Oracle® Adaptive Intelligent Apps for Manufacturing

Data Ingestion User's Guide

Release 18.3

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Oracle Adaptive Intelligent Apps for Manufacturing Data Ingestion User's Guide, Release 18.3

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- Did you understand the context of the procedures?
- Did you find any errors in the information?
- Does the structure of the information help you with your tasks?
- Do you need different information or graphics? If so, where, and in what format?
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Preface

Intended Audience

Welcome to Release 18.3 of the *Oracle Adaptive Intelligent Apps for Manufacturing Data Ingestion User's Guide.*

This guide is intended for Oracle customers and partners administering Oracle Adaptive Intelligent Apps for Manufacturing. It provides guidance and steps to upload and import data from various manufacturing enterprise systems and machine sensor devices into Oracle Adaptive Intelligent Apps for Manufacturing.

See Related Information Sources on page viii for more Oracle E-Business Suite product information.

Documentation Accessibility

For information about Oracle's commitment to accessibility, visit the Oracle Accessibility Program website at http://www.oracle.com/pls/topic/lookup?ctx=acc&id=docacc.

Access to Oracle Support

Oracle customers that have purchased support have access to electronic support through My Oracle Support. For information, visit http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info or visit http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs if you are hearing impaired.

Structure

Related Information Sources

Oracle Big Data Cloud Service [https://docs.oracle.com/en/cloud/paas/big-data-cloud/index.html]

Oracle Cloud Infrastructure Object Storage Documentation [https://docs.us-phoenix-1.oraclecloud.com/Content/Object/Concepts/objectstorageoverview.htm]

Oracle Data Mining Concepts [https://docs.oracle.com/en/database/oracle/oracle-database/18/dmcon/index.html]

Oracle Data Pump [https://docs.oracle.com/en/database/oracle/oracle-database/12.2/sutil/oracle-data-pump.html#GUID-501A9908-BCC5-434C-8853-9A6096766B5A]

Oracle Database Cloud Service [https://docs.oracle.com/en/cloud/paas/database-dbaas-cloud/index.html]

Oracle GoldenGate Cloud Service [http://docs.oracle.com/cloud/latest/goldengate-cloud/index.html]

Integration Repository

The Oracle Integration Repository is a compilation of information about the service endpoints exposed by the Oracle E-Business Suite of applications. It provides a complete catalog of Oracle E-Business Suite's business service interfaces. The tool lets users easily discover and deploy the appropriate business service interface for integration with any system, application, or business partner.

The Oracle Integration Repository is shipped as part of the Oracle E-Business Suite. As your instance is patched, the repository is automatically updated with content appropriate for the precise revisions of interfaces in your environment.

Do Not Use Database Tools to Modify Oracle E-Business Suite Data

Oracle STRONGLY RECOMMENDS that you never use SQL*Plus, Oracle Data Browser, database triggers, or any other tool to modify Oracle E-Business Suite data unless otherwise instructed.

Oracle provides powerful tools you can use to create, store, change, retrieve, and maintain information in an Oracle database. But if you use Oracle tools such as SQL*Plus to modify Oracle E-Business Suite data, you risk destroying the integrity of your data and you lose the ability to audit changes to your data.

Because Oracle E-Business Suite tables are interrelated, any change you make using an Oracle E-Business Suite form can update many tables at once. But when you modify Oracle E-Business Suite data using anything other than Oracle E-Business Suite, you may change a row in one table without making corresponding changes in related tables. If your tables get out of synchronization with each other, you risk retrieving erroneous

information and you risk unpredictable results throughout Oracle E-Business Suite.

When you use Oracle E-Business Suite to modify your data, Oracle E-Business Suite automatically checks that your changes are valid. Oracle E-Business Suite also keeps track of who changes information. If you enter information into database tables using database tools, you may store invalid information. You also lose the ability to track who has changed your information because SQL*Plus and other database tools do not keep a record of changes.

1

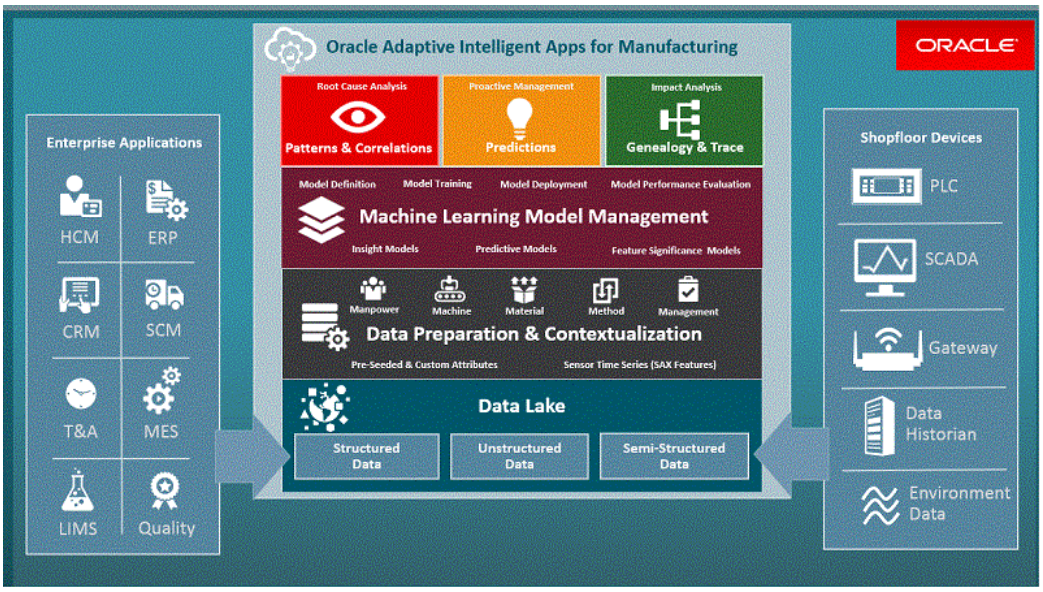
Overview

Overview of Oracle Adaptive Intelligent Apps for Manufacturing

Oracle Adaptive Intelligent Apps for Manufacturing (AIAMFG) collects, stores, prepares, and analyzes massive amounts of operational technology data coming from shop floor systems such as equipment, machines, sensors, and test stations and then contextualizes it with information technology data coming from business applications such as Supply Chain Management (SCM), Enterprise Resource Planning (ERP), Human Capital Management (HCM), and Customer Relationship Management (CRM). AIAMFG then analyzes the data by applying machine learning, data mining, and artificial intelligence techniques to discover key patterns and correlations that affect manufacturing efficiencies and provides actionable predictive analytics to maximize yield and minimize defects, scrap, cycle times, costs, and related parameters that impact or improve the manufacturing process. It also provides comprehensive capabilities for backward and forward tracing of products and processes within manufacturing and the supply chain, spanning manpower, machine, material, method and management aspects to facilitate rapid root cause, impact and containment analysis.

AIAMFG provides four modules with advanced analytical capabilities.

- Insights
- Predictions
- Genealogy and Trace
- Factory Command Center



Data ingestion provides users with the ability to upload structured enterprise and semi-structured sensor data into AIAMFG using comma separated values (CSV) file templates. Users can import data from third-party applications, enabling companies using any ERP application to take full advantage of the AIAMFG features. Oracle provides out-of-the-box integrations that use Oracle Data Pump and Oracle GoldenGate for E-Business Suite (EBS) customers who implement AIAMFG.

2

Getting Started with Data Ingestion

Overview of Data Ingestion

To analyze shop floor data, you must first acquire the data from sources such as ERP applications, Manufacturing Execution Systems (MES), and Quality/Laboratory Information Management Systems (LIMS) as well as from shop floor sensor devices mounted on machines. Oracle Adaptive Intelligent Apps for Manufacturing (AIAMFG) provides CSV file-based upload tools to collect data. Users can extract structured data from external source systems and semi structured data from machines and equipment sensor devices and load them into the data lake in Oracle Cloud. Equipment and sensor device data is then contextualized with equipment and work order information and summarized for analysis.

You can use spreadsheet templates and REST web services in AIAMFG to load data from various information technology and operational technology systems. Upload this data for any historical period and for one or more products using periodic and incremental batch uploads. The application also provides out-of-the-box integrations between AIAMFG and Oracle E-Business Suite (EBS), which enable the collection of data from EBS applications.

Structured Data

Import enterprise or business data into AIAMFG using CSV file templates. Two types of data uploads are supported, one for upload of prepared data for quick analysis and the other a detailed upload of entities to take full advantage of all AIAMFG features. Users may choose the upload method that meets their requirement. Oracle partners can help users extract data from external source systems and load the data into the AIAMFG data lake in Oracle Cloud.

Case Record Data

Upload case record data to obtain Insights after receiving the mined data in CSV files and importing these files into AIAMFG. The case record data file captures historical

work orders or assembly serial number data in a flattened file format. Each row in the spreadsheet corresponds to one work order or assembly serial number and contains all related information and influencing predictors.

Business Entity Data

Upload business entity data to capture the key entities from external source systems, entity by entity. Use this data in AIAMFG for data preparation and subsequent model building, as well as trace analysis. The CSV data files capture data for individual business entities such as items, lots, departments, persona, machines, receiving, work orders, quality, and so on. AIAMFG stitches all of the uploaded data together for analysis by relating the underlying data structures. Upload business entity data in order to take advantage of all AIAMFG features, including Insights, Predictions, Genealogy and Trace, and Factory Command Center.

Semi-structured Data

Import sensor stream and alert data from shop floor sensor devices into AIAMFG using CSV files. The sensor data is contextualized with the business entity data and summarized for analysis. Separate templates are available for sensor stream and alert data.

Sensor Data

Oracle partners can help users to configure machine data acquisition systems, such as Supervisory Control and Data Acquisition (SCADA), Distributed Control Systems (DCS) and other gateway device systems, to extract machine sensor data into the CSV file format. Users can then upload these sensor data files into AIAMFG in batch mode. The application processes the sensor stream data (for example, temperature) and alert data (for example, idle, paused), contextualizes it with equipment and work order information, and then summarizes the contextualized data for analysis.

Understanding Data Ingestion Methods

Users can ingest data into AIAMFG using either CSV files or out-of -the-box integration tools such as Oracle Data Pump and Oracle GoldenGate.

Uploading CSV Files

Users can import both structured and semi-structured data into AIAMFG using CSV files. Oracle partners can help users to configure and map data from external data sources into seeded templates for upload into AIAMFG. The process of extracting, configuring, and mapping the data from an external data source to a CSV file is the same irrespective of the data ingestion method used.

User Interfaces

AIAMFG provides three distinct user interfaces to import case record, business entity, and sensor data. Users can extract the data from external systems, enter the data into seeded templates, and then import the data into the application using these user interfaces.

REST Services

AIAMFG provides three REST services to import Business Entity data into AIAMFG using CSV files. Download a seeded template, enter data as suggested in the template guidelines, and then save the template as a CSV file. You can then import/upload the data file by calling a REST service. See: REST Web Services, *Oracle Adaptive Intelligent Apps for Manufacturing User's Guide*.

Using Oracle Data Pump and Oracle GoldenGate

AIAMFG provides out-of-the-box integration with Oracle E-Business Suite applications using Oracle Data Pump and Oracle GoldenGate. Oracle Data Pump enables high-speed transfer of data and metadata from a source database to the target database. Oracle GoldenGate provides near real time replication of data and real time capture, routing, and delivery of data across databases.

Comparing Data Types and Ingestion Methods

The following table compares the types of data available for ingestion with the various ingestion methods and features you can choose from.

> **Additional Information:** By importing Business Entity work order CSV files, you are able to import work orders that have not started or have partially progressed. By creating appropriate models with these work orders, you can make predictions for yield and quality attributes.

Data Ingestion: A Comparison

	Case Record Data	Business Entity Data	Sensor Device Data
Type of Data			
Characteristics	Structured Data: Prepared flattened records for quick analysis to obtain insights on historical data.	Structured Data: Separate files for each of the business entities to leverage all AIAMFG features.	Semi Structured Data: Sensor stream and alert data that is contextualized with Business Entity Data and then leveraged in all AIAMFG features.
Source Data System Examples	ERP Systems: JDE, SCM Cloud, etc. Other Shop Floor Systems: MES, LIMS, etc.	ERP Systems: SAP, JDE, SCM Cloud, EBS Other Shop Floor Systems: MES, LIMS, etc.	Sensor Devices: PLC, SCADA, Data Historian, Environment Data.
Data File			
Templates	Separate templates for process and discrete organizations.	A set of common templates and process or discrete organization specific templates.	Separate templates for Sensor Stream and Alerts.
File Examples	Files with flattened records of work orders, batches, or serial numbers.	Individual files for items, BOM, work orders, Receiving, equipment, quality, etc.	Individual files for Sensor Stream and Alerts data.
Ingestion Method			
CSV Files			
Upload through UIs	✓	✓	✓
Upload through REST APIs	✗	✓	✗
Data Pump	✗	✓ EBS Only	✗
Golden Gate	✗	✓ EBS Only	✗
AIAMFG Features (Leveraged)			
Insights	✓	✓	✓
Prediction	✗	✓	✓
Factory Command Center	✗	✓	✓
Genealogy and Trace	✗	✓	✓

Understanding the Data Ingestion Process

The Oracle Adaptive Intelligent Apps for Manufacturing Data Ingestion process consists of the following steps:

1. Copying a template to use as the basis for a CSV file, which matches the requirements of the target application table. Oracle and its partners can help users to configure and map the data.

2. Following an upload process to load the data files from the source system or local machine to storage cloud services.

3. Using data import programs to import data from interface tables in Oracle Storage Cloud Service to the AIAMFG tables in Oracle Database Cloud Service.

Storage Cloud Services

Oracle Storage Cloud Service serves as a storage area for uploaded CSV files. The types of data stored include raw sensor data and contextualized machine sensor data. It also stores enterprise data from external ERP systems such as JDE, SAP, SCM Cloud, EBS, or shop floor systems such as MES and LIMS. Both sensor and enterprise data are captured in a CSV file format and stored in the Storage Cloud.

Database Cloud Services

Oracle Database Cloud Service serves as the data lake for AIAMFG by storing data for analysis. The types of data stored in this database include Enterprise Resource Planning (ERP) application data, Manufacturing Execution System (MES) data, Quality/LIMS data, sensor device mapping definitions, and summarized machine sensor data. This

data is used for model building and analysis, lot genealogy, presenting the manufacturing time line, and providing a real-time overview of factory events in the Factory Command Center.

Following Template Guidelines for Data Ingestion

When uploading data files using Data Ingestion templates, follow these guidelines:

- Prepare the Business Entity, Case Record, or Sensor Device CSV data files as shown by the CSV templates.
- Save and upload the data files as CSV files. Other formats are not supported.
- Limit each data file size to less than 5 GB. If a file's size is greater than 5 GB, then split the data into more than one file.
- Verify that the column names in the data file match the column names in the template. The order of the columns in the data file do not have to match the order of the columns in the template, but you must include all mandatory columns in the data file.

When uploading data files directly into the Storage Cloud, all file names within the same folder must be unique.

Setting Up Data Ingestion

Perform the following setup steps in order to ingest data:

1. Define organizations. See: Defining Organizations, page 2-6.
2. Define users, which includes the following tasks. See: Creating and Managing Users, *Oracle Adaptive Intelligent Apps for Manufacturing User's Guide*.
    1. Add a new user.
    2. Assign a role to a user. For more information about roles, see: Managing User Roles and Access, *Oracle Adaptive Intelligent Apps for Manufacturing User's Guide*.
    3. Assign organization access to a user.
3. Define user preferences. See: Defining User Preferences, *Oracle Adaptive Intelligent Apps for Manufacturing User's Guide*.

    Important: In order to upload business entity CSV files, a user must set their user preference to an organization that allows business entity data ingestion only. Similarly, in order to upload case record

CSV files, set your user preferences to an organization that allows case record data ingestion only.

Defining Organizations

When defining organizations, consider the following information:

- A single AIAMFG instance can support multiple organizations. The organizations can be of type Business Entity, Case Record, or E-Business Suite (EBS).
- Create Case Record and Business Entity organizations manually through the AIAMFG user interface Create Organization page. EBS organizations are automatically created in AIAMFG via Data Pump and GoldenGate synchronization. You can upload sensor data for either a Business Entity or an EBS organization.
- Each organization in AIAMFG, depending on its type, can uniquely ingest data from only one of the following sources:
  - Business Entity CSV files.
  - Case Record CSV files.
  - Oracle Data Pump and GoldenGate synchronization.
- If you intend to ingest data from EBS by using Oracle Data Pump and GoldenGate, you must complete the EBS organization Data Pump load before ingesting data for Business Entity or Case Record organizations. If you initiate an EBS Data Pump load after ingesting Business Entity or Case Record data, the EBS organization data overwrites the Business Entity and Case Record organization data.

The following chart summarizes which type of organization to use with each type of data ingestion method.

	EBS Synced Org	Case Record Org	Business Entity Org
Data Pump + Golden Gate Sync	✓	X	X
Case Record CSV Upload	X	✓	X
Business Entity CSV Upload	X	X	✓
Machine Data CSV Upload	✓	✓	✓
Custom Predictors Rest API	✓	✓	✓

To create a Case Record or Business Entity data ingestion organization:

AIAMFG displays analysis data by organization, so data collected from various data sources using different ingestion methods must belong to a unique organization code.

1. Navigate to the Create Organization page.

   From the Setup page, click **Organization Access**, then **Create Organization**.

2. In the Name field, enter a unique name for the organization.

3. In the Code field, enter a unique organization code.

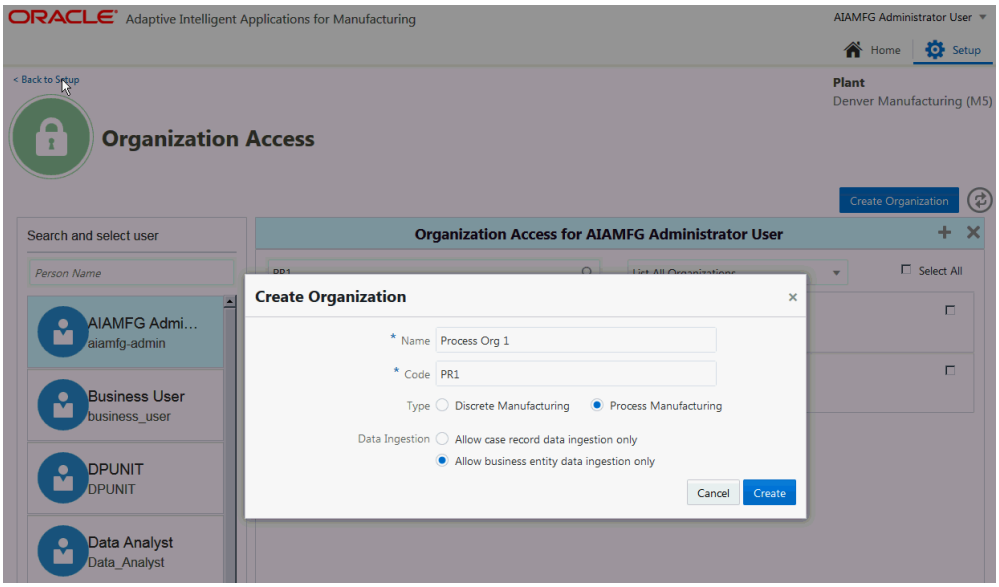
4. Select one of the following organization Types:

   - Discrete Manufacturing
   - Process Manufacturing

5. Select the Data Ingestion organization type:

   - Allow case record data ingestion only
   - Allow business entity data ingestion only

6. Click Create.



Supported Browsers

AIAMFG is supported on multiple web browser platforms. Support is provided by Oracle on all platforms for which the browser vendor provides support. For mobile device operating systems, Oracle provides support for the most recent browser delivered by the device operating system only.

Platform	Google Chrome	Mozilla Firefox	Microsoft Browsers**	Apple Safari
Android	Supported*	Not Supported	N/A	N/A
iOS	Not Supported	Not Supported	N/A	Supported
Mac OS X	Supported	Supported	N/A	Supported
Windows	Supported	Supported	Supported	N/A

* Support on the Android operating system is limited to Chrome for Android. The Native Android browser that shipped with versions prior to 4.4.x is not supported.

** Internet Explorer 11+ only (this includes Microsoft's new name for their browser, Edge). Support for Microsoft Browsers will follow the same N-1 (the most recent version plus one previous release) support policy that iOS provides.

- Compatibility Mode: For Windows Browsers, only Native mode is supported. View Compatibility mode should be disabled.
- RTL Languages: Support for RTL (right to left) languages, such as Arabic or Hebrew, is available with supported versions of Windows Browser, Firefox, Safari, and Chrome.
- JavaScript: JavaScript support must be enabled.
- Doctype: To use AIAMFG on Microsoft Internet Explorer, a doctype is required.

3

Importing Business Entity Data

Overview of Importing Business Entity Data

Use business entity data templates to upload the following key entities from external source systems into AIAMFG to take full advantage of all AIAMFG features.

- Master data, such as items, categories, resources, resource instances, operations, routings, bills of material, and recipes.
- Reference data, such as work orders or batches, sales orders, purchase orders, and quality test specifications.
- Transactional data, such as work order material and resource transactions, quality data, material move transactions, and work order completions.

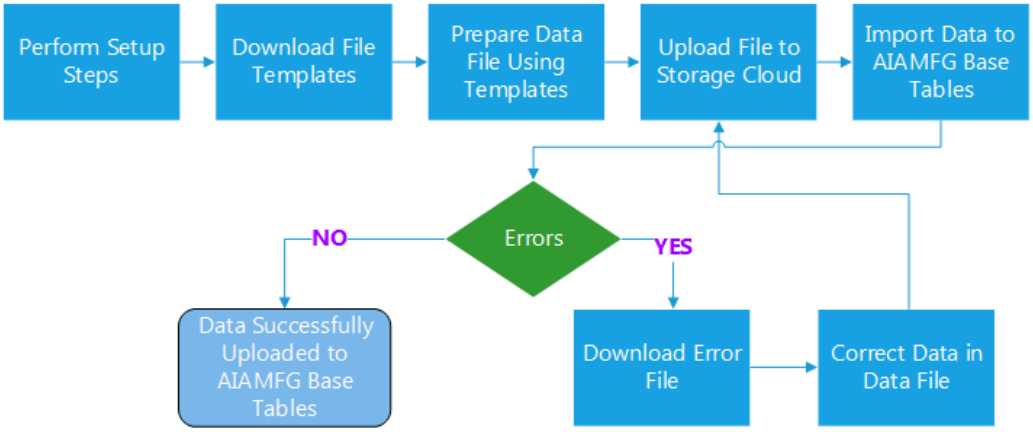
AIAMFG can ingest enterprise data from any ERP application, not only Oracle E-Business Suite (EBS) applications. Upload data from ERP systems such as JD Edwards, Oracle Supply Chain Management Cloud, SAP, or shop floor systems such as MES and LIMS, into AIAMFG using CSV data files. Oracle Data Pump and GoldenGate synchronization provide out of the box integration between E-Business Suite and AIAMFG.

