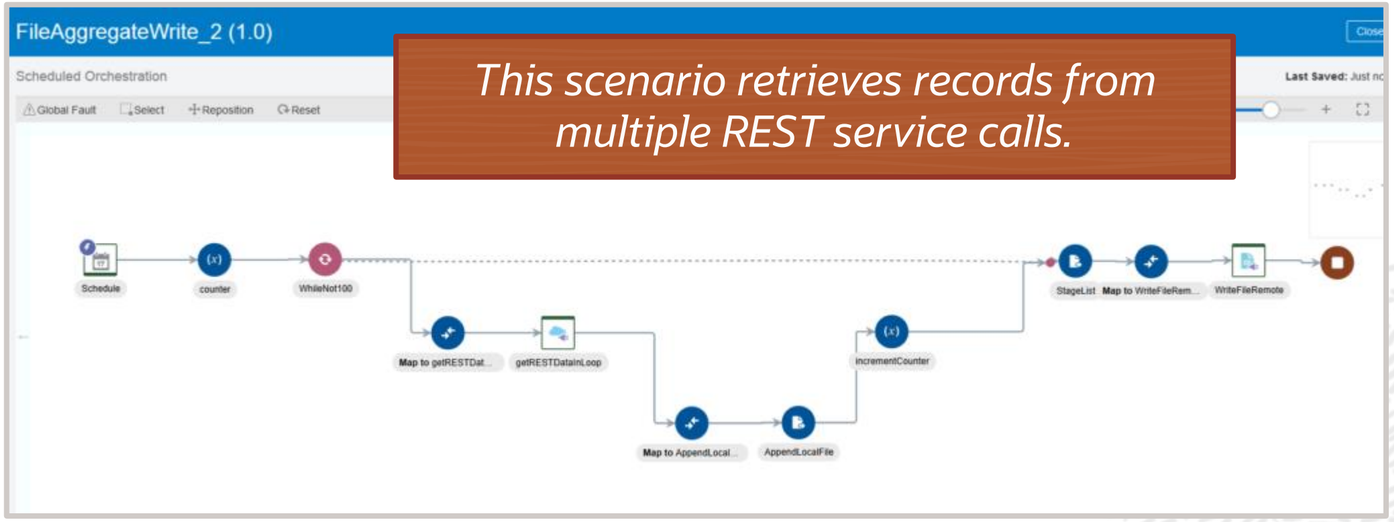


6. Aggregate Records Into Local File & Transfer to FTP

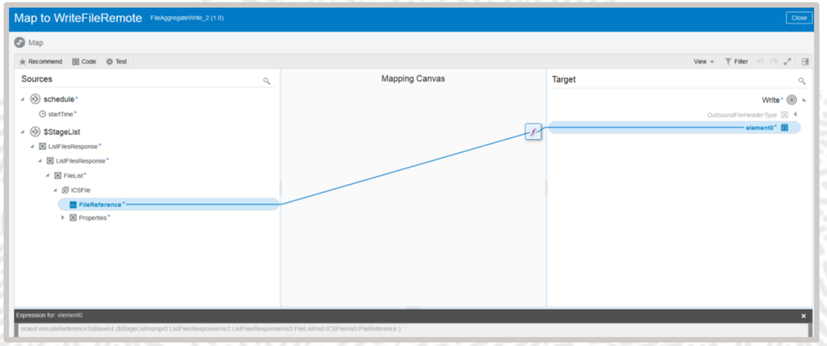
1. REST endpoint calls are made within a While loop.
   - Each response is mapped to be appended to a local file using the Stage File action Write File operation with the append option.
2. Add a Stage File action **List Files** operation to obtain the FileReference.
3. Use the FTP **Write File** operation to transfer file to remote server.







This scenario retrieves records from multiple REST service calls.



Agenda

- Tools and Options for File Handling
- Common File Handling Questions
- Use Case Scenarios and Example Solutions
- Design Guidelines for Fusion Applications

OIC Design/Modeling Considerations for Fusion Apps

The file size, content format, and processing requirements dictate how to model an integration flow in OIC when integrating with Fusion Applications.

Several integration patterns in Oracle Fusion Applications are file based.

- ERP Cloud importing bulk data through File Based Data Integration (FBDI) interface
- HCM Cloud importing bulk data through HCM Data Loader (HDL) interface
- CRM Cloud has similar patterns
- ERP Cloud Bulk Extracts where files are delivered to UCM or sFTP server
- HCM Cloud Extracts where files are delivered to UCM server
- Uploading attachments into ERP or HCM such as invoices, purchase orders, and other supporting documents.

The following slides highlight patterns based on file size, content, and whether it's pass-through or requires enrichment and transformation actions to generate a file that supports the respective business object or interface of the Fusion Application.