When choosing between ingesting Case Record or Business Entity data, choose to ingest Business Entity data when you need:

- Source data organized by business entities.
- AIAMFG to stitch together data across entities and create flattened case records.
- AIAMFG to extract out-of-the-box features for use in Feature Significance, Insights and/or Predictions models.
- Visibility into multi-level manufacturing operations and across organizations through use of the Genealogy feature.

- To drill down into transactional data from high level data transformations.
- Equipment sensor data contextualization within AIAMFG.
- To capture multiple values for quality at an operation.
- To upload reference information once or infrequently.
- To generate predictions using scheduled and in progress work orders.

Data Import Steps



1. Perform the setup steps required to import data.
2. Download the file templates for either a process or discrete organization.
3. Prepare or enter the data into the CSV file, following the template guidelines.
4. Submit the file for upload to Oracle Storage Cloud Service.
5. Run the data import program to import data into the target base tables in Oracle Database Cloud Service.
6. If errors occur, download the error file, correct the data, remove the error message columns, save the error file as a new CSV file, and then upload the file again.

> **Important:** In order to ingest business entity data into an organization, the organization must be defined as a business entity data ingestion organization. See: Defining Organizations, page 2-6.

Use one of the following three methods to import business entity data.

- Upload CSV files using the business entity data user interface, page 3-3.

- Upload CSV files using REST web services, page 3-9.
- Use Data Pump and GoldenGate to ingest EBS data, page 3-66.

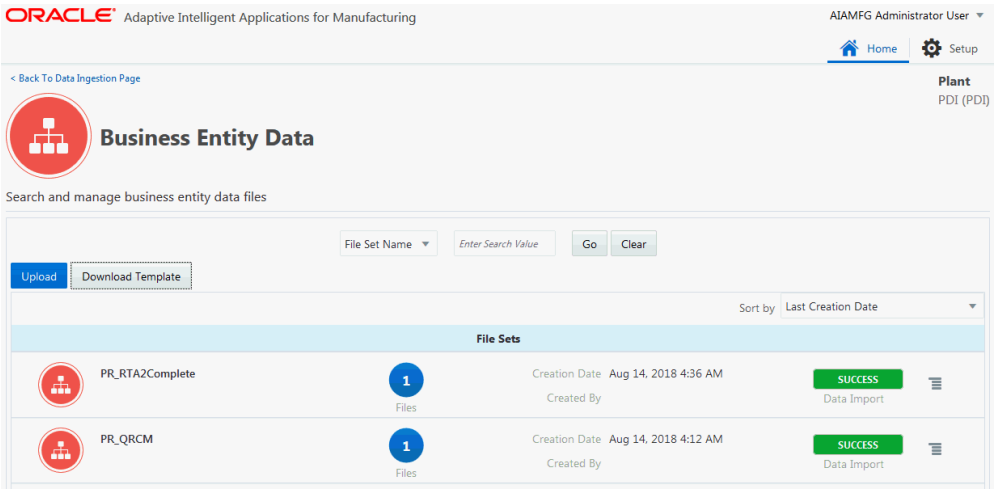
Uploading CSV Files Using the Business Entity Data User Interface

Import the CSV Business Entity Data files using the Business Entity user interface, which begins at the Business Entity Data page.

To download a template:

1. From the Home page, click **Insights** or **Predictions**, then the **Data Ingestion** tab, then **Business Entity Data**, and then **Download Template**.

   All of the Business Entity templates are zipped together into one file named AIMFG_BusinessEntityDataIngestionTemplates.zip. Download this zip file.



2. Extract the downloaded file AIMFG_BusinessEntityDataIngestionTemplates.zip. In the individual template files, enter your business entity data. For more information about entering data into each template, see:
   - Validating Business Entity Data and Handling Errors, page 3-12
   - Using Business Entity Data Template, page 3-23
3. Save each template file as type CSV.

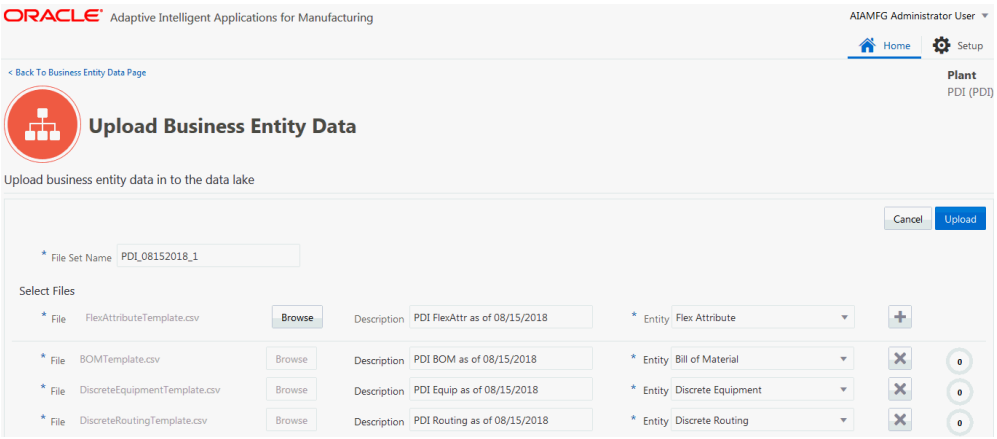
To upload business entity data files to Oracle Storage Cloud Service

4. In the Business Entity Data page, click **Upload**. The Upload Business Entity Data page opens.

5. In the File Set Name field, enter a meaningful name. You need to know this name to reference log files or the file set upload status.

6. Add one or more Business Entity Data CSV files to the file set in the Select Files region. After you enter information into the following fields for one CSV file, click the **Add** button (+ icon) to add a row for the next CSV file.

   - File: Click Browse to search for and select a CSV file.
   - Description: Optional. Enter a description of the CSV file selected.
   - Entity: Use the drop-down list to select the CSV file entity type.



7. Click **Upload** to submit the file set for upload to Oracle Storage Cloud Service.

   A File Upload Status page displays with the following information:

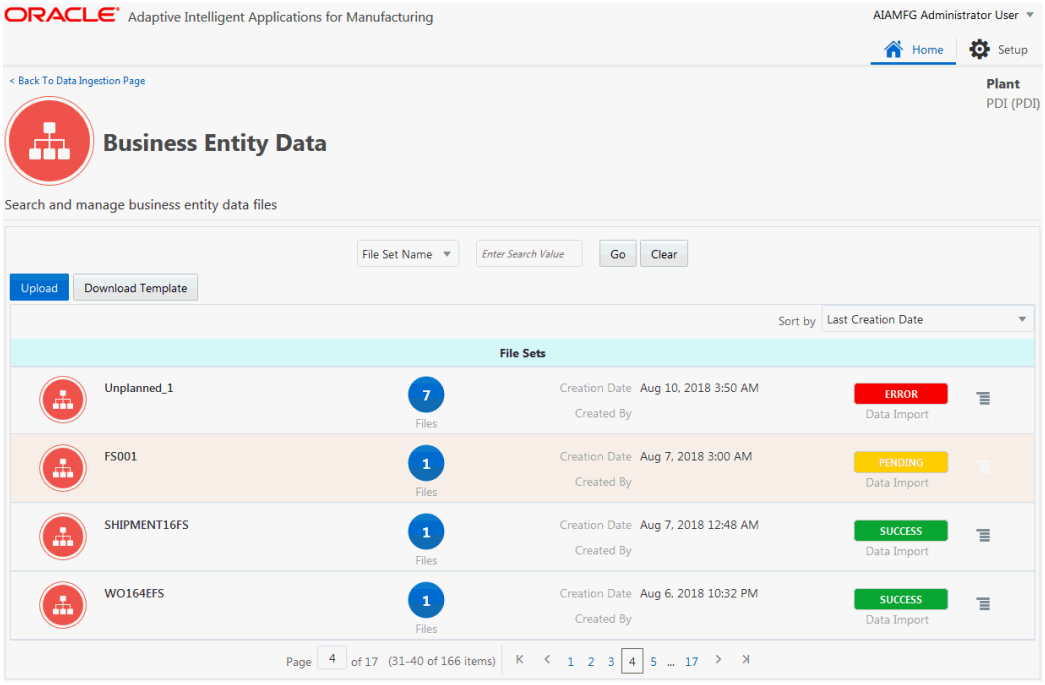
   - File upload: Displays the file number currently uploading out of the total number of files in the file set.
   - File upload progress indicator: Provides a visual representation of the upload progress.
   - File uploading in progress: Displays the file name currently uploading.

To import data into the target base tables:

Upon upload completion, the Business Entity Data page appears again, which displays the status of the uploaded file set. File set FS001 shown below contains 1 file, which has been uploaded to Oracle Storage Cloud Service and has a status of PENDING Data Import.

The File Sets region of the Business Entity Data page displays the following information:

- File Set Name
- Files: The number of CSV files uploaded in the file set.
- Creation Date: Creation date of the file set.
- Created By: User who uploaded the file set.
- Status: Data import status. Statuses include:
  - PENDING: File set upload to Oracle Storage Cloud Service completed successfully. Data import to the target base tables is pending.
  - IN PROGRESS: Data import to the target base tables is in progress.
  - SUCCESS: Data import completed successfully for all files in the file set.
  - ERROR: Data import failed for all or a subset of the files in the file set. To troubleshoot errors, refer to Validating Business Entity Data and Handling Errors, page 3-12. If you suspect the errors are related to Oracle Storage Cloud Service, contact the Oracle Cloud Operations team for support.
- Action icon: Invoke additional actions on the file set using this icon.



1. Click the **Action** icon, next to the Status, to perform additional actions on the file set. A drop-down list with two possible actions displays.

   - Import Data: Processes and imports data from the CSV files in the storage cloud to the target base tables.

   - Add File to File Set: Add additional files to an existing file set containing CSV files already uploaded to Oracle Storage Cloud Service.

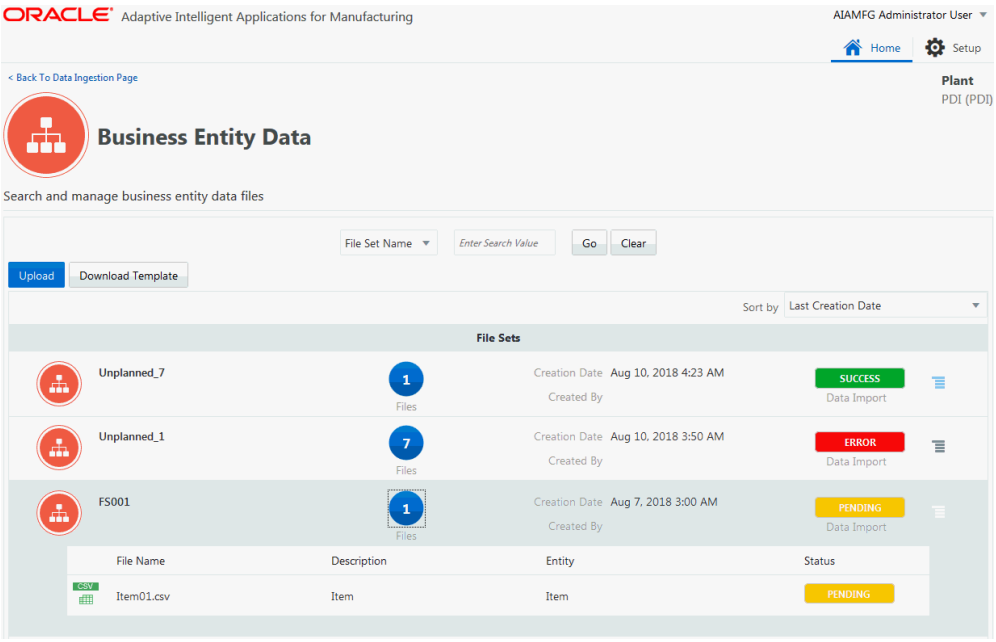
     Note: The above actions are only enabled when the status is PENDING..

2. Select the **Add File to a File Set** option.

   Follow the steps to upload business entity data files to Oracle Storage Cloud Service as described above. Note that the files already uploaded display, but are read only. Once files are uploaded, you cannot remove them from the file set.

3. Click **Upload** to resubmit the file set. The newly added files are uploaded to Oracle Storage Cloud Service.

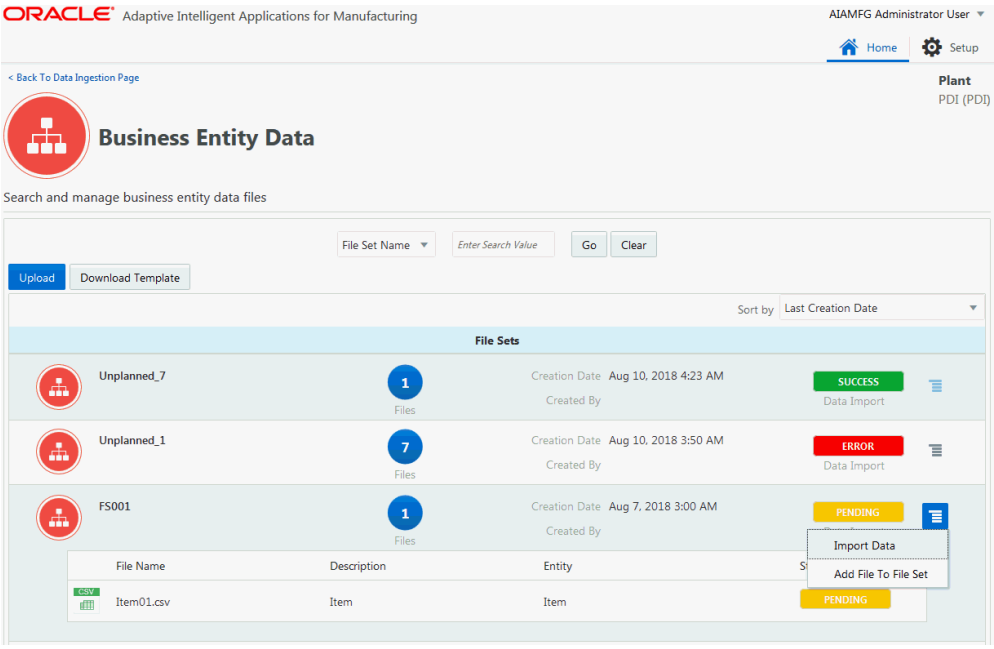
4. Click **Files** to view details of the uploaded files.



Details displayed for each file in the file set include:

- File Name
- Description
- Entity
- Status
- Action icon

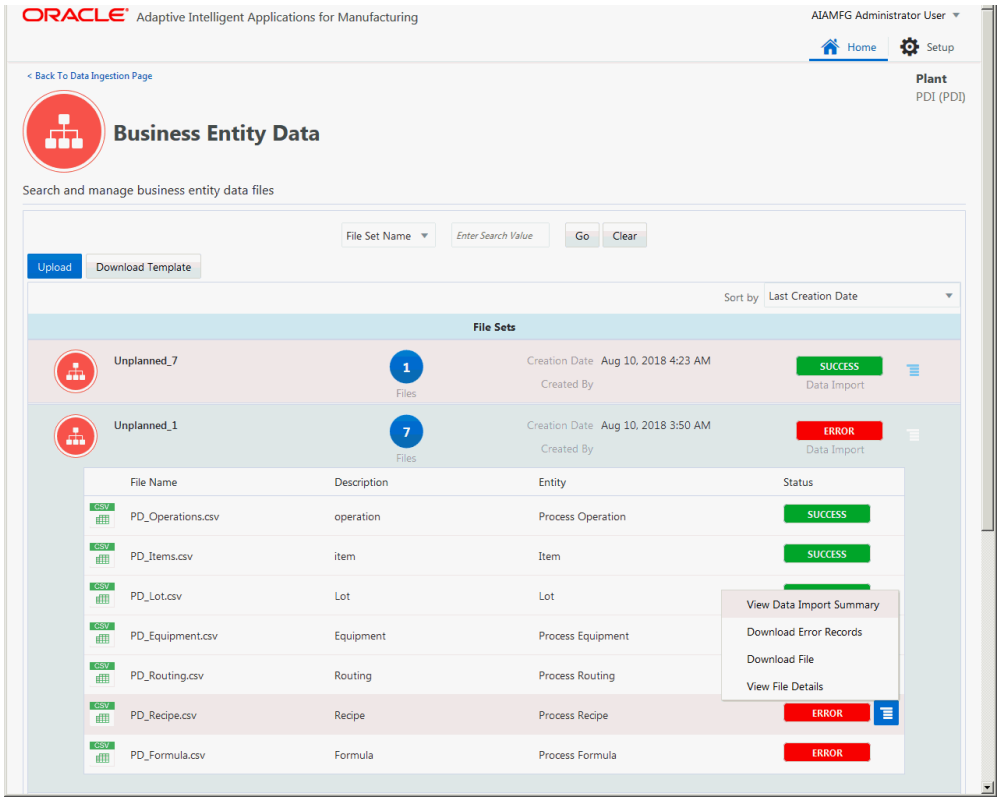
5. From the file set **Actions** icon, select **Import Data** to submit a program which imports the CSV files included in the file set to the target base tables.



Once the import data program completes, the Status at both the file set and file level are displayed.

6. Click **Files** again to view the individual files in the imported file set.

7. Click the Action icon for an individual file.



Choose from the following actions on an individual, imported CSV file:

- View Data Import Summary: Provides details about the number of uploaded records, successful imports, and failed imports.
- Download Error Records: Download a file containing the import error records of the CSV file.
- Download File: Download the CSV file uploaded as part of this file set.
- View File Details: View file details such as name, description, creation date, and so on.

Uploading CSV Files Using REST Web Services

Representational State Transfer, or REST web services, provide interoperability between computer systems and the web. REST web services enable requesting systems to access and manipulate resources.

Oracle Adaptive Intelligent Applications for Manufacturing provides three REST services to import data into the applications through CSV data files. The seeded templates must be downloaded, data entered as suggested in the template guidelines, and saved as a CSV file. These data files can then be imported using REST Services.

Business Entity Data Ingestion supports the following REST services:

1. Uploading data files in a file set to Storage Cloud. The file set can contain one or more files.

2. Importing files from Storage Cloud to the Database Cloud. This moves the data from the files in Storage Cloud to the product base tables.

3. Obtaining the status of all the files in a file set that is imported.

You must be assigned the Integrator role to access the REST services through a third-party client.

Uploading a file set to Storage Cloud:

You can upload a file set containing one or more business entity data files to the Storage Cloud.

`<host:>/aimfgapi/vof/v1/di/entitydata/upload`

Request Parameters:

Parameter Name	Description	Type	Required
filesetName	File Set Name	String	A value is required.
Files	List of files	Array	An array of files is required.

Payload Example:

Input:

```
{
    "filesetName" : "fileSet1",
    "files" : [
        {"fileName": "1.csv", "fileDescription" : "file description
here" , "template" : "Item"},
        {"fileName": "2.csv", "fileDescription" : "file description
here" , "template" : "Bom"}
    ]
}
```

Output:

```
{
filesetName" : "fileSet-1",
files" : [
{"fileName": "1.csv","fileDescription" : "file description here" ,
"template" : "Item ", "uploadStatus" : "SUCCESS"},
{"fileName": "2.csv","fileDescription" : "file description here" ,
"template" : "BOM", "uploadStatus" : "SUCCESS"}
 ]
 }
```

Importing the data file:

Import a file set containing one or more files from Storage Cloud to the base tables in the Database Cloud.

URL:

```
<host:>/aimfgapi/vof/v1/di/entitydata/process/<filesetName>
```

Request Parameters:

None

Payload Example:

Input:

```
"filesetName" as part of the url path parameter
```

Output:

```
{
    "filesetName": "fileSetName",
    "filesetStatus":"In-Progress"
     //In-Progress if job is submitted successfully. Else an error
message will be displayed in filesetName
}
```

Checking the Status of a File Upload:

Check the upload status of all the files in a file set.

URL:

<

```
<host:>/aimfgapi/vof/v1/di/pub/status/<filesetName>
```

Request Parameters:

None

Payload Example:

Input:

```
"filesetName" as part of the url path parameter
```

Output:

```
"fileSetName" : "fileSet-1",
  "files": [
     { fileName":"test.csv","entityName":"Items", "totalCount":3,
"uploadCount":3, "importCount":3,    "errorUploadCount":0,
"importStatus":"S", "processStatus":"S">" }
      {  "fileName":"test2.csv", "entityName":"BOM", "totalCount":3,
"uploadCount":3, "importCount":3, "errorUploadCount":0, "importStatus":"
S", "processStatus":"S">" }
       ]
    }
```

Validating Business Entity Data and Handling Errors

Oracle Storage Cloud imposes the following validation rules on uploaded CSV files:

1. Oracle Storage Cloud Service requires unique file names in a folder. Each folder in the storage cloud gets its name from an uploaded Business Entity file set. The storage cloud ensures file name uniqueness by ensuring the uniqueness of the file set names.

2. To avoid data dependency issues, follow the file set upload order as described in Template Upload Order, page 3-23.

3. To update an existing record in AIAMFG, create a data file, enter the updated data, and ensure that the primary key columns match the data record you wish to update.

4. A file set cannot exceed 5 GB. If a file set exceeds 5 GB, split the files into multiple file sets, each less than 5 GB.

5. When creating a data file based on a template, ensure that the columns names in the data file match the column names listed in the Column Header row of the template. Verify that the column names have no spaces.

Template Column Value Validations

The following list provides the valid values permitted in the following template columns:

Flex Attribute (FlexAttributeTemplate.xlsx)

- Entity: WorkOrder-Assembly, WorkOrder-Operation, WorkOrder-Person, WorkOrder-Equipment, WorkOrder-Component, WorkOrder-Exception, Lot, Serial, Equipment, Person, Item.

Serial (SerialAttributesTemplate.xlsx)

- Status: Defined, InStores, Issued, Intransit, Receiving, WIP

- OriginationDate: Serial units created will use Origination Date. If no Origination Date is provided, then the Origination Date value defaults to the import date.

Lot (LotAttributesTemplate.xlsx)

- OriginationDate: Lots created will use Origination Date. If no Origination Date is provided, then the Origination Date value defaults to the import date.

Receipt (ReceiptTemplate.xlsx)

- ReceivingType: External, Internal

- TransactionType: Receipt, Return

Work Order (WorkOrderTemplate.xlsx)

- RecordType: Assembly
  - TransactionType: Summary, Definition, Completion, Return, Release, OnHold, Cancel, Complete, Purge
- RecordType: Operation
  - TransactionType: Summary, Definition, Start, Completion, Return, Scrap, ScrapReturn
- RecordType: Component
  - TransactionType: Summary, Definition, Issue, Return
- RecordType: Equipment
  - TransactionType: Summary, Definition, Charge, Reverse
- RecordType: Person
  - TransactionType: Summary, Definition, Charge, Reverse
- RecordType: Exception
  - TransactionType: Assembly, Component, Equipment, Person, Quality, Other
- PlanQuantity, ActualQuantity, ScrapQuantity, ReworkedQuantity, TransactionQuantity: All quantity fields must be positive.
- ScheduledCompletionDate: Must be later than ScheduledStartDate.
- ActualCompletionDate: Must be later than ActualStartDate.
- For RecordTypes Assembly and Operation: If AssemblySerialNumber has a value, valid values for Yield and ReworkedQuantity are 0 or 1.
- SerialNumberFrom and SerialNumberTo: Both fields must be the same character length.
- TransactionType:
  - A value of Purge deletes the work order record as well as associated transactions, operations, equipment, person, exceptions, and quality records in other tables.
  - A value of Purge is only allowed for existing work orders.

- Use the Definition value to create or update a work order.
- If multiple Summary transactions are uploaded, the latest Summary transactions overwrite previous Summary transactions.

Routing (DiscreteRoutingTemplate.xlsx)

- ResourceType: Equipment, Person
- EffectiveDate must be earlier than DisableDate.
- EffectiveDate values should not overlap for the same operation code. If the EffectiveDate overlaps, multiple operation names display in the Insights, Predictions, Genealogy and Trace, and Factory Command Center pages.
- You can not update a primary resource (ResourceCode) and its alternate resource (Alternate) in the routing operation if the primary and alternate resource combination already exists.
- For a serialized assembly, enter the SerializationStartOperation in all records of the routing definition.
- The Usage value remains the same for both the primary (ResourceCode) and alternate (Alternate) resource.
- You can only define an Alternate resource if a primary resource (ResourceCode) exists in the routing definition.
- The default unit of measure for resource usage (Usage) is Hour.

Bill of Material (BOMTemplate.xlsx)

- EffectiveDate must be earlier than DisableDate.
- If the same Component is provided more than once in the same BOM routing operation (Operation) with a different effective date, the duplicate Components display in the in the Insights, Predictions, Genealogy and Trace, and Factory Command Center pages.
- You can not remove a Component from a BOM once it is defined.

Equipment (DiscreteEquipmentTemplate.xlsx)

- You can not delete an equipment instance (EquipmentInstance) once it is defined.

Person (PersonTemplate.xlsx)

- You can not delete a person instance once it is defined.
- StartDate must be earlier than EndDate.

Quality Test (QualityTestsTemplate.xlsx)

- SourceType: Discrete, Process
- TestDataType: Numerical, Categorical

Quality Result (QualityResultsTemplate.xlsx)

- Only provide a Sample value for a Process organization, not for a Discrete organization. Sample is not applicable for a Discrete organization.
- Existing quality test result records cannot be updated.
- Delete quality results for a work order using work order purge.
- The most recent TestResultDate determines the latest quality test result to use.
- In a Process organization, a Name of Ingredient Quality Result must leave the WorkOrder, SerialNumber and Operation fields empty.
- For an Assembly or Product WIP Quality Result, WorkOrder, SerialNumber and Operation field values are mandatory.
- For a Process organization, a Product WIP Quality Result uses the last Operation of the batch if an Operation is not provided.

Data Model Derived Field Values

Some of the uploaded business entity data is used to derive field values, as shown in the following table.

Template Name	Source Fields from Template	Derived Field in EBS Data Model	Derived Field Values
ProcessWorkOrderTemplate.xlsx	ActualStartDate, ActualEndDate	Work Order Status	Pending (If ActualStartDate and ActualEndDate are null). In Progress (If ActualEndDate is null and ActualStartDate is not null). Completed (If both ActualStartDate and ActualEndDate are not null).

Template Name	Source Fields from Template	Derived Field in EBS Data Model	Derived Field Values
ProcessWorkOrderTemplate.xlsx	ScheduleStartDate, ActualStartDate	Batch Creation Date	The earliest date of either ScheduleStartDate or ActualStartDate.
ProcessWorkorderTransactionTemplate.xlsx	TransactionType, when the EntityType field value is MaterialTransaction.	Item Type	Ingredient - If the TransactionType field value is IngredientIssue or IngredientReturn. Product - If the TransactionType field value is ProductCompletion or ProductReturn. By-Product - If the TransactionType field value is ByProductCompletion or ByProductReturn.

Error Messages

Error Code	Error Message
IOT_DI_INVALID_ORG	Enter a valid Organization Code.
IOT_DI_INVALID_ITEM	Enter a valid Item.
IOT_DI_INVALID_SERIAL_RANGE	Serial Numbers range quantity does not match Transaction Quantity.
IOT_DI_INVALID_SERIAL	Enter a valid Serial Number.
IOT_DI_INVALID_RECORD_TYPE	Enter a valid Record Type.
IOT_DI_INVALID_OPERATION	Enter a valid Operation Sequence Number.

Error Code	Error Message
IOT_DI_INVALID_TXN_QTY	Enter a valid Transaction Quantity.
IOT_DI_INVALID_DEPT	Enter a valid Department.
IOT_DI_INVALID_ITEM_REVISION	Enter a valid Item Revision.
IOT_DI_INVALID_LOT	Enter a valid Lot Number.
IOT_DI_MAND_VALUES_NULL	One or more mandatory value is missing.
IOT_DI_INVALID_WORK_ORDER	Enter a valid Work Order.
IOT_DI_INVALID_QUALITY_TEST	Enter a valid Quality Test Name.
IOT_DI_INVALID_TEST_VALUE	Enter a valid Quality Result Value.
IOT_DI_TEST_NAME_LENGTH	Enter Quality Test Name using up to 240 characters.
IOT_DI_TEST_DESC_LENGTH	Enter Quality Test Description using up to 240 characters.
IOT_DI_TEST_UOM_LENGTH	Enter Quality Test UOM using up to 5 characters.
IOT_DI_INVALID_TEST_DATATYPE	Enter a valid data type for Quality Test Name.
IOT_DI_INVALID_CONTEXT	Enter a valid Flex Attribute Context.
IOT_DI_NONDI_ORG	Organization is not enabled for Business Data Entity Ingestion.
IOT_PK_COL_MISSING	One or more mandatory value is missing.
IOT_DI_NONFLEX_ENTITY	Enter a valid Flex Entity.
IOT_DI_INVALID_LENGTH	One or more attributes contain more than allowed characters.
IOT_DI_INVALID_TEMPLATE	Select a valid Entity.

Error Code	Error Message
IOT_DI_LOADSET_PROCESSED	Data import job for the file set is in progress or completed. You cannot import data again.
IOT_DI_INVALID_LOADSET	File set name does not exist.
IOT_DI_INVALID_JOB_RESOURCE	Enter a valid Person or Equipment for the work order.
IOT_DI_INVALID_RESOURCE	Enter a valid Equipment.
IOT_DI_INVALID_OP_CODE	Enter a valid Operation Code.
IOT_DI_INVALID_RESOURCE_INSTANCE	Enter a valid Person or Equipment Instance.
IOT_DI_TXN_TYPE_MAND	Enter a Transaction Type.
IOT_DI_QTY_NEGATIVE	Enter a positive value for quantity attributes.
IOT_DI_MISSING_MAND_ATTRS	One or more mandatory value is missing.
IOT_DI_INVALID_TXN_TYPE	Enter a valid Transaction Type.
IOT_DI_TXN_QTY_ONE	Enter Transaction Quantity as 1 when providing only a Serial Number.
IOT_DI_INVALID_RCV_TYPE	Enter a valid Receiving Type.
IOT_DI_INV_ITEM_ATTR	Some attributes are not allowed as the Item is not serial or lot enabled.
IOT_DI_INV_CONTACT_INFO	Enter Contact information with FirstName and LastName each using up to 15 characters in the format of <FirstName, LastName>.
IOT_DI_UNEQUAL_FILE_LIST	Enter the correct number of files and file names in the payload.
IOT_DI_ACTIVITY_LENGTH	Enter Activity using up to 16 characters.
IOT_DI_OPERATION_LENGTH	Enter Operation using up to 16 characters.

Error Code	Error Message
IOT_DI_UOM_LENGTH	Enter UOM using up to 4 characters.
IOT_DI_INVALID_DEPN_TYPE	Enter a valid Dependency Type.
IOT_DI_INVALID_DELAY	Enter a positive value for Standard Delay or Max Delay.
IOT_DI_INVALID_ROUT_LENGTH	Enter Routing using up to <> characters.
IOT_DI_INCORRECT_TXN_TYPE	Transaction Type is not allowed as data exists already with another Transaction Type.
IOT_DI_INVALID_FORMULA_LENGTH	Enter Formula using up to 32 characters.
IOT_DI_INVALID_LINETYPE	Enter a valid Formula Line Type.
IOT_DI_INVALID_CONTRITOYIELD	Contribute To Yield is applicable only to Ingredient.
IOT_DI_INVALID_ROUTING	Enter a valid Routing.
IOT_DI_INVALID_FORMULA	Enter a valid Formula.
IOT_DI_INVALID_PRODUCT	Enter a valid Product.
IOT_DI_INVALID_RECIPE_LENGTH	Enter Recipe using up to <> characters.
IOT_DI_INVALID_RECIPE	Enter a valid Recipe.
IOT_DI_INVALID_ROUTINGSTEP	Enter a Routing Step.
IOT_DI_INVALID_FORMULA_ITEM	Enter a valid combination of Formula Item and Formula Item Type.
IOT_DI_EQUIPMENT_LENGTH	Enter Equipment using up to <> characters.
IOT_DI_EQUIP_PARAM_UOM_ERR	Enter Equipment Parameter UOM using up to <> characters.
IOT_DI_YIELD_ONE	Enter Yield and Rework as either 0 or 1 when an Assembly Serial Number is provided.

Error Code	Error Message
IOT_DI_DUP_ATTR	Enter a unique Context Attribute name.
IOT_DI_TEST_NAME_DUPLICATE	Enter a unique Quality Test Name.
IOT_DI_OPRN_NOT_PRESENT	Enter a Operation.
IOT_DI_INVALID_ALTERNATE_RSRC	Enter a Resource Code as Alternate is used.
IOT_DI_INVALID_CLOSE_DATE	Close Date must be greater than Start Date or End Date.
IOT_INVALID_SERIAL_STATUS	Enter a valid Status for the serial number.
IOT_DI_EQUIPMENT_USG_UOM	Enter Equipment UOM using up to <> characters.
IOT_DI_EQUIP_PARAMETER_LENGTH	Enter Equipment Parameter using up to <> characters.
IOT_DI_EQUIP_PARAM_TRGT_LENGTH	Enter Equipment Parameter Target Value using up to <> characters.
IOT_DI_EQUIP_MIN_MAX_CAP	Minimum Capacity must be less than Maximum Capacity.
IOT_DI_PARAM_MIN_MAX_VAL	Minimum Value must be less than Maximum Value.
IOT_DI_INV_STEP_NO	Enter a valid Step Number.
IOT_DI_INV_PREV_STEP	Enter a valid Previous Step.
IOT_DI_INVALID_RESOURCE_TYPE	Enter a valid Resource Type.
IOT_DI_USAGE_NULL	Enter a Usage value.
IOT_DI_EMP_NUM_NAME	Employee already exists.
INV_STD_OPERATION_ERROR -	Standard Operation Code <> already exists for the operation and effective date.

Error Code	Error Message
IOT_DI_INVALID_EFECT_DATE	Enter a valid Effective Date.
IOT_DI_INVALID_ENTITY_TYPE	Enter a valid Entity Type.
IOT_DI_OWNER_ORG_MISMATCH	The definition for <Entity> already exists for a different organization.
IOT_DI_CAPACITY_ERR	Capacity must be greater than zero.
IOT_DI_EQUIP_IDEAL_CAP	Ideal Capacity must be between Minimum Capacity and Maximum Capacity.
IOT_DI_NONPROCESS_ORG	Organization is not Process Manufacturing Type.
IOT_DI_INV_ENTITY_VERS	Enter a valid Entity Version.
IOT_DI_INV_STEP_QTY	Step Quantity value must be greater than zero.
IOT_DI_SAMPLE_NOTNULL	Sample is not required for Discrete Manufacturing organization.
IOT_DI_SAMPLE_NULL	Enter a Sample name.
IOT_DI_DUPLICATE_SAMPLE	Sample exists for a different Item or Work Order.
IOT_DI_EQUIP_PARAM_TRGT_NUM	Enter a valid data type for Parameter Target Value.
IOT_DI_INV_BATCH_LENGTH	Enter a Batch using up to 32 characters.
IOT_DI_INVALID_BATCH	Enter a valid Batch.
IOT_DI_NO_OPERATION_UPDATE	Operation cannot be updated for Batch Step.
IOT_DI_INV_OPERATION	Enter a valid Operation.
IOT_DI_INVALID_STEP	Enter a valid Step.
IOT_DI_INVALID_END_DATE	End Date must be greater than Start Date.

Error Code	Error Message
IOT_DI_INV_PREV_STEP	Enter a valid Previous Step.
IOT_DI_INVALID_ACTIVITY	Enter a valid Activity.
IOT_DI_INV_TERMINATE_FLAG	Enter a valid Terminate Flag.
IOT_DI_INVALID_DEPN_TYPE	Enter a valid Dependency Type.
IOT_DI_INVALID_QUANTITY	Quantity values must be greater than zero.
IOT_DI_INV_YIELD_VALUE	Enter a valid Yield value.
IOT_DI_INV_TARGET_VALUE	Target Value must be between Min Value and Max Value.
IOT_DI_INVALID_MAX_VALUE	Max Value must be greater than Min Value.
IOT_DI_INVALID_EQUIPMENT	Enter a valid Equipment.
IOT_DI_INVALID_LINETYPE	Enter a valid Line Type.
IOT_DI_INVALID_PARAMETER	Enter a valid Parameter.
IOT_DI_INV_EQUIP_INSTANCE	Enter a valid Equipment Instance.
IOT_DI_OVERLAP_TXN_DATES	Equipment Transaction already exists in the specified date range.
IOT_DI_EQUIP_PARAM_TRGT_RNG	Equipment Parameter Target Value must be between Minimum Value and Maximum Value.
IOT_DI_PARAM_TYPE_ERR_CODE	Enter a valid Parameter Type.
IOT_DI_IMPORT_JOB_SUBMITTED	Data import job is already submitted.
BDCS_UNEXPECTED_ERROR	Error occurred in BDCS. Please contact administrator.
IOT_DI_ATTRIBUTE_EXISTS	Attribute Set already exists for the context.

Error Code	Error Message
IOT_DI_ATTR_DATA_EXISTS	Entity Data already exists. You cannot redefine context.
IOT_DI_CONTEXT_EXISTS	Context already exists.
IOT_DI_EQUIP_SRL_NUM_ERR	Enter Equipment Serial Number using up to <> characters.
IOT_DI_EQUIP_CAP_UOM_ERR	Enter Equipment Capacity UOM using up to <> characters.
IOT_DI_COST_ERR	Enter a valid Equipment Planning Cost greater than 0.
IOT_DI_EQUIPMENT_INST	Enter a valid Equipment Instance greater than 0.

Using Business Entity Data Templates

AIAMFG provides twenty-one business entity data templates. Download the templates from AIAMFG or from the linked file names below and then enter the data as recommended into the spreadsheet templates. You can upload multiple files together by creating a file set.

Template Upload Order

The import program manages data dependencies within a file set. If files have data dependencies across file sets, then you must manually manage the dependencies as described in the table below. The table lists the order in which to upload files. For example, upload setup templates before transaction templates due to data dependencies between the templates. You can upload setup data once and then all dependent entities can use the setup data multiple times. Upload additional setup data and import it into the application when required.

Seeded Business Entity Data Templates

Entity Execution Order	Entity Name	Template Classification (Process, Discrete, Both)	Entity Type (Setup/Transaction)
1	Flex Attribute	Both	Setup
2	Item	Both	Setup
3	Lot	Both	Transaction
4	Serial	Both	Transaction
5	Department	Discrete	Setup
6	Equipment	Discrete	Setup
7	Process Equipment	Process	Setup
8	Person	Both	Setup
9	Routing	Discrete	Transaction
10	BOM	Discrete	Transaction
11	Process Operation	Process	Setup
12	Process Routing	Process	Setup
13	Process Formula	Process	Setup
14	Process Recipe	Process	Setup
15	Quality Test	Both	Setup
16	Receipts	Both	Transaction
17	Work Order	Discrete	Transaction
18	Batch	Process	Transaction

Entity Execution Order	Entity Name	Template Classification (Process, Discrete, Both)	Entity Type (Setup/Transaction)
19	Batch Transactions	Process	Transaction
20	Quality Result	Both	Transaction
21	Shipping	Both	Transaction

Data Used by Both Discrete and Process Organizations (Common)

Flex Attribute (FlexAttributeTemplate.xlsx [https://www.oracle.com/webfolder/technetwork/mfg/AIMDIG/FlexAttributeTemplate.xlsx])

CSV templates have a set of standard columns used to import data into AIAMFG. In addition to the standard columns, users can also import custom or organization specific attributes into AIAMFG using flex attributes. Use the flex attributes template to define and import the flex context and corresponding attributes before referencing the flex data in other data files.

Field Name	Required	Data Type	Length (Max)	Description	Sample Data
Entity	Y	Char	30	Name of the entity for which the flex attribute context is defined.	Lot, Serial, Equipment, Person, Work Order
FlexAttributesContext	Y	Char	30	An entity can have as much context as required. Each context provides a logical name for a set of attributes.	Lot Attributes, Electrical Parameters

Field Name	Required	Data Type	Length (Max)	Description	Sample Data
C_FlexAttribute1...15	-	Char	240	Fifteen attributes that can hold character values for the context. Users can choose to use a subset of the attributes or none of the attributes.	Length (mm), Voltage (V)
N_FlexAttribute1...15	Y	Number	240	Fifteen attributes that can hold numeric values for the context. Users can choose to use a subset of the attributes or none of the attributes.	Height (ft), Weight (kg)

Item (ItemTemplate.xlsx [https://www.oracle.com/webfolder/technetwork/mfg/AIMDIG/ItemTemplate.xlsx])

The Items data file contains definitions for inventory items, engineering items, and purchasing items. You can specify item-related information in fields such as Revision, Lot Control, and Serial Control, for example.

Field Name	Required	Data Type	Length (Max)	Description	Sample Data
SourceSystem		Char	100	Identifies the success or failure records uploaded from a specific source system.	SYS1
Organization Code	Y	Char	3	Short alphanumeric code of the organization to which the item belongs.	MD5, PD2
ItemName	Y	Char	40	Inventory item name.	G15-Pinion Gear, Strawberry Fruit
ItemDescription	Y	Char	240	Item description.	Helical - 40mm 46T, 8mm Bore
Category		Char	20	Item category.	Inventory
MakeorBuy		Char	1	Make or Buy	M, B
Revision	Y	Char	3	Revision of the item.	A, B, C
LotControl		Char	1	Flag indicating lot control allowed.	Y, N
SerialControl		Char	1	Flag indicating Serial Control allowed.	Y, N

Field Name	Required	Data Type	Length (Max)	Description	Sample Data
UnitOfMeasure	Y	Char	3	Item unit of measure.	Ea
FlexAttributesContext		Char	30	Flex attributes context code.	Item Attributes
C_FlexAttribute1...15		Char	150	Fifteen attributes than can hold character values for the context.	Expiration Date, Purchasable
N_FlexAttribute1...15		Number	240	Fifteen attributes that can hold numeric values for the context.	

Lot (LotAttributesTemplate.xlsx [https://www.oracle.com/webfolder/technetwork/mfg/AIMDIG/LotAttributesTemplate.xlsx])

A lot can represent a quantity of an item that shares the same specifications, one or more receipts from the same vendor, or characteristics you choose. You can divide each lot into child lots that reflect characteristics you choose for items within the lot. For example, you may divide an item lot from a vendor into child lots to reflect differences in quality specifications. When you allocate stock for production, you can allocate specific lots to a production batch based on the potency, age, or other item characteristics.

This data file contains the definitions for lot controlled items. For items under lot control, you must assign lot numbers to each receipt, and then reference these lots each time you perform material transactions. This enables you to maintain control over lot controlled items in inventory.

Field Name	Required	Data Type	Length (Max)	Description	Sample Data
SourceSystem		Char	100	Identifies the success or failure records uploaded from a specific source system.	INV
Organization Code	Y	Char	3	Short alphanumeric code of the organization.	MD5, PD2
ItemName	Y	Char	40	Name of the item.	G15-Pinion Gear, Sugar
LotNumber	Y	Char	80	Lot number to which the item belongs.	LTG15G01, LTSG0106
ParentLotNumber		Char	80	Parent lot number.	PLTSG001
Description		Char	256	Lot description.	Sugar from Crystals
ExpirationDate		Date		Expiration date. Format: (mm/dd/yyyy hh24:mi:ss)	01/01/2019 14:33:04
GradeCode		Char	150	Lot grade code.	L31
OriginationDate		Date		Origination date. Format: (mm/dd/yyyy hh24:mi:ss)	01/01/2019 14:33:04

Field Name	Required	Data Type	Length (Max)	Description	Sample Data
FlexAttributesContext		Char	30	Descriptive flex field context code.	Crystal Size
C_FlexAttribute1...15		Char	150	One of up to 15 flex field attributes.	Large
N_FlexAttribute1...15		Number		One of up to 15 flex field attributes.	

Serial (SerialAttributesTemplate.xlsx [https://www.oracle.com/webfolder/technetwork/mfg/AIMDIG/SerialAttributesTemplate.xlsx])

For items that are under serial number control, you must assign a unique serial number to each individual unit and reference the same serial number each time you perform a transaction on an individual unit. This enables you to have control over every unit of every serial-controlled item in your inventory. This data file contains serial number details for each item.

Field Name	Required	Data Type	Length (Max)	Description	Sample Data
SourceSystem		Char	100	Identifies the success or failure records uploaded from a specific source system.	INV
Organization Code	Y	Char	3	Short alphanumeric code of the organization to which the serial item belongs.	MD5

Field Name	Required	Data Type	Length (Max)	Description	Sample Data
ItemName	Y	Char	40	Name of the item.	G15-Gearbox
SerialNumber	Y	Char	30	Item serial number.	SNG15000001
Revision		Char	3	Revision of the item.	A
Description		Char	240	Description.	
LotNumber		Char	80	Lot number.	FGLT0001
OriginationDate		Date	Y	Origination date. Format: (mm/dd/yyyy hh24:mi:ss)	01/01/2019 14:33:04
Status		Char	80	Status	Defined
FlexAttributesContext		Char	30	Descriptive flex field context code.	GearRatio Torque
C_FlexAttribute1...15		Char	150	One of up to 15 flex field attributes.	5 to 1
N_FlexAttribute1...15		Number		One of up to 15 flex field attributes.	

Department (DepartmentTemplate.xlsx [https://www.oracle.com/webfolder/technetwork/mfg/AIMDIG/DepartmentTemplate.xlsx])

A department consists of one or more people, machines, or suppliers within your organization where you want to collect costs, apply overhead, and compare load to capacity. Assign a department to each operation in a routing and then assign resources available for that department.