1. Inbound FTP <= 1 MB / Outbound <= 10 MB

Key Orchestration Steps

1. FTP Read File or Stage File Action *(Read Entire File)*
2. Enrichment and Transformation
3. Stage File Action *(Write File [create target file])*
4. Stage File Action *(Zip File)*
5. Outbound: FTP/SOAP/REST
   - *Mapper with encodeToBase64 function or attachment*

Inbound Content Type: XML or CSV

Use FTP-Download File for binary content

Write operations used within a parallel For-Each loop supports CSV only

Pattern applies to any outbound interface

2. Inbound FTP <= 10 MB / Outbound <= 10 MB

Key Orchestration Steps

1. FTP List File
2. FTP Download File
3. Stage File Action *(Read File in Segments)*
4. Enrichment and Transformation
5. Stage File Action *(Write File [create target file])*
6. Stage File Action *(Zip File)*
7. Outbound: FTP/SOAP/REST
   - *Mapper with encodeToBase64 function or attachment*

Inbound Content Type: XML or CSV

Binary files cannot be read using Stage File operations

Write operations used within a parallel For-Each loop supports CSV only

Pattern applies to any outbound interface

3. Inbound FTP > 10 MB / Outbound > 10 MB

Key Orchestration Steps

1. FTP List File
2. FTP Download File
3. Stage File Action *(Read File in Segments)*
4. Enrichment and Transformation
5. Stage File Action *(Write File [create target file])*
6. Stage File Action *(Zip File)*
7. Outbound: FTP/SOAP/REST
   - *Attachment only*

Inbound Content Type: XML or CSV

Binary files cannot be read using Stage File operations

Write operations used within a parallel For-Each loop supports CSV only

Pattern applies to FTP/SOAP/REST interfaces

4. Inbound REST <= 10 MB / Outbound <= 10 MB

Key Orchestration Steps

1. Obtain file reference in Mapper
   - *Attachment or use decodeReferenceFromBase64*
2. Stage File Action (Unzip File)
3. Stage File Action *(Read File in Segments)*
4. Enrichment and Transformation
5. Stage File Action *(Write File [create target file])*
6. Stage File Action *(Zip File)*
7. Outbound: FTP/SOAP/REST
   - *Mapper with encodeToBase64 function or attachment*

Inbound Content Type: XML or CSV (Base64)

Binary files cannot be read using Stage File operations

Write operations used within a parallel For-Each loop supports CSV only

Pattern applies to any outbound interface

5. Inbound REST > 10 MB / Outbound > 10 MB

Key Orchestration Steps

1. Obtain file reference in Mapper from attachment
2. Stage File Action *(Unzip File)*
3. Stage File Action *(Read File in Segments)*
4. Enrichment and Transformation
5. Stage File Action *(Write File [create target file])*
6. Stage File Action *(Zip File)*
7. Outbound: FTP/SOAP/REST
   - *Attachment only*

Inbound Content Type: XML or CSV (Attachment)
Binary files cannot be read using Stage File operations

Write operations used within a parallel For-Each loop supports CSV only

Pattern applies to FTP/SOAP/REST interfaces

6. Response File <= 10 MB / Outbound <= 10 MB

Key Orchestration Steps

1. Obtain file reference in Mapper
   - *Attachment or use decodeReferenceFromBase64*
2. Stage File Action *(Unzip File)*
3. Stage File Action *(Read File in Segments)*
4. Enrichment and Transformation
5. Stage File Action *(Write File [create target file])*
6. Stage File Action *(Zip File)*
7. Outbound: FTP/SOAP/REST
   - *Mapper with encodeToBase64 function or attachment*

File in intermediate SOAP/REST response payload (XML or CSV only)

Binary files cannot be read using Stage File operations

Write operations used within a parallel For-Each loop supports CSV only

Pattern applies to any outbound interface

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7. Response File > 10 MB / Outbound > 10 MB

Key Orchestration Steps

1. Obtain file reference in Mapper from attachment
2. Stage File Action *(Unzip File)*
3. Stage File Action *(Read File in Segments)*
4. Enrichment and Transformation
5. Stage File Action *(Write File [create target file])*
6. Stage File Action *(Zip File)*
7. Outbound: FTP/SOAP/REST
   - *Attachment only*

File in intermediate SOAP/REST response payload (XML or CSV only)

Binary files cannot be read using Stage File operations

Write operations used within a parallel For-Each loop supports CSV only

Pattern applies to any outbound interface

Summary

In this lesson, you should have learned how to:

- Describe the tools and components in OIC to facilitate file processing
- Describe the capability differences between FTP and File adapters
- Explain the file operations available with the Stage File action
- Describe common file handling scenarios and how to handle them in OIC
- Be familiar with file handling design guidelines for SaaS Fusion Applications

Practice 11-1 (Instructor Demo): File Handling Transfer to HCM Cloud

This practice includes:

- PART 1 – Set Up the Directories and Files on the FTP Server File System
- PART 2 – Import the Prebuilt Integration and Complete the Setup Configuration
- PART 3 – Activate, Test, and Demo the Integration Flow

In OIC environments with more than one student assigned, the instructor will provide hands-on demonstration.

Practice 11-2: FTP to ERP Cloud Scheduled Orchestration Project

This practice includes:

- PART 1 – Create a Scheduled Integration and Set Up FTP Server Access
- PART 2 – Implement the Initial Scheduled Integration Orchestration Logic
- PART 3 – Implement the Logic in the For-Each Loop
- PART 4 – Complete the Integration Flow Logic Invoking ERP Cloud
- PART 5 – Activate and Test the Integration Flow