Field Name	Required	Data Type	Length (Max)	Description	Sample Data
SourceSystem		Char	100	Identifies the success or failure records uploaded from a specific source system.	SYS1
Organization Code	Y	Char	3	Short alphanumeric code of the organization to which the item belongs.	DI1
DepartmentCode **Note:** This is an optional field for process organizations.	Y	Char	10	Short alphanumeric code of the Department to which the employee belongs.	Assembly
Description		Char	240	Description of the department.	Assembly Department

Person (PersonTemplate.xlsx [https://www.oracle.com/webfolder/technetwork/mfg/AIMDIG/PersonTemplate.xlsx])

This data file contains employee details of people working in the manufacturing process.

Field Name	Required	Data Type	Length (Max)	Description	Sample Data
SourceSystem		Char	100	Identifies the success or failure records uploaded from a specific source system.	WIP
Organization Code	Y	Char	3	Short alphanumeric code of the organization to which the person belongs.	MD5
DepartmentCode **Note:** This is an optional field for process organizations.		Char	10	Short alphanumeric code of the Department to which the employee belongs.	Assembly
PersonResourceCode	Y	Char	10	Short alphanumeric code of the person.	ASSEMBLER
PersonFullName	Y	Char	240	Employee's full name.	Hammond John
Employee Number	Y	Char	30	Employee number.	2725

Field Name	Required	Data Type	Length (Max)	Description	Sample Data
StartDate	Y	Date		Employee start date. Format: (mm/dd/yyyy hh24:mi:ss)	01/01/2019 14:33:04
EndDate		Date		Employee end date. Format: (mm/dd/yyyy hh24:mi:ss)	01/01/2019 14:33:04
Email		Char	240	Email ID of the person.	John.Hammond@abc.com
FlexAttributesContext		Char	30	Descriptive flex field context code.	Employee Attributes
C_FlexAttribute1...15		Char	150	One of up to 15 flex field attributes.	Operator Shop Floor
N_FlexAttribute1...15		Number		One of up to 15 flex field attributes.	

Quality Result (QualityResultsTemplate.xlsx [https://www.oracle.com/webfolder/technetwork/mfg/AIMDIG/QualityResultsTemplate.xlsx])

The quality results data file contains definitions for inspection quality test results. Along with the test results, the template also contains information about the item, operation, serial number, test date, and so on. For items under serial number control, you must assign a unique serial number to each individual item and reference the same serial number each time you perform a transaction on an individual item. This enables you to have control over every serial numbered item in your inventory. This data file contains serial number details for each item.

Field Name	Required	Data Type	Length (Max)	Description	Sample Data
SourceSystem		Char	100	Identifies the success or failure records uploaded from a specific source system.	EBSOPM
Source System Result ID		Number		Stores reference information that links quality results in AIAMFG to the quality source system.	96117
Organization Code	Y	Char	3	Short alphanumeric code of the organization to which the quality result for an item belongs.	PD2
Sample		Char	240	Sample name.	SAMPLE230531-1600039
ItemName	Y	Char	240	Name of the item.	Strawberry Fruit
LotNumber		Char	80	Lot number of the item.	LI-230167-1600039-1
WorkOrder		Char	240	Work order number.	WO-PG-7812
SerialNumber		Char	30	Item serial number.	SNG16000607

Field Name	Required	Data Type	Length (Max)	Description	Sample Data
Operation		Number		Operation sequence.	10
SampleDataDrawn		Date		Sample date drawn (mm/dd/yyyy hh24:mi:ss)	01/01/2018 08:00:00
Tester		Char	240	Name of the tester.	
TestName	Y	Char	240	Quality test name.	Soluble Solids%
TestResultValue	Y	Char	240	Quality test result value.	67
TestResultDate	Y	Date		Quality test result date (mm/dd/yyyy hh24:mi:ss)	11/16/2017 08:00:00
SpecMinValue		Number		Test specification minimum value.	65
SpecTargetValue		Number		Test specification target value.	68
SpecMaxValue		Number		Test specification maximum value.	70
InspectionResult		Char	240	Results of the inspection.	Accept, Reject
Disposition		Char	240	Disposition	Accept with Variance

Quality Test (QualityTestsTemplate.xlsx [https://www.oracle.com/webfolder/technetwork/mfg/AIMDIG/QualityTestsTemplate.xlsx])

The quality test data file contains the definition of each test, including information such as test name and test method.

Field Name	Required	Data Type	Length (Max)	Description	Sample Data
SourceSystem		Char	100	Identifies the success or failure records uploaded from a specific source system.	LIMS
SourceType	Y	Char	30	Identifies the source as either a discrete or process manufacturing organization.	Discrete, Process
TestName	Y	Char	240	Quality test name.	Noise level
TestDataType	Y	Char	15	Identifies the test results as either alphanumerical or numerical.	Numerical
TestDescription		Char	240	Quality test description.	Noise Level
TestType		Char	30	The type of quality parameter tested.	ATTRIBUTE

Field Name	Required	Data Type	Length (Max)	Description	Sample Data
TestMethod		Char	30	Quality test method	FLAME PHOTOMETRY
UnitOfMeasure		Char	5	Quality parameter unit of measure.	mg%

Receipts (ReceiptTemplate.xlsx [https://www.oracle.com/webfolder/technetwork/mfg/AIMDIG/ReceiptTemplate.xlsx])

A receipt provides information about the items received, such as the supplier, purchase order, item, lot, serial number, quantity, and more.

This data file contains the receipt information for each purchase order line number, as well as the lot and serial number range, if applicable.

Field Name	Required	Data Type	Length (Max)	Description	Sample Data
SourceSystem		Char	100	Identifies the success or failure records uploaded from a specific source system.	PROC
TransactionType	Y	Char	10	Type of transaction, either receipt or return.	Receipt
ReceivingType	Y	Char	10	Type of receipt, such as external or transfer.	External

Field Name	Required	Data Type	Length (Max)	Description	Sample Data
Supplier	Y	Char	240	Supplier name.	ABC Suppliers
SupplierSite		Char	15	Supplier site.	Site_132197
SupplierContact		Char	32	Supplier contact name.	Steve Johnson
PONumber	Y	Char	20	Purchase order number.	PO-6058
LineNumber		Number		Purchase order line number.	1
SourceOrganizationCode	Y	Char	3	Source organization code for an internal transfer purchase order.	MD5
DestinationOrganizationCode	Y	Char	3	Organization code for the receiving organization.	M1
ItemName	Y	Char	40	Item name.	Strawberry Fruit
Revision		Char	3	Item revision.	A
LotNumber		Char	80	Item lot number.	LTG15MM01
SerialNumberFrom		Char	30	Start of a serial number range.	SL-G15GB-0012

Field Name	Required	Data Type	Length (Max)	Description	Sample Data
SerialNumberTo		Char	30	End of a serial number range.	SL-G15GB-0014
TransactionDate		Date		Transaction date (mm/dd/yyyy hh24:mi:ss).	04/13/2020 15:45:10
TransactionQuantity	Y	Number		Transaction quantity	10

Shipping (ShipmentTemplate.xlsx [https://www.oracle.com/webfolder/technetwork/mfg/AIMDIG/ShipmentTemplate.xlsx])

This data file contains shipping transaction details.

Field Name	Required	Data Type	Length (Max)	Description	Sample Data
SourceSystem		Char	100	Identifies the success or failure records uploaded from a specific source system.	OM
TransactionType	Y	Char	10	Transaction type.	Return, Ship
Customer	Y	Char	240	Customer name.	Bigmart
CustomerContact		Char	15 for first name, 15 for last name.	Customer contact name entered in the format of FirstName, LastName.	David, Cooper

Field Name	Required	Data Type	Length (Max)	Description	Sample Data
OrderNumber	Y	Number		Order number.	153150
LineNumber		Number		Order line number.	1
OrganizationCode	Y	Char	3	Short alphanumeric code of the organization to which the sales order belongs.	PD2
ItemName	Y	Char	40	Name of the item.	SB Jam Case
Revision		Char	3	Revision of the item.	A
LotNumber		Char	80	Lot number.	LTP-2233162-1
SerialNumberFrom		Char	30	Serial number at the beginning of the item range.	SL-G15GB-0012
SerialNumberTo		Char	30	Serial number at the end of the item range.	SL-G15GB-0015
TransactionDate	Y	Date		Transaction date (mm/dd/yyyy hh24:mi:ss).	01/01/2018
TransactionQuantity	Y	Number		Transaction Quantity	1

Data Used by Discrete Manufacturing Organizations (Discrete)

Equipment (DiscreteEquipmentTemplate.xlsx [https://www.oracle.com/webfolder/technetwork/mfg/AIMDIG/DiscreteEquipmentTemplate.xlsx])

The Equipment entity provides information about equipment instances used in the manufacturing process.

Field Name	Required	Data Type	Length (Max)	Description	Sample Data
SourceSystem		Char	100	Identifies the success or failure records uploaded from a specific source system.	SYS1
Organization Code	Y	Char	3	Short alphanumeric code of the organization to which the Equipment belongs.	DI1
DepartmentCode	Y	Char	10	Department code.	DI_DEPT
Equipment	Y	Char	10	Equipment name.	MCH_RSRC
EquipmentInstance	Y	Char	40	Equipment instance.	DRILL_1
EquipmentSerialNumber	Y	Char	30	Equipment serial number.	SER_001
FlexAttributesContext		Char	30	Flex attributes context.	Physical Attributes

Field Name	Required	Data Type	Length (Max)	Description	Sample Data
C_FlexAttribute1...15		Char	150	Up to 15 character-based flex attributes.	10
N_FlexAttribute1...15		Number		Up to 15 number-based flex attributes.	

Bill of Materials (BOMTemplate.xlsx [https://www.oracle.com/webfolder/technetwork/mfg/AIMDIG/BOMTemplate.xlsx])

A bill of materials identifies the list of components and assemblies and the quantity of each needed to manufacture an end part. This data file provides the information necessary to create new and update existing bills of materials.

Field Name	Required	Data Type	Length (Max)	Description	Sample Data
SourceSystem		Char	100	Identifies the success or failure records uploaded from a specific source system.	SYS1
Organization Code	Y	Char	3	Short alphanumeric code of the organization to which the BOM belongs.	DI1
Assembly	Y	Char	40	Assembly name.	ASSEMBLY_1
Revision	Y	Char	3	Assembly revision.	A

Field Name	Required	Data Type	Length (Max)	Description	Sample Data
Alternate		Char	10		
Operation	Y	Number		Operation number.	10
Component	Y	Char	40	Component name.	COMPONENT_1
SubstituteComponent		Char	40	Name of the substitute component.	
Quantity	Y	Number		Component quantity used in the assembly.	100
EffectiveDate	Y	Date		Date the BOM became effective (mm/dd/yyyy hh24:mi:ss).	01/01/2001 10:00:00
DisableDate		Date		Date to disable the BOM (mm/dd/yyyy hh24:mi:ss).	01/01/2020 10:00:00

Routing (DiscreteRoutingTemplate.xlsx [https://www.oracle.com/webfolder/technetwork/mfg/AIMDIG/DiscreteRoutingTemplate.xlsx])

A Routing consists of the operations and resources used to assemble an item. This data file provides the information necessary to create new routings.

Field Name	Required	Data Type	Length (Max)	Description	Sample Data
SourceSystem		Char	100	Identifies the success or failure records uploaded from a specific source system.	INV
Organization Code	Y	Char	3	Short alphanumeric code of the organization to which the routing belongs.	MD5
Assembly	Y	Char	240	Assembly name.	G15-Gearbox
Revision	Y	Char	3	Assembly revision.	A
AlternateRouting		Char	10	Alternate routing name.	
Operation	Y	Number		Operation number.	10
StandardOperationCode	Y	Char	4	Standard operation code.	SAY
OperationDescription		Char	240	Operation description.	Sub assembly
EffectiveDate	Y	Date		Date the routing became effective (mm/dd/yyyy hh24:mi:ss).	01/01/2015 12:00:00

Field Name	Required	Data Type	Length (Max)	Description	Sample Data
DisableDate		Date		Date the routing is disabled.	01/01/2020 12:00:00
Department	Y	Char	10	Department name.	Assembly
SerializationStartOperation		Number		The operation when serialization begins.	10
ResourceType		Char	10	Type of resource.	Person
ResourceCode		Char	10	Resource code.	ASSEMBLER
Usage	Y	Number		Resource usage (in hours).	2
Alternate		Char	10	Alternate resource code.	

Discrete Work Order (WorkOrderTemplate.xlsx [https://www.oracle.com/webfolder/technetwork/mfg/AIMDIG/WorkOrderTemplate.xlsx])

The Work Order entity encapsulates the manufacturing process on the shop floor by tracking the item, quantity manufactured, routing steps, material consumption, equipment, operators, scrap generated and exceptions reported in the manufacturing process.

Field Name	Required	Data Type	Length (Max)	Description	Sample Data
SourceSystem	-	Char	100	Identifies the success or failure records uploaded from a specific source system.	MES
RecordType	Y	Char	30	Transaction record type.	Assembly
TransactionType	Y	Char	20	Transaction type.	Summary
TransactionDate	-	Date	-	Transaction date, mm/dd/yyyy hh24:mi:ss.	09/14/2018 13:10:12
Organization Code	Y	Char	3	Short alphanumeric code of the organization to which the work order belongs.	MD5
AssemblySerialNumber	Y	Char	30	Serial Number for the assembly.	SNG15000608
WorkOrder	Y	Char	240	Work order number.	WO-PG-8813
Operation	Y	Number	-	Operation.	10
EntityName	Y	Char	40	Name associated with the transaction record type.	3DP

Field Name	Required	Data Type	Length (Max)	Description	Sample Data
Revision	Y	Char	3	Item revision.	A
EntityDescription	-	Char	240	Description of entity value associated with the transaction record type.	3D Printing
ExceptionNumber	-	Number	-	Exception Number	102200
EntityDetail	-	Char	71	Description of entity.	Machining
PlanQuantity	Y	Number	-	Planned transaction quantity.	10
ActualQuantity	-	Number	-	Actual transaction quantity.	11
ScrapQuantity	-	Number	-	Quantity scrapped.	2
ReworkedQuantity	-	Number	-	Quantity reworked.	3
Yield	-	Number	-	Yield.	100
TransactionQuantity	-	Number	-	Transaction quantity.	10
ScheduledStartDate	Y	Date	-	Scheduled work order start date (mm/dd/yyyy hh24:mi:ss).	07/20/2017 13:00:00

Field Name	Required	Data Type	Length (Max)	Description	Sample Data
ScheduledCompletionDate	-	Date	-	Scheduled work order completion date (mm/dd/yyyy hh24:mi:ss).	07/20/2017 17:00:00
ActualStartDate	-	Date	-	Actual work order start date (mm/dd/yyyy hh24:mi:ss).	07/20/2017 13:00:00
ActualCompletionDate	-	Date	-	Actual work order completion date (mm/dd/yyyy hh24:mi:ss).	07/20/2017 17:00:00
LotNumber	-	Char	80	Component lot number	LTG15G003219
SerialNumberFrom	-	Char	30	Starting serial number in a series.	SNG15000608
SerialNumberTo	-	Char	80	Ending serial number in a series.	SNG15000613
FlexAttributesContext	-	Char	30		
C_FlexAttribute1...15	-	Char	150		
N_FlexAttribute1...15	-	Number	-		

Data Used by Process Manufacturing Organizations (Process)

Equipment (ProcessEquipmentTemplate.xlsx [https://www.oracle.com/webfolder/technetwork/mfg/AIMDIG/ProcessEquipmentTemplate.xlsx])

Equipment includes the assets used to produce batches. This data file provides the details of each equipment instance, such as equipment name, instance number, serial number, minimum and maximum capacity, capacity UOM, and parameter details.

Field Name	Required?	Data Type	Length (Max)	Description	Sample Data
SourceSystem	N	Char	100	Identifies the success or failure records uploaded from a specific source system.	OPM
Organization Code	Y	Char	3	Short alphanumeric code of the organization/ plant to which the equipment belongs.	PD2
Equipment	Y	Char	16	Name of the equipment.	OVEN
EquipmentUsageUOM	Y	Char	3	Unit of measure for equipment usage.	HR
EquipmentInstance	N	Number		Equipment instance number.	1
EquipmentSerialNumber	N	Char	30	Equipment serial number.	OV01

Field Name	Required?	Data Type	Length (Max)	Description	Sample Data
MinCapacity	N	Number		Minimum equipment capacity.	0
MaxCapacity	N	Number		Maximum equipment capacity.	1000
IdealCapacity	N	Number		Ideal equipment capacity.	600
CapacityUOM	N	Char	4	Unit of measure for capacity.	LB
PlanningCost	N	Number		Nominal cost.	10
ParameterName	N	Char	40	Process parameter name.	Temperature
ParameterType	N	Char	3	Type of parameter. (N= Numeric; L= List of Values)	N
TargetValue	N	Char	16	Target value for equipment parameter.	10
MinValue	Y	Number		Minimum value.	0
MaxValue	Y	Number		Maximum value.	100
ParameterUOM	Y	Char	25	Unit of measure for the parameter.	F

Operation (ProcessOperationTemplate.xlsx [https://www.oracle.com/webfolder/technetwork/mfg/AIMDIG/ProcessOperationTemplate.xlsx])

An operation combines one or more activities performed in a production batch and the resources used to perform those activities. This data file contains operation details, such as operation name, version, unit of measure, and activity.

Field Name	Required	Primary Key	Update Allowed	Data Type	Length (Max)	Description	Sample Data
SourceSystem				Char	100	Identifies the success or failure records uploaded from a specific source system.	OPM-GMD
OrganizationCode	Y	N	N	Char	3	Short alphanumeric code of the organization to which the BOM belongs.	PD2
Operation	Y	Y	N	Char	16	Name of the operation.	SJ-PACK
OperationVersion	Y	Y	N	Number	5	Version of the operation.	1
UOM	Y	N	Y	Char	4	Unit of measure for the process quantity.	EA

Field Name	Required	Primary Key	Update Allowed	Data Type	Length (Max)	Description	Sample Data
Activity	Y	N	N	Char	16	Name of the activity associated to the operation.	RUN-TIME
Equipment	Y	N	N	Char	16	Name of the equipment associated with the activity of the operation.	JJ-BOX-PACK

Formula (FormulaTemplate.xlsx [https://www.oracle.com/webfolder/technetwork/mfg/AIMDIG/FormulaTemplate.xlsx])

This data file contains item details that explain each item's contribution to the formula yield as ingredients or as a product.

Field Name	Required	Data Type	Length (Max)	Description	Sample Data
SourceSystem	N	Char	100	Identifies the success or failure records uploaded from a specific source system.	OPM-GMD

Field Name	Required	Data Type	Length (Max)	Description	Sample Data
Organization Code	Y	Char	3	Short alphanumeric code of the organization to which the formula belongs.	PD2
Formula	Y	Char	32	Name of the formula.	STRAWBERRY JAM
FormulaVersion	Y	Number	5	Version of the formula.	1
FormulaItemType	Y	Char	10	Type of formula line item. Valid values are: Ingredient, Product, Co-Product, By-Product.	Ingredient
ItemName	Y	Char	240	Item name for the formula line item.	Strawberry Jam
ContributeToYield	N	Char	1	Indicates if the item contributes to yield. If the item is a packaging item, then the item cannot contribute to yield and the value is N, for No. Valid values are Y or N.	Y

Routing (ProcessRoutingTemplate.xlsx [https://www.oracle.

com/webfolder/technetwork/mfg/AIMDIG/ProcessRoutingTemplate.xlsx])

A routing defines the step-by-step operations you perform to manufacture a product. Each routing can have any number of operations, and provides the relationship between operations.

> **Additional Information:** The **Required?** column refers to whether the field is required for a step and/or a step dependency. The **Sample Data** column provides sample data for a step, step dependency, or both.

Field Name	Required?	Data Type	Length (Max)	Description	Sample Data
SourceSystem	No for both.	Char	100	Identifies the success or failure records uploaded from a specific source system.	OPM-GMD
Organization Code	Yes for both.	Char	3	Short alphanumeric code of the organization to which the routing belongs.	PD2
Routing	Yes for both.	Char	32	Name of the routing.	STRAWBERRY JAM
RoutingVersion	Yes for both.	Number	5	Version of the routing.	1
EntityType	Yes for both.	Char	14	Valid entity types include: Step, StepDependency.	Step, StepDependency
Step	Yes for both.	Number	5	Step number.	10

Field Name	Required?	Data Type	Length (Max)	Description	Sample Data
Operation	Yes for step, No for step dependency.	Char	16	Operation code.	STEAM
OperationVersion	Yes for step, No for step dependency.	Number		Version of the operation.	1
StepQuantity	Yes for step, No for step dependency.	Number	5	Quantity processed during the step.	550
PreviousStep	No for step, Yes for step dependency.	Number		Previous step number.	10
DependencyType	No for step, Yes for step dependency.	Char	240	Type of dependency. Valid values are Finish-to-Start and Start-to-Start.	Finish-to-Start
StandardDelay	No for both.	Number		Standard delay for a step dependency.	0
MaxDelay	No for both.	Number		Maximum delay for a step dependency.	100

Recipe (RecipeTemplate.xlsx [https://www.oracle.com/webfolder/technetwork/mfg/AIMDIG/RecipeTemplate.xlsx])

Recipes standardize the structure of all information that describes production of one or more products. Recipes have:

1. Formulas that define the relationship of material resources, including products, ingredients, and byproducts.
2. Routings that define the relationship of non material resources, including

equipment operations with activities and associated resources. Routings are optional.

Additional Information: The **Required?** column refers to whether the field is required for a recipe and/or a step material association. The **Sample Data** column provides sample data for a recipe, step material association, or both.

Field Name	Required?	Data Type	Length (Max)	Description	Sample Data
SourceSystem	No for both.	Char	100	Identifies the success or failure records uploaded from a specific source system.	OPM-GMD
Organization Code	Yes for both.	Char	3	Short alphanumeric code of the organization to which the recipe belongs.	PD2
Entity Type	Yes for both.	Char	30	Valid entity types include: Recipe, StepMaterial Association.	Recipe, StepMaterial Association
Recipe	Yes for both.	Char	32	Name of the recipe.	STRAWBERRY JAR
RecipeVersion	Yes for both.	Number	5	Version of the recipe.	1
Formula	Yes for both.	Char	32	Name of the formula used in the recipe.	STRAWBERRY JAR

Field Name	Required?	Data Type	Length (Max)	Description	Sample Data
FormulaVersion	Yes for recipe, No for SMA.	Number		Version of the formula used in the recipe.	1
Routing	Yes for recipe, No for SMA.	Char	32	Name of the routing used in the recipe.	STRAWBERRY JAR
RoutingVersion	Yes for recipe, No for SMA.	Number	5	Version of the routing used in the recipe.	
RoutingStep	No for recipe, Yes for SMA.	Number	5	Routing step associated with the formula item.	30
FormulaItem	No for recipe, Yes for SMA.	Char	240	Formula item associated with the routing step.	Strawberry Jam
FormulaItemType	No for recipe, Yes for SMA.	Char	10	Item type of the formula item associated with the routing step. Valid values include: Ingredient, Product, Co-Product, By-Product.	Product
Product	Yes for recipe, No for SMA.	Char	240	Product for which to make the validity rule.	SB Jam Case

Batch (ProcessWorkOrderTemplate.xlsx [https://www.oracle.com/webfolder/technetwork/mfg/AIMDIG/ProcessWorkOrderTemplate.xlsx])

This data file contains the list of work orders (batches) submitted. It contains details such as the recipe, operations, activities, equipment, items, quantity produced, and scheduled and actual dates.

Additional Information: In the **Required?** column, the following entity type acronyms indicate that the field is required for the entity type.

- B = Batch
- BOH = Batch on Hold
- S = Step
- A = Activity
- E = Equipment
- M = Material
- SD = Step Dependency
- P = Parameter

Field Name	Required?	Data Type	Length (Max)	Description	Sample Data
SourceSystem		Char	100	Identifies the success or failure records uploaded from a specific source system.	MES
Organization Code		Char	3	Short alphanumeric code of the organization to which the formula belongs.	PD2

Field Name	Required?	Data Type	Length (Max)	Description	Sample Data
Recipe	B	Char	32	Recipe name. Along with Recipe version, part of the Alternate Key for the recipe.	STRAWBERRY JAM
RecipeVersion	B	Number	5	Recipe version. Along with Recipe name, part of the Alternate Key for the recipe.	1
EntityType	B, BOH, S, A, E, M, SD, P	Char	20	Valid Entity Types: Batch, Batch on Hold, Step, Activity, Equipment, Material, Step Dependency, Parameter.	Batch
Batch	B, BOH, S, A, E, M, SD, P	Char	32	Batch name.	WO-SBJ-230167
Step	S, A, E, M, SD, P	Number		Step number.	10
OperationCode	S	Char	16	Operation code.	STEAM
OperationVersion	S	Number		Version of the operation.	1
Activity	A, E, P	Char	16	Activity.	RUN-TIME
Equipment	E, P	Char	16	Name of the equipment.	OVEN

Field Name	Required?	Data Type	Length (Max)	Description	Sample Data
ParameterName	P	Char	40	Parameter name.	Temperature
LineType	M	Char	10	Valid line types: Ingredient, Product, By-Product.	Ingredient
ItemName	M	Char	40	Name of the item.	Purified Water
ScheduleStartDate	B, S, A, E	Date		Batch scheduled start date (mm/dd/yyyy hh24:mi:ss).	01/22/2018 04:00:00
ScheduleEndDate	B, S, A, E	Date		Batch scheduled end date (mm/dd/yyyy hh24:mi:ss).	01/25/2018 04:00:00
ActualStartDate		Date		Batch actual start date (mm/dd/yyyy hh24:mi:ss).	01/22/2018 04:00:00
ActualEndDate		Date		Batch actual end date (mm/dd/yyyy hh24:mi:ss).	01/25/2018 04:00:00
CloseDate		Date		Batch close date (mm/dd/yyyy hh24:mi:ss).	01/25/2018 04:00:00
PlannedQuantity	S, M	Number		Step/resource planned quantity.	550

Field Name	Required?	Data Type	Length (Max)	Description	Sample Data
ActualQuantity		Number		Step/resource actual quantity.	548
PlannedActivityFactor	A	Number		Planned activity factor.	1
ActualActivityFactor		Number		Actual activity factor.	1
EquipmentType	E	Char	10	Resource type for the activity. Valid values are: Primary, Secondary, Aux.	Primary
PlannedUsage		Number		Resource planned usage.	0.083333333
Yield		Number		Batch/step yield.	100
TerminateFlag		Char	1	Batch terminate flag.	
PreviousStep	SD	Number		Previous step number for step dependency.	10
Dependency Type	SD	Char	15	Step dependency types: start-to-start, finish-to-start.	FINISH-TO-START

Field Name	Required?	Data Type	Length (Max)	Description	Sample Data
ActualValue	P	Number		Parameter actual value.	
TargetValue	P	Number		Parameter target value	35
MinValue	P	Number		Parameter minimum value	50
MaxValue	P	Number		Parameter maximum value	150

Batch Transaction (ProcessWorkorderTransactionTemplate.xlsx [https://www.oracle.com/webfolder/technetwork/mfg/AIMDIG/ProcessWorkorderTransactionTemplate.xlsx])

This data file contains the list of material and equipment transactions related to the work order (batch).

Additional Information: In the **Required?** column, the following entity type acronyms indicate that the field is required for the entity type.

- MT = Material Transaction
- ET = Equipment Transaction
- E= Exception

Field Name	Required?	Data Type	Length (Max)	Description	Sample Data
SourceSystem		Char	100	Identifies the success or failure records uploaded from a specific source system.	MES

Field Name	Required?	Data Type	Length (Max)	Description	Sample Data
Organization Code	MT, ET, E	Char	3	Short alphanumeric code of the organization to which the formula belongs.	PD2
EntityType	MT, ET, E	Char	25	Valid entity types: MaterialTransaction, EquipmentTransaction, Exception.	MaterialTransaction
EntityName	MT, ET, E	Char	10	Depending on the entity type, the entity name is an item name, equipment name, or exception number.	Strawberry Fruit

Field Name	Required?	Data Type	Length (Max)	Description	Sample Data
TransactionType	MT, ET, E	Char	20	Valid values for material transactions: IngredientIssue, IngredientReturn, ProductCompletion, ProductReturn, ByProductCompletion, ByProductReturn Valid values for equipment transactions: PlannedTransaction, ActualTransaction Valid values for exceptions: Other, Quality, Equipment, Product, Ingredient	IngredientIssue
Batch	MT, ET, E	Char	32	Batch number.	WO-SBJ-230167
Step	MT, ET, E	Number		Batch step.	10
Activity	ET	Char	16	Activity	RUN-TIME
EquipmentInstance	ET	Number		Equipment instance.	1

Field Name	Required?	Data Type	Length (Max)	Description	Sample Data
TransactionQuantity	MT, ET	Number		Either batch transaction quantity or equipment usage (mm/dd/yyyy hh24:mi:ss).	500
StartDate	MT, ET, E	Date		Either batch transaction date, equipment start time, or reported date (mm/dd/yyyy hh24:mi:ss).	06/01/2017 04:00:00
EndDate		Date		Either batch end date, equipment end time, or resolved date (mm/dd/yyyy hh24:mi:ss).	06/03/2017 04:00:00
LotNumber	MT	Char	80	Lot number.	LI-230167-1600039-1
ExceptionEntityName	E	Char	240	Equipment name, product name, or ingredient name.	Pectin
ExceptionEntityDetail	E	Char	240	Resource Name: Instance Number (Resource)	

Using Data Pump and GoldenGate to Ingest EBS Data

An out of the box integration is provided between Oracle E-Business Suite and Oracle

Adaptive Intelligent Apps for Manufacturing through Oracle Data Pump and GoldenGate Synchronization. You can also choose to import E-Business Suite data through Business Entity Data files, but it is recommended to use the built-in integrations.

Oracle Data Pump performs the initial load of data from E-Business Suite to Adaptive Intelligent Apps for Manufacturingg, after which the GoldenGate solution synchronizes data from E-Business Suite to Adaptive Intelligent Apps for Manufacturing in near real time. Oracle GoldenGate is a replication software that provides real time capture, routing, and delivery of data across heterogenous databases.

Performing Initial Data Load with Oracle Data Pump:

1. Export:

   Data Pump Export is a utility for unloading data and metadata into a set of operating system files called a dump file set.

   The dump file set is made up of one or more disk files that contain table data, database object metadata, and control information. The files are written in a proprietary, binary format.

   Oracle Adaptive Intelligent Apps for Manufacturing uses Oracle Data Pump Export utility to extract data for the initial load from the source database to the target database. You will need to run the automated script and upload dump files to Oracle Cloud by working with Oracle Cloud Operations.

2. Import:

   Data Pump Import is a utility for loading an export dump file set into a target system. During an import operation, the Data Pump Import utility uses these dump files to locate each database object in the dump file set. Oracle Cloud Operations takes the data pump file set provided by the customer and uploads it to the Oracle Adaptive Intelligent Applications for Manufacturing.

Synchronizing Data with Oracle GoldenGate :

1. Export:

   The Extract process runs on the source system and is the extraction (capture) mechanism of Oracle GoldenGate .

   Extract captures the Data Manipulation Language(DML) and Data Definition Language(DDL) operations that are performed on objects in the source E-Business Database. Extract stores these operations until it receives commit records or rollbacks for the transactions that contain them. When a rollback is received, Extract discards the operations for that transaction. When a commit is received, Extract persists the transaction to disks in a series of files called a trail, where it is queued for propagation to the target system. All the operations in each transaction are written to the trail as a sequentially organized transaction unit.

2. Data Pump:

   Data pump reads the trail created in the Extract and sends them over the network to a remote trail on the target, in this case Adaptive Intelligent Apps for Manufacturing. The data pump adds storage flexibility and serves to isolate the primary Extract process from TCP/IP activity.

3. Replicat:

   The Replicat process runs on the target system, reads the trail on that system, and then reconstructs the DML or DDL operations and applies them to the target database.

Enabling Data Pump and GoldenGate :

1. Begin by logging a service request with Oracle Cloud Operations team to enable Data Pump and GoldenGate from your Source E-Business Suite Database to Oracle Adaptive Intelligent Apps for Manufacturing Cloud Service.

2. The Oracle Cloud Operations team will then provide a set of instructions and scripts to:

   - Create Data Pump Files.
   - Steps to upload them in Oracle Cloud.
   - Steps to deploy GoldenGate Source Database artifacts.

4

Importing Sensor Devices Data

Overview of Importing Sensor Devices Data

The two type of sensor data collected from shop floor devices are:

- Stream Data
- Alert/Event Data

Stream Data includes values for parameters like, for example, temperature, pressure, vibration, cutting speed, spindle RPM, and so on.

Alert/Event Data includes the following alert type information:

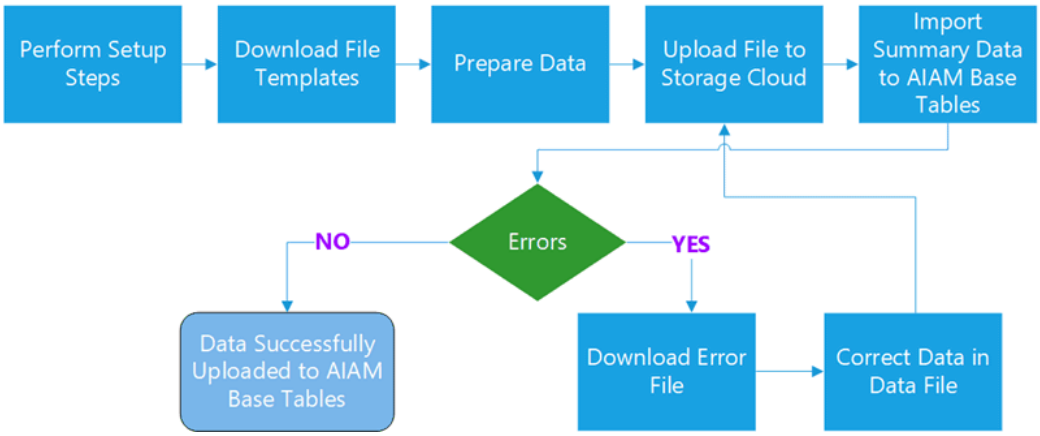
- Machine Status such as up, down, idle, or in-use.
- Job Status such as started, paused, resumed or completed.
- Pattern Match.
- Threshold Violations.
- Door State such as open or closed.
- Power State such as up or down.

You can use specific templates provided by the application to capture stream data and alert data which can be then uploaded for data contextualization.

Oracle partners can help users to configure machine data acquisition systems, such as Supervisory Control and Data Acquisition (SCADA), Distributed Control Systems (DCS) and other gateway device systems, to extract machine sensor data in the CSV file format. Users can then upload these sensor data files into Oracle Adaptive Intelligent Apps for Manufacturing in batch mode. The application processes the sensor stream data and alert data, contextualizes it with equipment and work order information, and

summarizes the contextualized data for analysis.

Sensor Devices Data Import Steps



1. Define setups. For example: define sensor device mappings.
2. Download the sensor devices data file template, either for alert or stream data.
3. Prepare or enter the data into the CSV file following the template guidelines.
4. Submit the file for upload to Oracle Storage Cloud Service.
5. Run the data import program to import data into the target base tables.
6. If errors occur, download the error file, correct the data, remove the error message columns, save the error file as a new CSV file, and then upload the file again.
7. After a successful import, the summarized data/features are imported into the AIAMFG base tables.

In addition to completing the setup steps described in Setting Up Data Ingestion, you must also create and map sensor devices.

To map sensor devices using the user interface see: Setting Up Sensor Device Data Mappings, page 4-2.

To import mappings using spreadsheet templates see: Uploading CSV Files Using the Sensor Devices Data User Interface, page 4-16.

Setting Up Sensor Devices Mappings

The first step to acquire sensor data is to define the sensor devices in the application. If the sensor devices are already defined in the application, this step can be skipped.

Sensor Devices mapping can be defined by entering the sensor device IDs and sensor

attributes such as manufacturer, model number, and serial number. The sensor devices are then mapped to the ERP equipment and equipment instance.

The data collected from these sensor devices is contextualized with the Enterprise Resource Planning (ERP) data. You can set the contextualization rules and priority for equipment and work context (and serial context for discrete serialized manufacturing organizations) You can also enter stream parameter name derived from IoT systems and select the corresponding equipment parameter from ERP for process manufacturing organizations, or enter equipment parameter for discrete manufacturing organizations along with the parameter unit of measure. The pages in the application display the equipment parameter name.

When you map a sensor device, you can select a time series feature set you have defined for either production analysis usage or machine event analysis usage. When the data set request runs, the program extracts features from the time series data based on feature set selected for production analysis usage. You can also specify stream interval for processing event data. The specified stream sample interval splits the records as separate time series data and applies the event identification processing based on feature set selected for machine event analysis usage. Oracle Adaptive Intelligent Apps for Manufacturing provides a user interface to map sensor devices, as well as specific templates for capturing stream data and alert data, to which you can then add sensor data information and then upload the files.

Creating and Mapping Sensor Device Data:

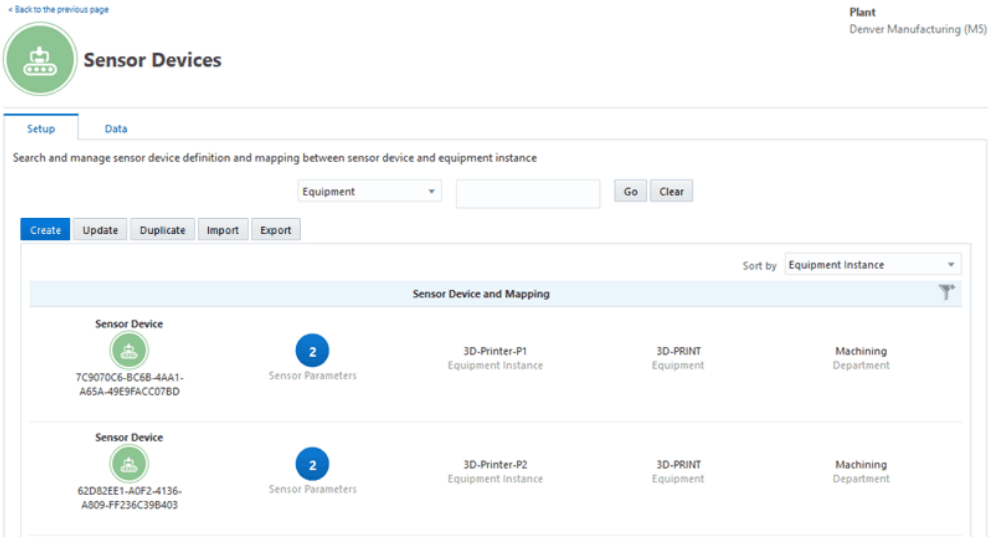
Use the Setup tab in the Sensor Devices page to:

- View existing sensor device mappings.
- Create a new sensor device mapping.
- Update an existing sensor device mapping.
- Duplicate an existing sensor device mapping.
- Import sensor device mapping definitions using CSV files.
- Export existing sensor device mappings in CSV files.

To view a sensor device mapping

1. Navigate to the Sensor Devices page.

   From the Home Page, click **Insights** or **Predictions**, then click the **Configuration** link, and then **Sensor Devices**. You can also from the Home page, click **Setup** and then **Sensor Devices**.



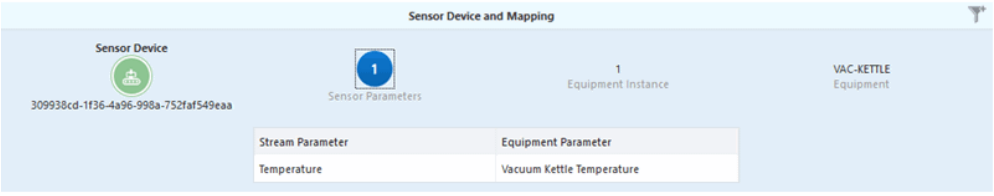
2. Use the Setup tab in the Sensor Devices page to view details like sensor device name, and number of sensor parameters for process manufacturing or discrete manufacturing depending on the organization you have selected. You can search for and view sensor device definitions and mappings using the following criteria:

   - Equipment
   - Equipment Instance
   - Sensor Device ID
   - Equipment Parameter

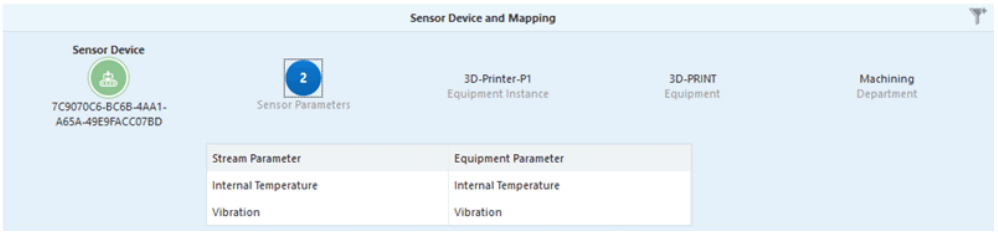
   Select a search criteria and click **Go**.

3. From the Sensor Device and Mapping table, select a sensor device mapping and click **Sensor Parameters** to view names of stream parameters and the equipment parameter names they have been mapped to.

   For process manufacturing organizations you can view equipment instance and equipment.



   For discrete manufacturing organizations you can view equipment instance, equipment and department.

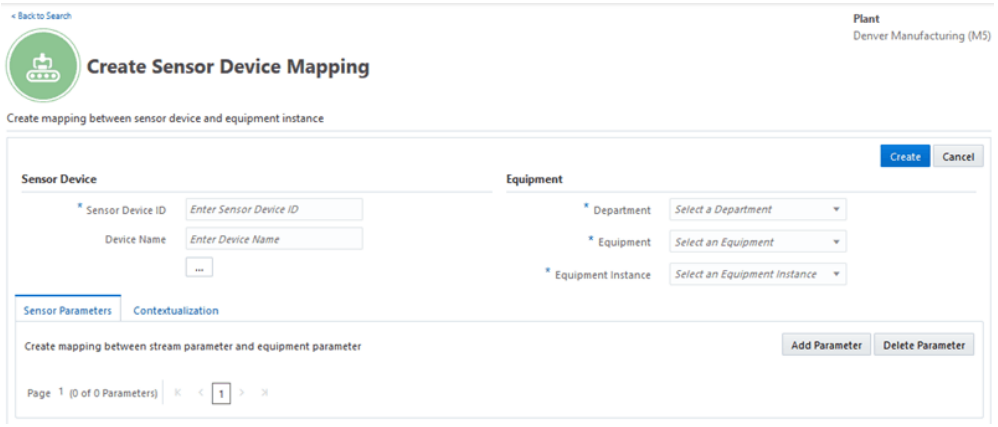


To create a sensor device mapping

1. Navigate to the Create Sensor Device Mapping page.

   Use the Setup tab in the Sensor Devices page to create a sensor mapping.

   Click **Create**.



Map Sensor Device ID

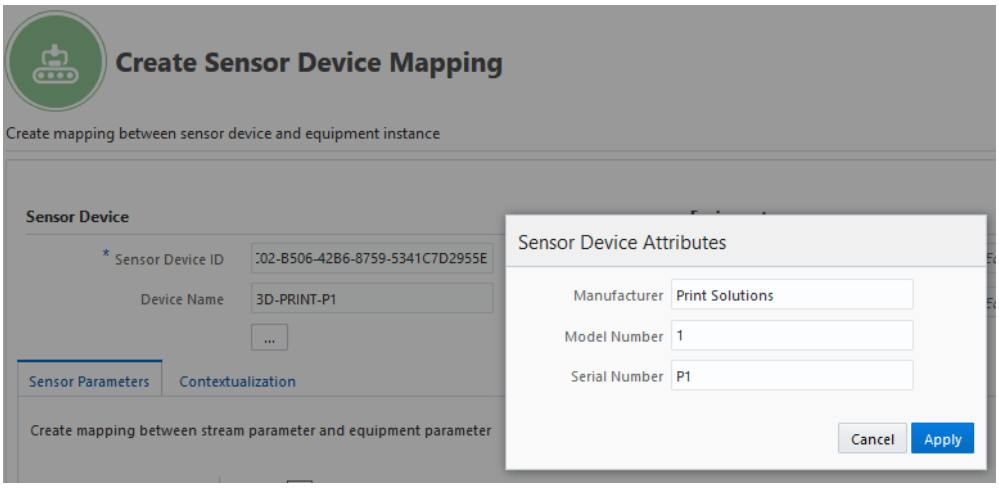
2. In the Create Sensor Device Mapping page, enter values in the following fields:

   - **Sensor Device ID**
   - **Device Name**

3. Click the ellipsis points (...) under Sensor Device.

   Enter information for the following Sensor Device Attributes fields:

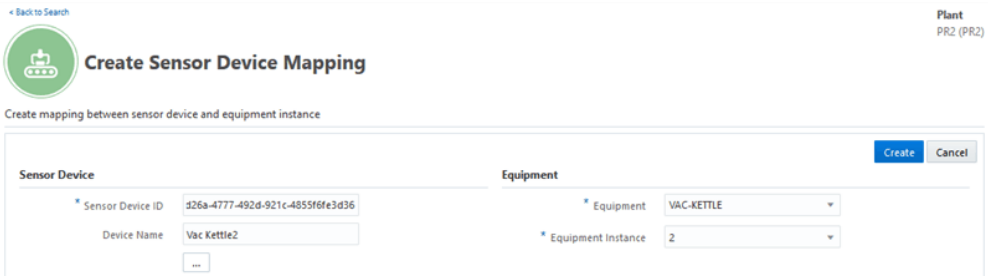
   - **Manufacturer**
   - **Model Number**
   - **Serial Number**



4. Map the sensor device you have entered to its ERP equipment and equipment instance:

   For process manufacturing organizations:

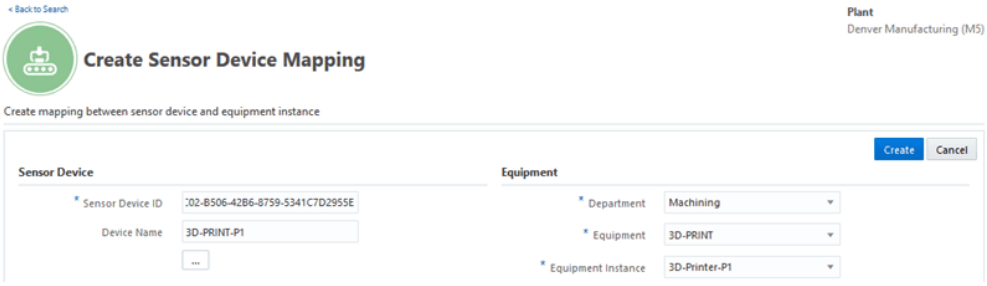
   Select **Equipment** and **Equipment Instance**.



   Note: For process manufacturing users, all the equipment parameters have to be defined in ERP before setting up the parameter mapping.

   For discrete manufacturing organizations:

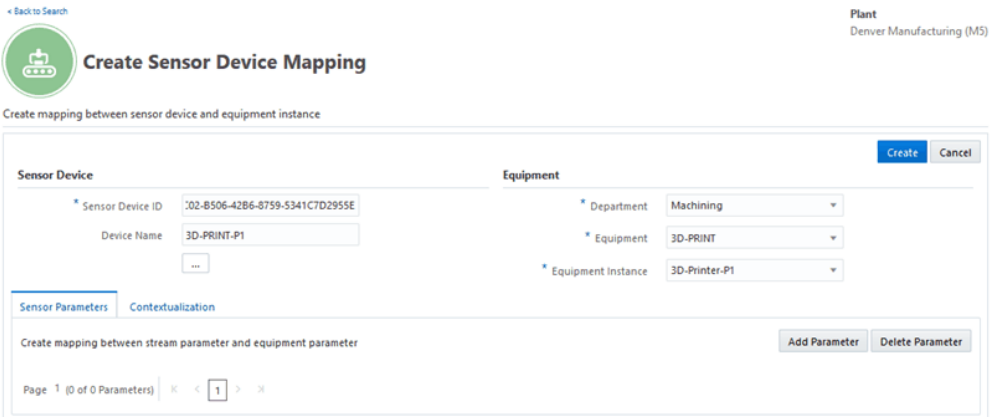
   Select **Department**, **Equipment**, and **Equipment Instance**.



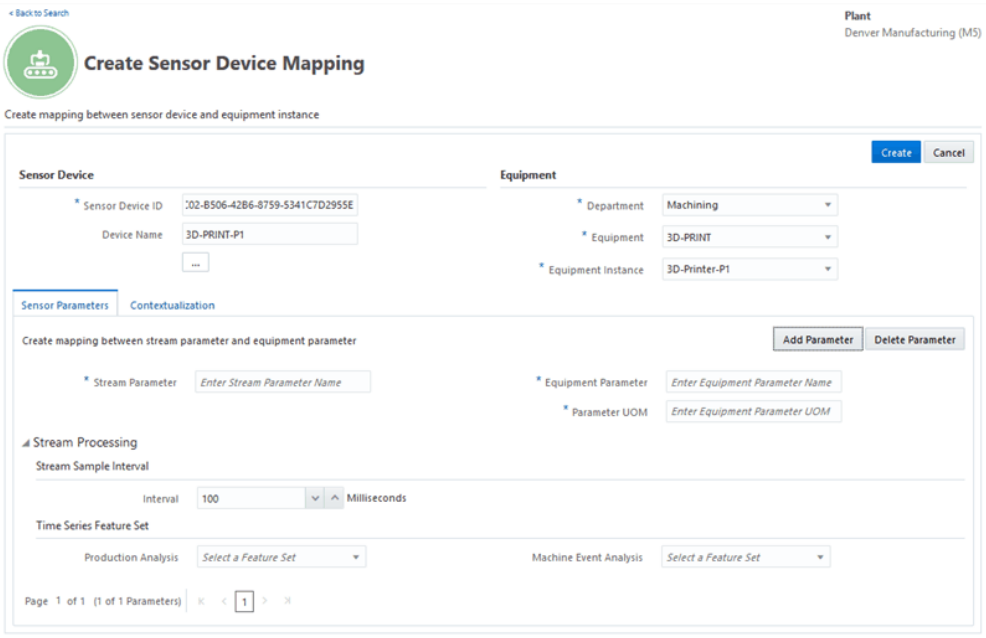
Process Stream Data

5. Use the Sensor Parameters tab to create mappings between a stream parameter and the equipment parameter. You can map multiple parameters with the sensor device.

   Note: Not all sensor devices will send sensor stream data. In case of sensors that only send alert data, there is no requirement to map parameters.



6. Click **Add Parameter** to add stream parameters you will map to the equipment parameters in the ERP.

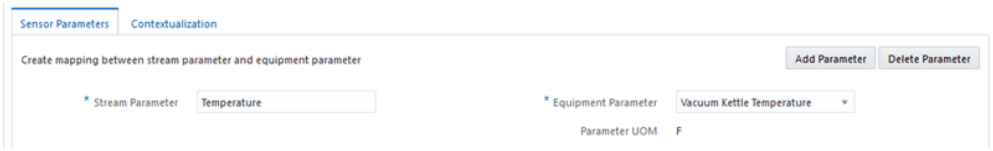


7. Enter the **Stream Parameter**.

8. In the **Equipment Parameter** field specify the equipment parameter in the ERP.

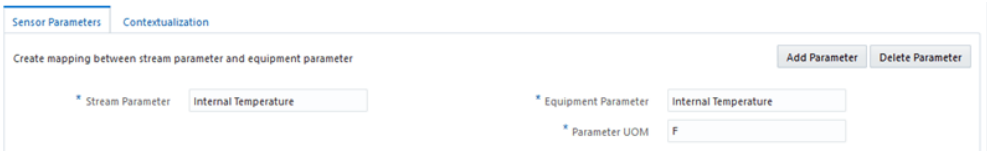
   For process manufacturing organizations:

   Select the **Equipment Parameter** from the list of values. The parameter UOM is displayed depending on equipment parameter you select.



   For discrete manufacturing organizations:

   Enter the **Equipment Parameter** and the **Parameter UOM**.

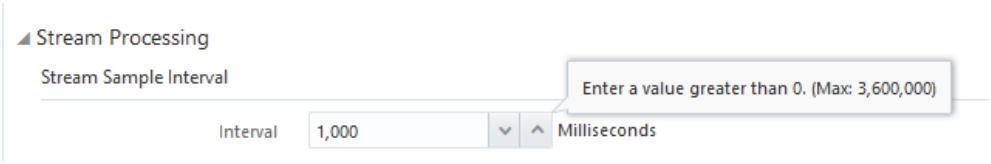


9. Click **Delete Parameter** to delete a parameter.

Process Event Identification

10. In Stream Sample Interval, use the **Interval** field to enter the same frequency at

which the sensor machine sends the data in milliseconds. The default interval value is 100 milliseconds. This field is mandatory when a time series feature set has been selected in the Machine Event Analysis field.

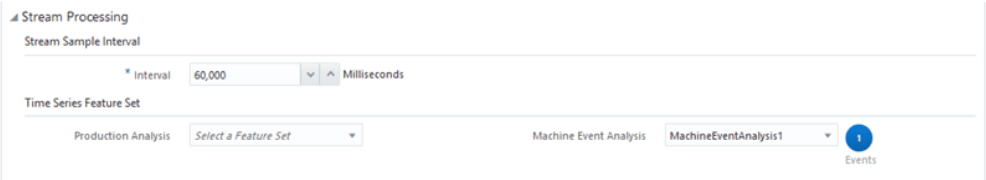


The **Interval** field is used to ensure that sensor stream data is streaming correctly and to calculate and generate events based on the intervals from the sensor data.

For example, if a parameter is set to stream at an interval of 100 milliseconds, and in case there is a gap in the data set readings, the machine will gauge this gap and split the data for processing event identifications.

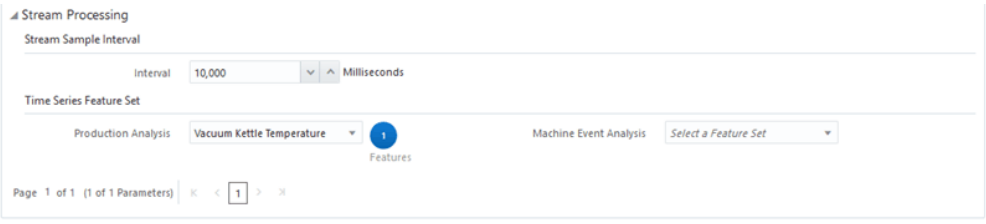
See: Processing Event Identification and Summarization

11. In the Time Series Feature Set region, select a feature set in the **Machine Event Analysis** field. Alert messages are usually received directly from the sensors, but machine alerts can also be indirectly derived from a time series sensor stream data. When a time series features set is selected in this field, it enables event identification based on the time series feature set.



See: Setting Up Times Series Features Sets, *Oracle Adaptive Intelligent Apps for Manufacturing User's Guide*

12. In the Time Series Feature Set region select a feature set in the **Production Analysis** field. When a time series features set is selected in this field, based on the definition of the time series features set, it will generate features that will be used in model building and analysis.

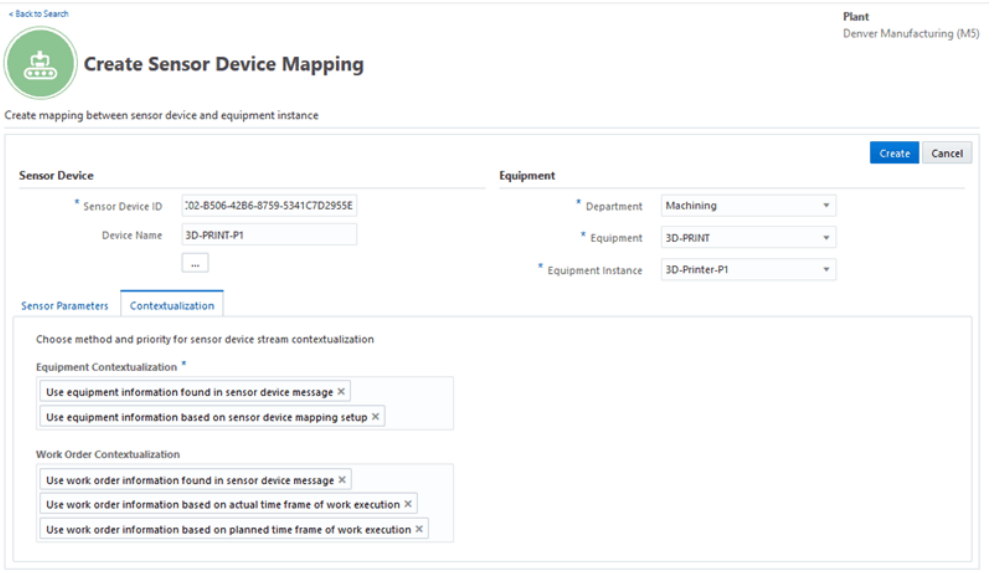


See: Setting Up Time Series Features Sets, *Oracle Adaptive Intelligent Apps for Manufacturing User's Guide*

Contextualize Data

13. Select the Contextualization tab to select a priority sequence of the context source for both equipment and work order contextualization.

    See: Processing Data Contextualization



14. **Equipment Contextualization**

    In the mandatory **Equipment Contextualization**, select the priority sequence of the context source. You can select to:

    - Use equipment information found in sensor device message
    - Use equipment information found in sensor device mapping setup

    You must select at least one of the options in this field.

    The default first option for the priority sequence is using equipment information found in sensor device message and the second is using equipment information found in sensor device mapping setup. For example, if the first default option is selected, this ensures that the context values from the sensor device is first sourced.

    If the context information from the first option is not available and not valid, the context value from the sensor machine will be sourced from the second priority option which is essentially the mapping you created between the sensor device and the equipment instance.

15. **Work Order Contextualization**

    Optionally, in **Work Order Contextualization**, select the priority sequence of the context source. You can select to:

- Use work order information found in sensor device message
- Use work order information based on actual time frame of work execution
- Use work order information based on planned time frame of work execution

> **Note:** You can disable the work order contextualization for sensor records for an equipment by removing all the three values. In this case, the contextualization is completed without work order/ serial context.

The default first option for the priority sequence is Use equipment information found in sensor device message, followed by Use work order information based on actual time frame of work execution as the second option, and Use work order information based on planned time frame of work execution as the third option. You can choose to have only one of the above, or a combination of two of the options.

For example, if the first option is selected as Use equipment information found in sensor device message, the context values from the sensor machine is first sourced from the sensor message.

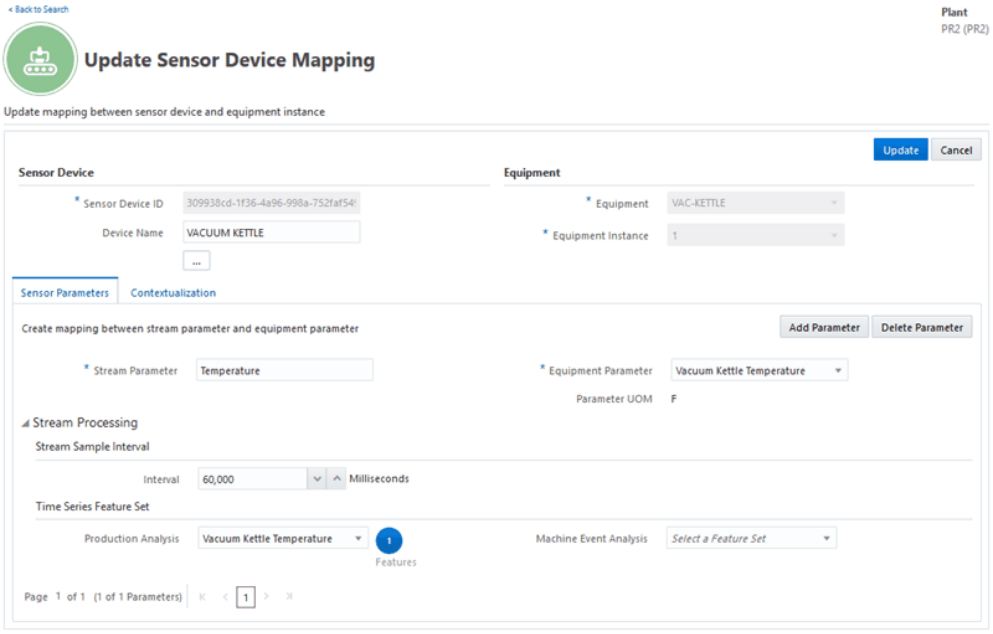
If context values from the first option is not available and not valid, the context value from the sensor machine is sourced from the second priority option which is Use work order information based on actual time frame of work execution. If valid context information cannot be derived from the sensor device tag, or from actuals, the context values is derived from the third option which is Use work order information based on planned time frame of work execution.

> **Note:** You cannot prioritize to use work order information based on planned time frame of work execution before work order information based on actual time frame of work execution. You can however select to use work order information based on planned time frame of work execution as the only source for context values.

16. Click **Create** to complete the sensor device mapping.

To update a sensor device mapping

1. Select the existing sensor device mapping you would like to update. Click **Update**. The Update Sensor Device Mapping page appears.



2. Note that you cannot update the Sensor Device ID, Equipment and Equipment Instance fields for process organizations, and Sensor Device ID, Department, Equipment and Equipment Instance fields for discrete manufacturing organizations.

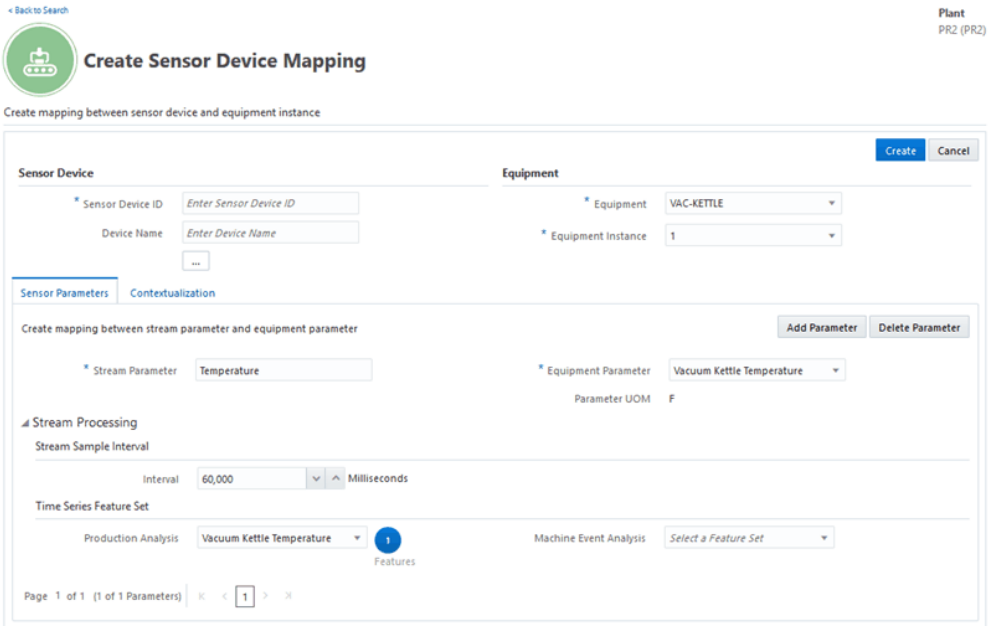
   You can update the following:

   - Device Name.
   - Sensor Device Attributes.
   - Stream Parameter.
   - Equipment Parameter.
   - Stream Sample Interval information.
   - Time Series Feature Sets Information.
   - Contexualization information

3. Click **Update** to save and update the sensor device mapping.

To duplicate a sensor device mapping

1. Select the existing sensor device mapping you would like to duplicate. Click **Duplicate**. The Create Sensor Device Mapping page appears.



2. Enter information for:
   - **Sensor Device ID**
   - **Device Name**

3. Note that the following information is duplicated from the existing sensor device mapping your selected:
   - Equipment.
   - Equipment Instance
   - Department (for discrete manufacturing organizations).
   - Stream Parameter.
   - Equipment Parameter.
   - Stream Sample Interval information.
   - Time Series Feature Sets Information.
   - Contexualization information

   You can choose to retain or update the duplicated information.

4. Click **Create** to create the sensor device mapping.

To import a sensor device mapping

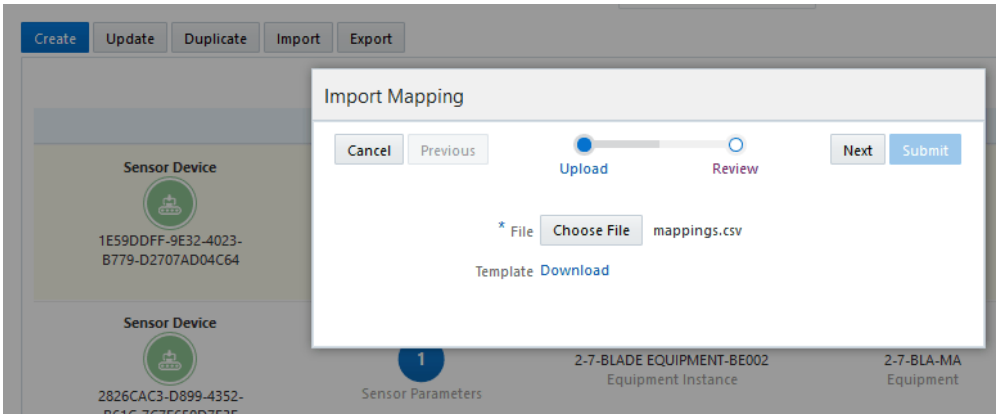
You can choose to enter sensor data in a mapping sheet, save it as a CSV file and import the sensor device mapping definitions.

1. Navigate to the Import Mapping page.

   In the Setup tab of the Sensor Devices page, click Import

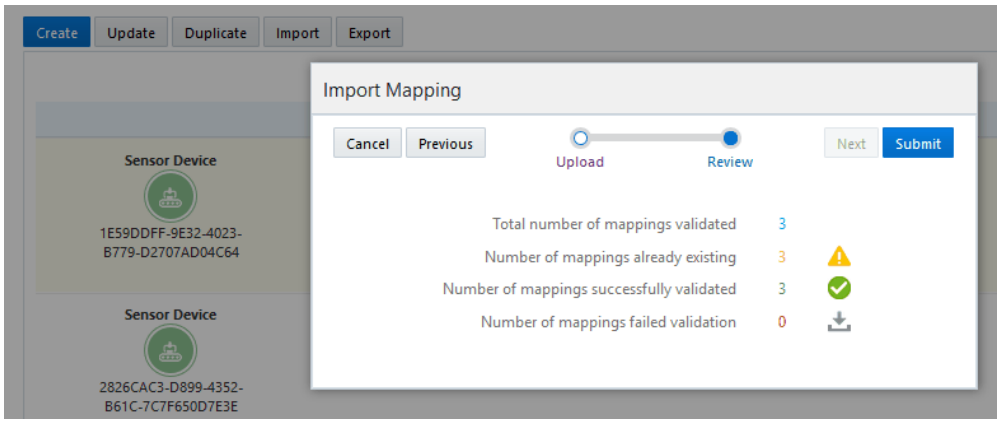
2. In the Import Mapping page, click the Template Download link to download the sensor device mapping template. Use the given instructions in the template to enter the mandatory components of the parent header information, and equipment contextualization. Optionally, enter child paramenter information and work order contexualization. Before saving the file, make sure you are in the Mapping sheet and save the file in the CSV format.

3. Click Choose File, in the Import Mapping page to browse and select your saved file.



4. Click Next. Review the following information:

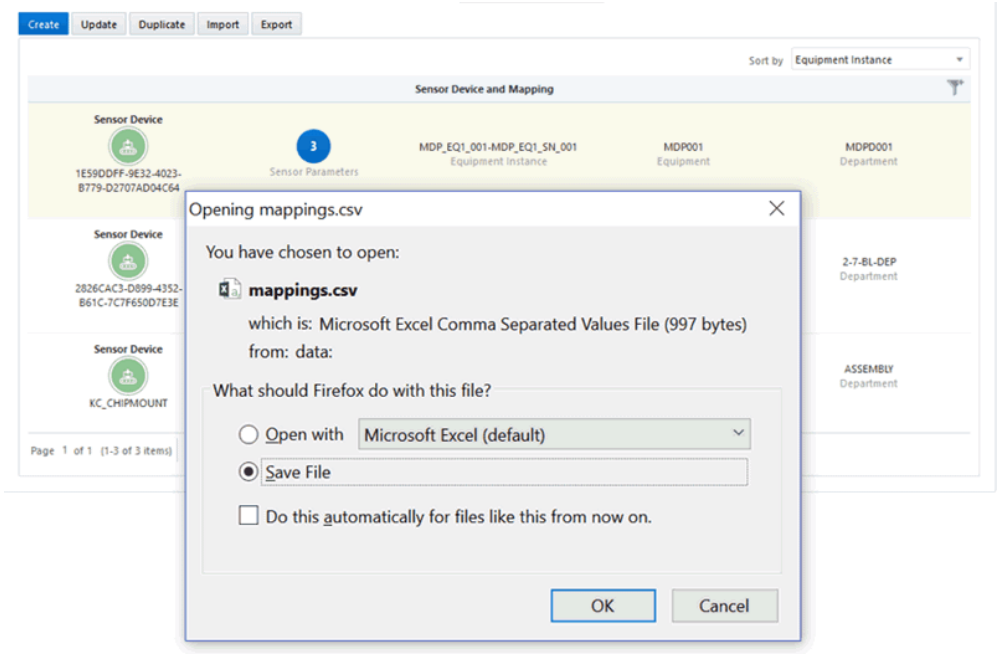
   - Total number of mappings validated
   - Number of mappings already existing
   - Number of mappings successfully validated
   - Number of mappings failed validation.



5. To complete the import, click Submit.

To export sensor device mappings

1. The Export functionality exports all mappings for the selected organization that appear in the Sensor Devices page. To reduce the number of mappings you want to export, use the search criteria to select specific mappings. Click **Export**.



2. The sensor device mapping definition you selected is exported to a CSV file. Use the browser's dialogue box to save the exported sensor device mapping in the CSV format.

Uploading CSV Files Using the Sensor Devices Data User Interface

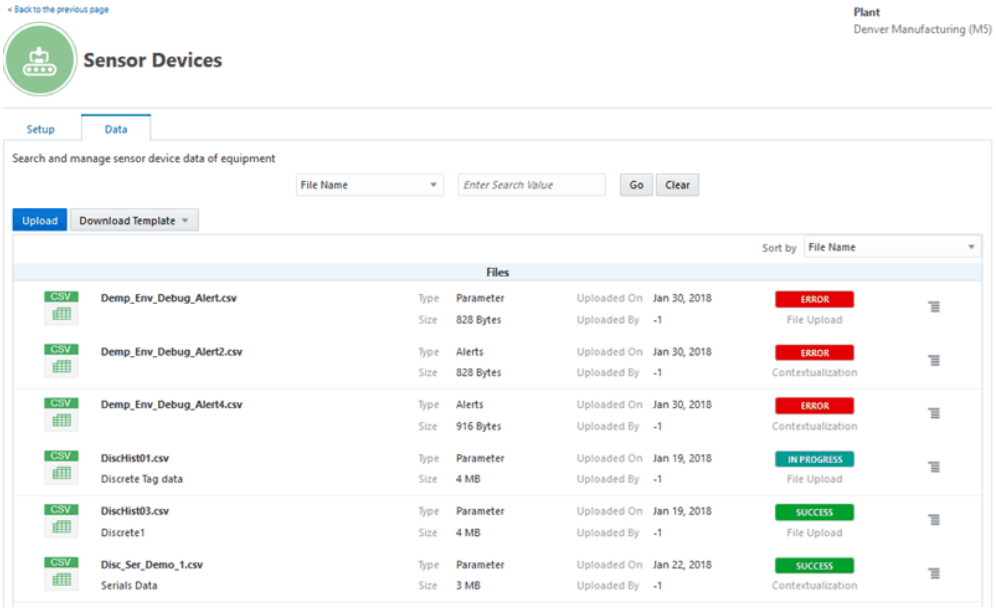
Oracle Adaptive Intelligent Apps for Manufacturing provides specific templates which you can download and use to add sensor device data information. You can then upload the CSV format files using the Sensor Devices Data user interface.

Uploading CSV Files Using the User Interface:

Use the Data tab of the Sensor Devices Page to import sensor device data by downloading and using the Stream data and Alert data templates which are provided.

To use the Data tab

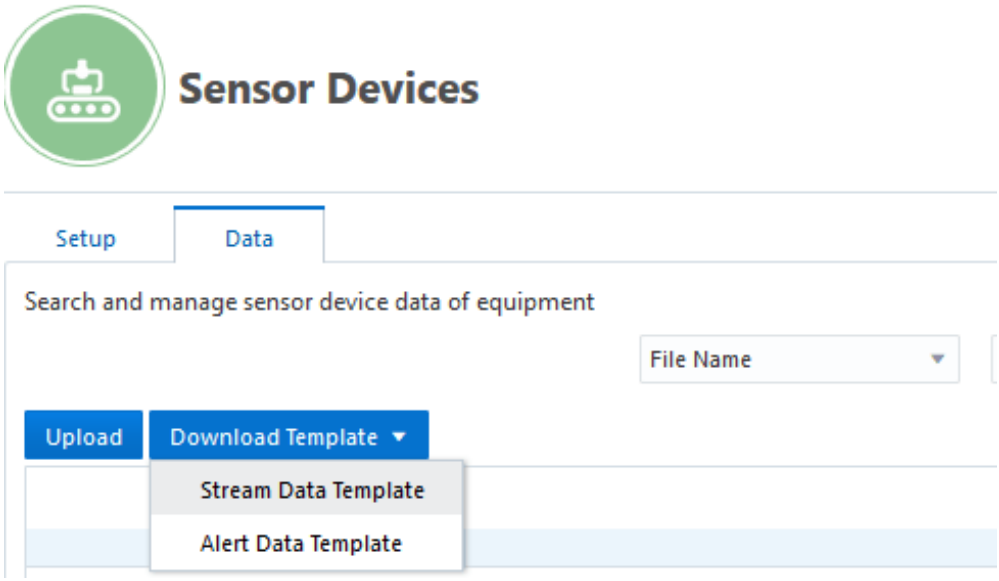
1. From the Home Page, click **Insights** or **Predictions**, then **Data Ingestion** link, then **Sensor Devices Data**, and then the **Data** tab. You can also from the Home page, click **Setup**, then **Sensor Devices**, and then the **Data** tab.



To download file templates

You can download the file template for either stream data or alert data in xlsx format. The same file template is used for both discrete and process manufacturing organizations. Follow the instructions provided in the templates to ensure you enter the required fields in the specified data formats.

1. From the Download Template drop-down list, select one of the following templates:
    - Stream Data Template
    - Alert Data Template



Review the Read Me instructions in the template, add information in the mandatory columns, and save the file in the required CSV formats to your preferred location in the local drive.

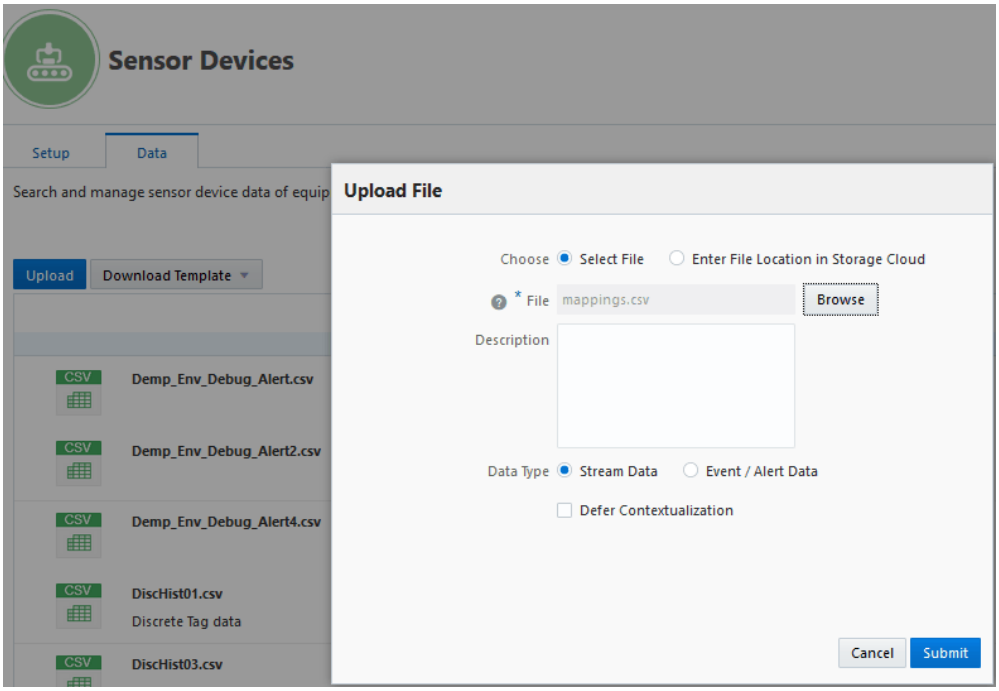
To upload sensor data files

1. In the Data tab, Click Upload. The Upload File page appears. Use the Upload File page to upload a CSV file.

2. Choose one of the following options:

   - Select File option, to upload a file from your local drive.

   - Enter File Location in Storage Cloud option, to specify the file location where you have already uploaded the file in Oracle Storage Cloud.



3. If the file is being selected from the local machine, click **Browse** or enter the file path in the **File** field.

   If the file is being selected from Storage Cloud, provide the location of the file in Storage Cloud. The URL format should be Container/sub folders/filename.csv

   For example: NTAIAMFG1825DEV1BDCSCE/aimfg/custom/Machine_Data_With_Tags_Pre_Uploaded.csv. Note that this example of the file path depicts the case where Oracle Data Transfer Service was used to import sensor data to storage cloud. In this case, the URL or container name must be obtained from Oracle Data Transfer Service.

4. Optionally, enter information in the **Description** field.

5. Depending on the data you are uploading, select one of the following Data Types:

   - Stream Data
   - Event/Alert Data

6. Optionally, select the Defer Contextualization check box to only upload the file and defer contextualization processing of the sensor data.

7. Click Cancel if you do not want to upload the file. Click Submit to upload the file.

   If Defer Contextualization is selected, select Run Contextualization from the Action link to start contextualization processing of sensor data, after the file is successfully

uploaded.

If Defer Contextualization is not selected, contextualization processing of sensor data starts after the file is successfully uploaded.

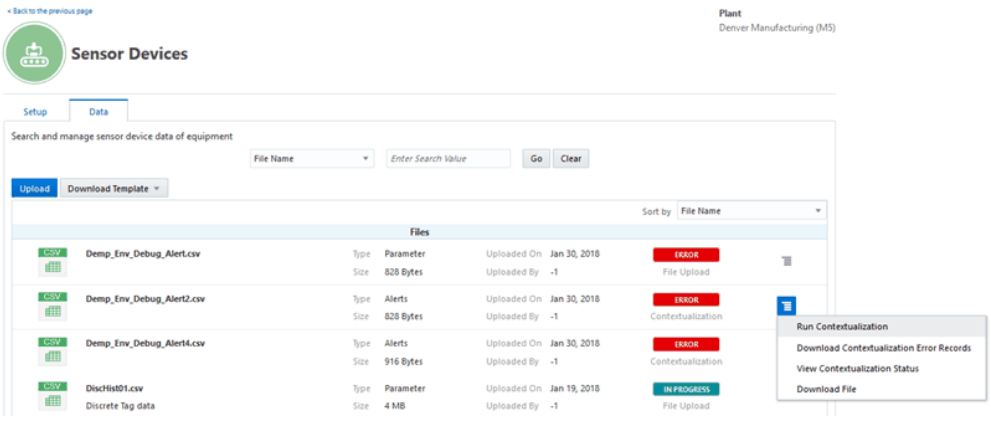
> **Note:** Contextualization processing can run on one file at a time. Select Run Contextualization from the Action link after the file is successfully uploaded.

8. When you click Submit, the file appears in the List page, along with the details of file, the status, and actions that can be performed.

   View the status of the file upload that displays in the Sensor Data page which can appear as In Progress, Success, or Error. After the file is successfully uploaded and contextualization processing is complete, the status of the contextualization is shown as Pending, In Progress, Success, Warning, or Error.

9. Click the Action link for a file and select to perform the following actions:

   - Run Contextualization
   - Download Contextualization Error Records
   - View Contextualization Status
   - View File Details
   - Download File



Note that the options in the Action link are enabled or disabled based on the status of file upload or contextualization processing.

Upload Status	Processing Status	Run Contextualization	Download Contextualization Error Records	View Contextualization Status	Download File	File Details
File Upload	SUCCESS	Enabled	Disabled	Disabled	Enabled	Enabled
File Upload	ERROR	Disabled	Disabled	Disabled	Disabled	Enabled
Contextualization	SUCCESS	Enabled	Disabled	Enabled	Enabled	Enabled
Contextualization	ERROR	Enabled	Enabled	Enabled	Enabled	Enabled
Contextualization	WARNING	Enabled	Enabled	Enabled	Enabled	Enabled

Downloading Files:

- You can downloaded a file only when it is successfully uploaded to Storage Cloud.
- You can download the csv file in gz zipped format.

Downloading Contextualization Error Records:

- When contextualization fails, a CSV file with records of the errors is generated, listing the error code and error message for each error record.
- You can fix the errors in generated error file and upload it as a new file. You must remove the error code and error message columns from the file

Viewing Contextualization Status:

- You can view the number of data points uploaded which have been contextualized successfully, or have errors.
- You can view the summary of contextualization by organization, department, equipment, sensor, work order, operation, and the processing information.

File Details:

The file you download has the following details:

- File Name: Name of the data file.
- Description: Description of the file.
- Type: Data file type, whether it contains Stream or Alert data.
- Size: Data file size.
- Uploaded On: Date the file was uploaded.
- Stage: The step that has been completed in the upload process, like File Upload or Contextualization.
- Status: Status of the file upload like ERROR, WARNING, or SUCCESS.
- Error Message: Gives a high-level summary of the error message associated to the upload. This message only appears when the status of the import appears as ERROR.

Processing Sensor Devices Data and Contextualization

Once the sensor data is uploaded in Oracle Storage Cloud, the stream and event/alert data is processed for contextualization, event identification and summarization.

Note: The application checks sensor data for any duplicate data and does not save it in the contextualized data repository. Duplicate records, like for example, sensor data with the same sensor device ID, parameter name, and reading date within an uploaded file is not saved. Similarly when the data is already existing in the repository for an equipment, sensor device ID, parameter name, and period, the newly uploaded file data is also not saved.

Processing Sensor Data

The following topics describe how the two types of sensor devices data, namely Stream data and Alert data are processed:

Processing Stream Data

1. The Data Contextualization Processor applies the records for stream data with equipment context information.
2. The Data Contextualization Processor then applies the work order context to the stream data that has already been contextualized with the equipment information.

3. This is followed by events being identified by the Event Identification Processor which applies the selected time series feature sets. The derived alerts for machine event analysis are seen in the Factory Command Center and Genealogy and Trace Timeline Viewer.

Processing Alert Data

1. The Data Contextualization Processor applies the alert data with equipment context and work context information which then appears in the Factory Command Center.

2. The Alert Summarization Processor merges the continual occurrent alert data points to one record with the start and end time. The information appears in Genealogy and Trace Timeline Viewer.

Processing Data Contextualization

Data contextualization enriches stream data and alert data from sensor devices with equipment and work order context attributes so that the machine data can be associated to the entities defined in the EBS instance.

Contextualizing data includes setting up contextualization for deriving equipment and work order information:

- Equipment Contextualization: Equipment context includes information about the organization code, department code, equipment code, and equipment instance code.

- Work Order Contextualization: Depending on whether it is a process or discrete manufacturing organization, work order context includes information about the work order number operation or step, activity, and serial number.

The three available seeded context types provided are:

- Equipment context type only (Context Type = 1) : The contextualized data includes only information on organization code, department code, equipment code, and equipment instance code.

- Work order context type only (Context Type = 2): The contextualized data includes information on work order number operation or step, activity, and serial number.

- Equipment and work order context type (Context Type = 3): The contextualized data includes both equipment and work order contexts.

The following table details the context values derived from the selected seeded context type:

Context Value	Context Type = 1	Context Type = 2	Context Type = 3
OrganizationCode	Organization Code	-	Organization Code
DepartmentCode	Department Code	-	Department Code
EquipmentCode	Equipment Code	-	Equipment Code
EquipmentInstanceCode	Equipment Instance Code	-	Equipment Instance Code
WorkOrderNumber	-	Work Order Number	Work Order Number
OperationSequence	-	Operation or Step	Operation or Step
Activity	-	Activity	Activity
SerialNumber	-	Serial Number	Serial Number

Equipment contextualization helps to obtain equipment information found either in sensor device messages or sensor device mapping setup.

Work and Serial contextualization helps to obtain work order information from the sensor device messages or from ERP based on the actual or planned time frame of work execution. In case of machine alerts, equipment contextualization is sufficient to show the data in the Factory Command Center and Genealogy and Trace module pages.

You can specify equipment contextualization and work order contextualization when setting up sensor device mappings.

See: Setting Up Sensor Device Mappings

Equipment Contextualization

The equipment contextualization processes sensor device data and associates each sensor message data with equipment information. The mandatory equipment contextualization processor contextualizes machine stream raw data and alerts with equipment information. It stamps each message with equipment instance, equipment, department (in case of discrete manufacturing) and organization to the sensor readings data.

The following are the two types of equipment contextualization, shown in order of priority:

1. Use equipment information found in sensor device message.

2. Use equipment information based on sensor device mapping setup.

When the contextualization is based on the sensor device message, the sensor is expected to send the readings with the equipment context information. The processor picks context information from the sensor readings and validates the codes in the ERP instance. If the context information is found to be valid, the contextualization is successful. If it is not valid, the record will be marked as error record.

The following table shows the placeholders for context attributes for equipment contextualization only:

Context Value	Context Type = 1
OrganizationCode	Organization Code
DepartmentCode	Department Code
EquipmentCode	Equipment Code
EquipmentInstanceCode	Equipment Instance Code

The following table describes equipment contextualization status:

Status	Description
Success	Equipment information is derived from sensor device message or sensor device mapping setup and the equipment contextualization is complete. These records are available for the Factory Command Center and the Timeline Viewer and are ready for further processing for work order and serial unit contextualization.
Error	Equipment contextualization fails as the equipment information in sensor device message is invalid or the sensor device mapping setup is not available. These records are not stored in the repository. The contextualization also fails when the record is found to be duplicated in the file or the record exists in the repository.

Work Order Contextualization

Once the equipment contextualization is complete, the work order contextualization process begins.

Work order and serial (for discrete serialized manufacturing) contextualization contextualizes machine stream data and alert data with work order (and serial if serialized manufacturing) information. It stamps work order, operation, step, and serial (in case of discrete serialized manufacturing) to the sensor readings.

It is not mandatory to choose a work and serial contextualization method as in some cases the need is to only monitor the stream data and alert data and not use it for model building purposes.

Following are the three types of work order contextualization, shown in order of priority:

1. Use work order information found in sensor device message.
2. Use work order information based on actual time frame of work execution.
3. Use work order information based on planned time frame of work execution.

Work order contextualization is processed according to the priority sequence chosen in the sensor device mapping setup. Based on the preference, it picks the context from either the sensor device message,, work order actuals, or work order planned and validates context for work order, operation/step, activity and serial number (in case of discrete serialized manufacturing).

In case of contextualization using work order information found in the sensor device message, the work order information is validated with work orders whose plan schedule falls within the range of 30 days before and after the sensor device message reading date.

> **Note:** You can choose to change the order or remove all the methods if work and serial contextualization is not required. This is applicable in cases where the need is to only monitor the parameters or alerts but not use them for a model building process. You cannot select the priority of work order planned over work order actuals as the work order actuals takes preference in majority of use cases.

The following table shows the placeholders for context attributes for work order contextualization only as well as both equipment and work order contextualization:

Context Value	Context Type = 2	Context Type = 3
OrganizationCode	-	Organization Code

DepartmentCode	-	Department Code
EquipmentCode	-	Equipment Code
EquipmentInstanceCode	-	Equipment Instance Code
WorkOrderNumber	Work Order Number	Work Order Number
OperationSequence	Operation or Step	Operation or Step
Activity	Activity	Activity
SerialNumber	Serial Number	Serial Number

The following table describes work order contextualization status:

Status	Description
Success	Work order information context is derived from the sensor device message, actual work order, or plan work order and the contextualization is complete. These records are available for downstream applications. In case of serialized manufacturing, the serial unit information is derived from sensor device message.
Error	Work order contextualization fails as the work order information in sensor device message is invalid or actual/plan work order is not available. These records are not available for analysis.

You can view the status of contextualization processing for successfully uploaded sensor data file in the Data tab of the Sensor Devices page. The status of the contextualization is shown as Pending, In Progress, Success, Warning, or Error.

See: Uploading CSV Files Using the Sensor Devices Data User Interface

Processing Event Identification and Alert Data Summarization

Event identification processing is run on contextualized stream data and generates machine alerts. The event identification processor is run in batch mode on the stream data and derive alerts. You can process event identification by selecting the feature set

for machine event analysis usage when setting up sensor device mappings. Both the derived alerts from the stream data using event identification processing and the direct alerts from the equipment is summarized and stored for analysis.

Event Identification in Stream Data

The Stream Sample Interval feature enables the calculation and generation of events based on intervals from the stream data.

The event identification processor uses stream sample interval defined for the parameter in the sensor device mapping setup to identify if there is any break in the stream data. If a break is identified in the stream data, the records are split as separate time series data, and event identification processing is applied on each block of data.

> **Note:** In case the stream sample interval value is different from the stream data readings interval, the stream data is split into multiple blocks and event identification processing is applied. However, when the split exceeed 10 blocks, the event identification processing is stopped for this stream data in order to detect events correctly. Event identificaiton processing will continue for other stream data which is coming at right interval and matching with steam sample interval.

It is important that users specify the stream sample interval same as the actual time interval of sensor readings. If the sample interval is different, then the event identification processing may fail due to performance issues.

Summarization of Alert Data

Machine events can be indirectly derived from a time series sensor stream data. Time series feature sets defined for Machine Event Analysis usage help derive such events. These time series features set can be used for machine event analysis to enable event identification based on the simple functions you select like Above Threshold Alert or the advanced SAX Pattern Alert when creating a time series feature set.

Event identification processing allows the following time segment and function options to choose when defining a time segment feature set for Machine Event Analysis usage:

- Time Segment: Full is the only time segment available as the streaming data will be analyzed for any events in the duration of the work order and operation.The time segment step is retained in the page for consistency in the navigation.
- Simple Functions: Only the following threshold violation rules are allowed:
  - Above threshold alert
  - Below threshold alert
  - Within range alert

- Outside range alert

- Advanced Functions: Only SAX pattern alert is allowed.

  Note: In the case of Event functions, you can specify the value aggregation function like minimum, maximum or average for generating the value of the event. You can specify after an event is matched whether to skip to the last data point or skip to the next data point for checking next matching pattern.

  Above Threshold Alert example:

  You can specify, after an event is matched, to skip to the last data point or skip to the next data point for the following temperature readings:

Time	T1	T2	T3	T4	T5	T6	T7	T8
Temperature Reading	10	25	23	34	11	12	10	11

  If you have defined the Above Threshold value as 20 and selected the Value Aggregation function as Maximum, based on the temperature readings given above, the events are generated based on the option you choose for After Match.

  If the After Match is Skip to Next, the following three events are generated:

  - Event E1 - Start Time: T2, End Time: T2, Value: 25
  - Event E2 - Start Time: T3, End Time: T3, Value: 23
  - Event E3 - Start Time: T4, End Time: T4, Value: 34

  If the After Match is Skip to Last, one event is generated:

  - Event E1 - Start Time: T2, End Time: T4, Value: 34

See the following topics in *Oracle Adaptive Intelligent Apps for Manufacturing User's Guide* :

- Using Time Series Feature Sets
- Setting Up Time Series Feature Sets

Using Sensor Devices Data Templates

AIAMFG provides sensor device data templates for stream data and alert data which can be used by process manufacturing and discrete manufacturing organizations. Download the templates from AIAMFG or from the linked file names below and then enter the data as recommended into the spreadsheet templates. The following data templates are available for sensor device data:

Alert Data (EventAlertDataTemplate.xlsx [https://www.oracle.com/webfolder/technetwork/mfg/AIMDIG/EventAlertDataTemplate.xlsx])

Field Name	Required	Data Type	Length (Max)	Description	Sample Data
Reading Date	Y	Number		Reading Date field should be in Epoch milliseconds format (number of milliseconds elapsed since Unix epoch).	1494403200000
Sensor Device ID	Y	Char		Unique ID for the sensor device	7CCBC4D9-FD52-4919-8212-219DBFCF0B2E
Alert Type	Y	String		See Alert Type Values table for more details.	MachineStatus
Alert Value	Y	Char		See Alert Type Values table for more details.	UP

Context Type	Number		1 - If only equipment context information is available. 2 - If only work order context information is available 3 - If both equipment and work order context information is available	General Electrics
Organization Code	Char	4	Short alphanumeric code of the organization to which the item belongs. Required for equipment contextualization	M5
Department Code	Char		Required for Discrete Manufacturing	Machining
Equipment Code	Char		Required for equipment contextualization	3D-PRINT
Equipment Code Instance	Char		Required for equipment contextualization	

Work Order Number	Char	Required for work order contextualization	7320
Operation Sequence	Number	Required for work order contextualization	10
Activity	Char	Process - Required for work order contextualization. Discrete - Not applicable	ACT
Serial Number	Char	Process - Not applicable	S000000
Additional Attributes	Char	See Additional Attributes Values table for more details.	{"current_quantity":10,"overall_quantity":100}

Stream Data (StreamDataTemplate.xlsx [https://www.oracle.com/webfolder/technetwork/mfg/AIMDIG/StreamDataTemplate.xlsx])

Field Name	Required	Data Type	Length (Max)	Description	Sample Data
Reading Date	Y	Number		Reading Date field should be in Epoch milliseconds format (number of milliseconds elapsed since Unix epoch).	1494403200000

Sensor Device ID	Y	Char		Unique ID for the sensor device	7CCBC4D9-FD52-4919-8212-219DBFCF0B2E
Parameter Name	Y	Char		Sensor Parameter Name defined in the device setup.	Internal Temperature
Parameter Value	Y	Char		Parameter Value	119
Organization Code		Char	4	Short alphanumeric code of the organization to which the item belongs. Required for equipment contextualization	M1
Department Code		Char		Required for Discrete Manufacturing	Machining
Equipment Code		Char		Required for equipment contextualization	3D-PRINT
Equipment Code Instance		Char		Required for equipment contextualization	
Work Order Number		Char		Required for work order contextualization	7320

Operation Sequence	Number	Required for work order contextualization	10
Activity	Char	Process - Required for work order contextualization. Discrete - Not applicable	ACT
Serial Number	Char	Process - Not applicable	S000000
Context Type	Number	1 - If only equipment context information is available. 2 - If only work order context information is available 3 - If both equipment and work order context information is available	2

Alert Type Values

Alert Types	Values	Meanings

MachineStatus	OFF, UP, DOWN, IDLE, IN-USE, FAULTED	UP: State of the machine when it is warming up, when just turned on. DOWN: State of the machine when it is down. Additional Attribute: resourceDownCode IDLE: Optional, state of the machine when it is powered on but is not working. If the sensor device is unable to provide the status of the machine, machine status will be determined based of the ERP context information and set to a status of UP. IN-USE: Optional, state of the machine when it is running. If the sensor device is unable to provide the status of the machine, machine status will be determined based of the ERP context information and set to a status of UP.
JobStatus	STARTED, PAUSED, RESUMED, COMPLETED	STARTED: Job has started and is in-progress (Additional attributes 'current_quantity' and 'overall_quantity' are applicable) PAUSED: Job has paused (Additional attribute 'current_quantity' and 'overall_quantity' is applicable) RESUMED: Job has resumed (Additional attribute 'quantity' is applicable) COMPLETED: Job has been completed (Additional attribute 'quantity' is applicable)

PatternMatch		<<Stream Parameter Name>> Additional Attributes: • Max • Min • Average • ERP_PARAMETER_NAME • UOM • PatternType – SAX_PATTERN Note that amMessage can send attribute values for more than 1 parameter
Threshold Violations		<<Stream Parameter Name>> Additional Attributes: • Max • Min • Average • ERP_PARAMETER_NAME
DoorState	OPEN, CLOSE	
PowerState	UP, DOWN	

Validating Sensor Devices Data and Handling Errors

Error Messages

Error Code	Error Message
2	Device mapping is missing.
3.1	Equipment context information is invalid.
3.2	Work order context information is invalid.
3.3	Serial unit context information is invalid.
4.1	This record already exists in the file.
4.2	This record could not be processed as the data exists in the table and contextualized.

5

Importing Case Record Data

Overview of Importing Case Record Data

Case Record Data upload may be used when data is mined and prepared in an external system and imported into Oracle Adaptive Intelligence for Manufacturing for quick analysis to obtain insights on historical data. Case Record Data files capture historical work order data in a flattened file format. Each row in the spreadsheet corresponds to one work order and contains all related entities data like items, operation, routing, and so on, in the same row.

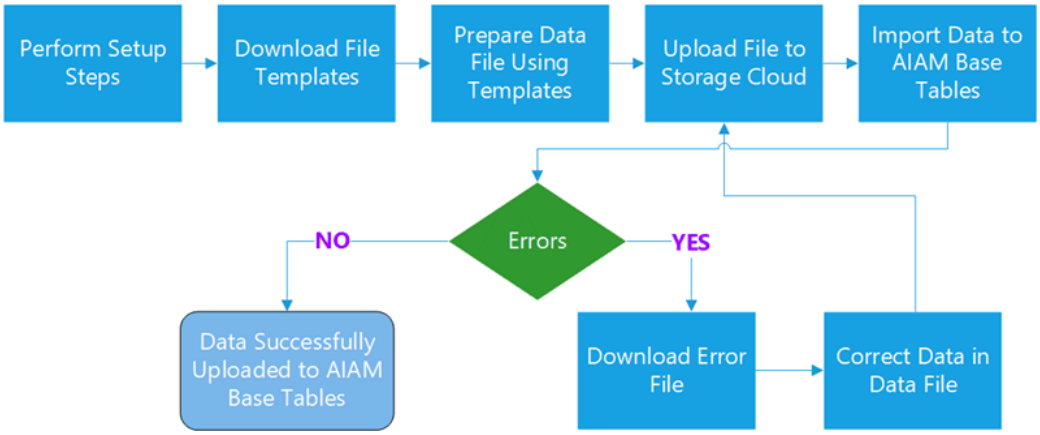
The data file contains context data which includes information on item, BOM, operation, transactions, and so on. It also includes details of input predictors and target test results. This ingested data can be analyzed to identify key patterns and correlations that affect manufacturing efficiencies. The data ingested through this template, can only be used in the Insights module.

If you only plan to use the Insights feature to identify patterns and correlations based of historical data, use the Case Record Data upload. Other key features like Predictions, Genealogy and Trace, and Factory Command Center cannot be used with data imported through Case Record Data files.

The Case Record Data file uploads data for the following entities:

1. Creates setups required for the business context such as Item, Recipe, Routing, and so on.
2. Uploads transaction records such as work order, serial transactions, and so on.
3. Uploads input custom predictors.
4. Uploads quality output predictors.
5. Enables quick creation of a data set using the uploaded data.

Case Record Data Import Steps



1. Perform the setup steps required to import data.
2. Download the file templates for either a process or discrete organization.
3. Prepare or enter the data into CSV files following the template guidelines.
4. Submit the file for upload to Oracle Storage Cloud Service.
5. Run the data import program to import data into the target base tables.
6. If errors occur, download the error file, correct the data, remove the error message columns, save the error file as a new CSV file, and then upload the file again.

Select to use Case Record Data:

- When flattened records are already available.
- For the flexibility of stitching data outside AIAMFG.
- For the flexibility of creating features outside AIAMFG.
- For simpler ingestion of data into AIAMFG using the single CSV template that is provided.
- When a quick track analysis is required.
- For initial proof of concept validation.

> **Note:** Select to first use case records data for insights before using business entity data.

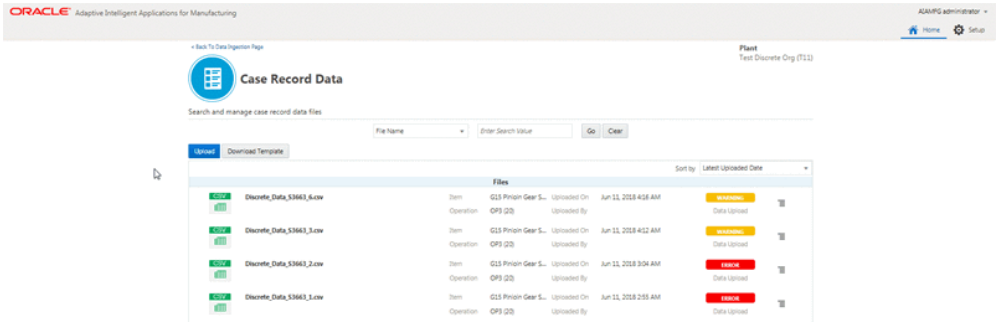
Uploading CSV Files Using the Case Record Data User Interface

Oracle Adaptive Intelligent Apps for Manufacturing provides specific templates which you can download and use to add case record data information. You can then upload these CSV format files using the Case Record user interface.

To use the Case Record Data page:

1. Navigate to the Data Ingestion Page.

   From the Home Page, click **Insights** or **Predictions**, then click the **Data Ingestion** link, and then **Case Record Data**.



   Click Download Template to download the Case Record Data template. Click Upload to upload a case record data file in the CSV format.

To download file templates

2. In the Case Record Data page, click **Download Template** to download the Case Record Data seeded template. Based on the organization type of the context organization, either a discrete manufacturing or a process manufacturing template is downloaded. An excel file named CaseRecordDataTemplate.xlsx is downloaded in your local system.

   Use the instructions in the ReadMe and Field Information sections of the template to enter the required information.

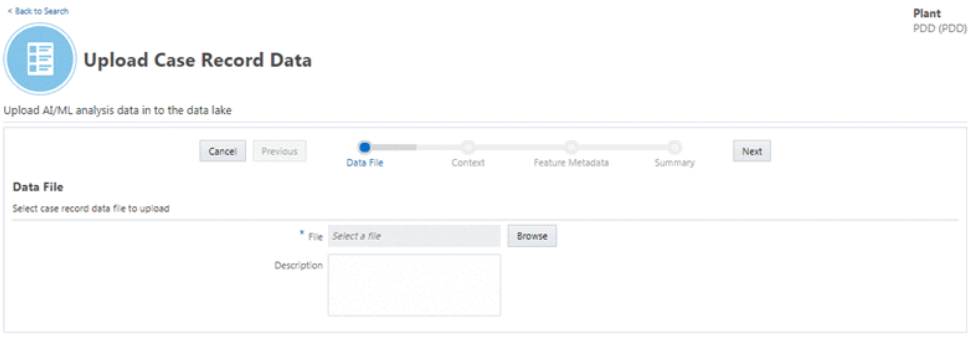
3. On completion of Case Record Data entry in the spreadsheet, save the file in a CSV format. It is required that the data be entered in the same format as defined in the template for processing to be completed successfully.

To upload Case Record Data file templates

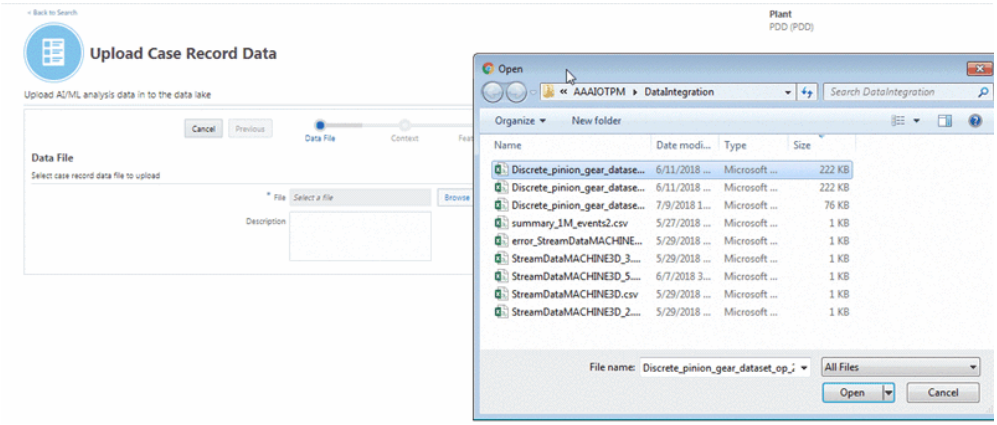
4. In the Case Record Data page, click the Upload Button to upload the Case Record Data file you have saved

   To upload a Case Record Data file you will complete the following steps:

- Choose the data file to be uploaded.
- Review the context identified from the uploaded data.
- Review the feature metadata extracted from the uploaded data and make changes if required.
- Review the Case Record Data Upload and submit the file for processing.



5. In the Data File region use the following fields:
   - **File** to select the data file you want to upload. Click Browse and then choose the CSV spreadsheet from the local system. This is a mandatory step.
   - **Description** to enter a meaningful description to represent the data upload.



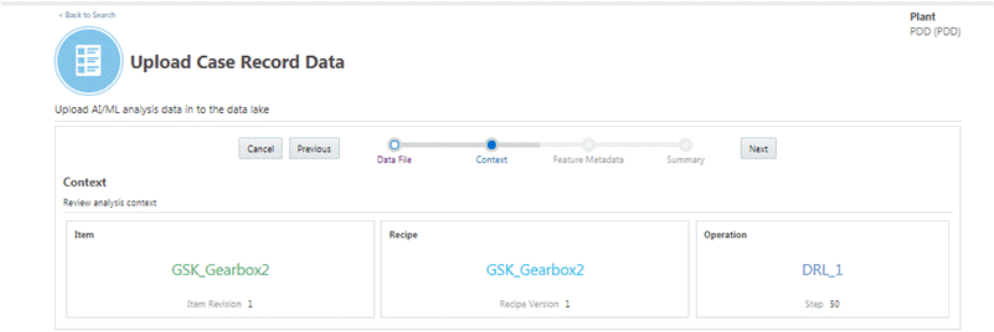
6. Click **Cancel** to cancel the process. Click **Next** to continue.
7. In the Context region, review the data context information that displays.

   The data context is extracted from the data uploaded in the spreadsheet. The data context information is part of the standard mandatory columns. The data context must be the same for all rows in the spreadsheet. As the data context is derived

from the data entered in the first 100 rows of the spreadsheet, it is required that the data in the spreadsheet reflect the right context.

The context information that displays for your review consists of the following fields:

- For discrete manufacturing organizations:
  - Item
  - BOM Type
  - Routing Type
  - Operation
- For process manufacturing organization:
  - Item
  - Recipe
  - Step
  - Operation



8. Click **Cancel** to cancel the process. Click **Previous** to go back to the Data File step. Click **Next**, to continue the upload.

9. In the Feature Metadata region, review the feature metadata.

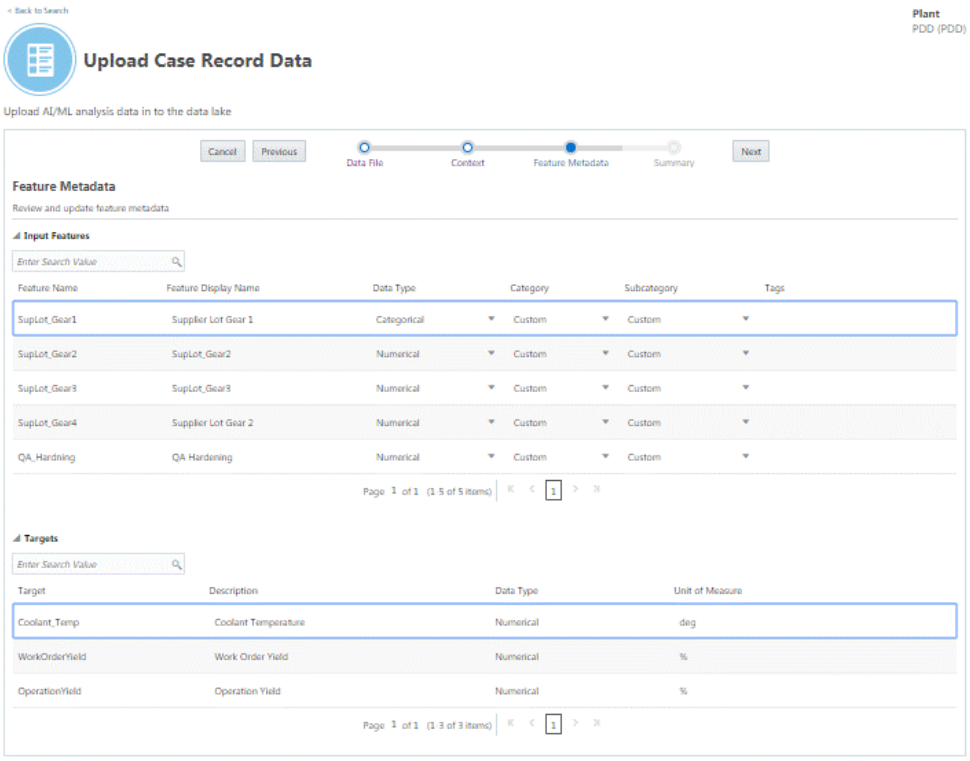
   The metadata is extracted from the data uploaded in the spreadsheet. As the metadata information is extracted from the data entered in the first 100 rows of the spreadsheet, it is required that the data in the spreadsheet reflect the right datatype, column name, and so on.

   Input Features are extracted from the spreadsheet. The spreadsheet contains a set of

19 mandatory columns from which item, BOM, and other data context details are derived. The spreadsheet provides users the ability to:

- Create 450 categorical custom features (columns).
- Create 450 numeric custom features (columns).
- Support an additional 30 quality features (columns).

Any column that is not part of the standard columns will be classified as a custom or quality feature. The quality feature column names must be prefixed with a Q_ in the spreadsheet, for the program to extract the right set of data.



Features Metadata includes information on input features and quality features, which include the following details:

- **Input Features**

  Input Features are extracted from the spreadsheet and any column not part of the standard columns and not prefixed with Q_, will be considered as an input feature. Input features consists of the following fields:

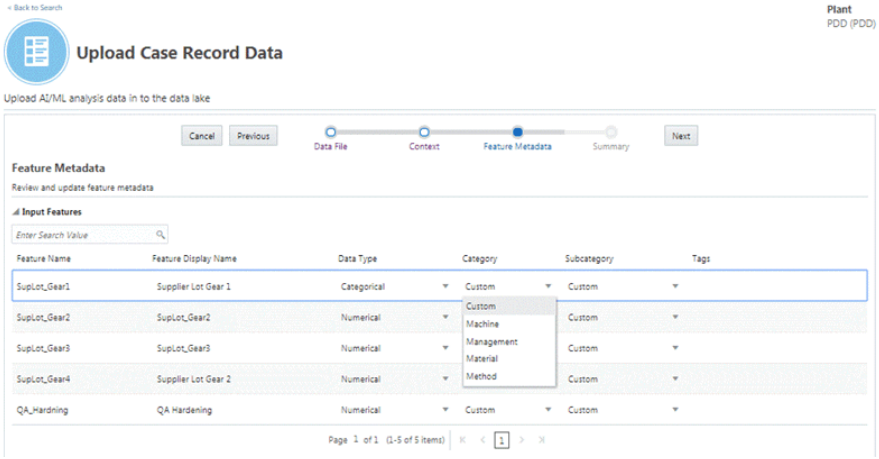
  - Feature Name: This is the name of the input feature which defaults from the column name defined in the spreadsheet. This is a display only field.

- Feature Display Name: This is the feature display name which defaults:
  - From the value stored in the application, if the feature name already exists in the application either through manual entry or through upload creation.
  - From the spreadsheet column name, if the feature name does not already exist in the application.

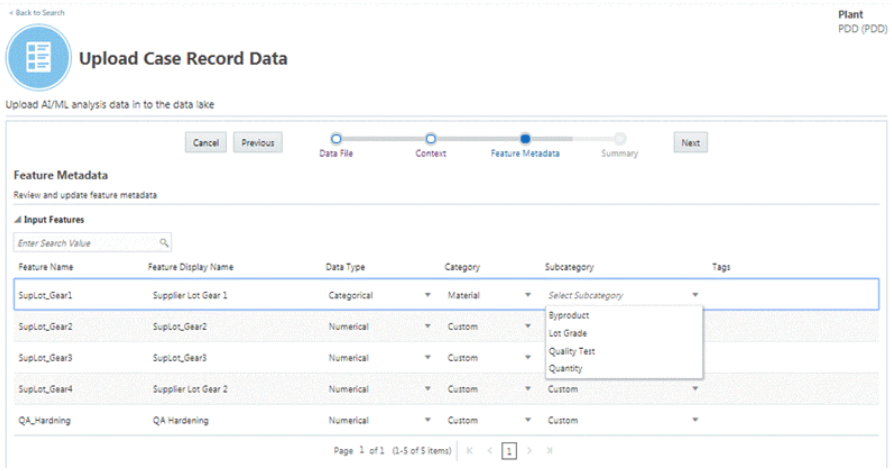
  You can update the name to a more user friendly name and future imports will display the new value you have entered for the feature display name.

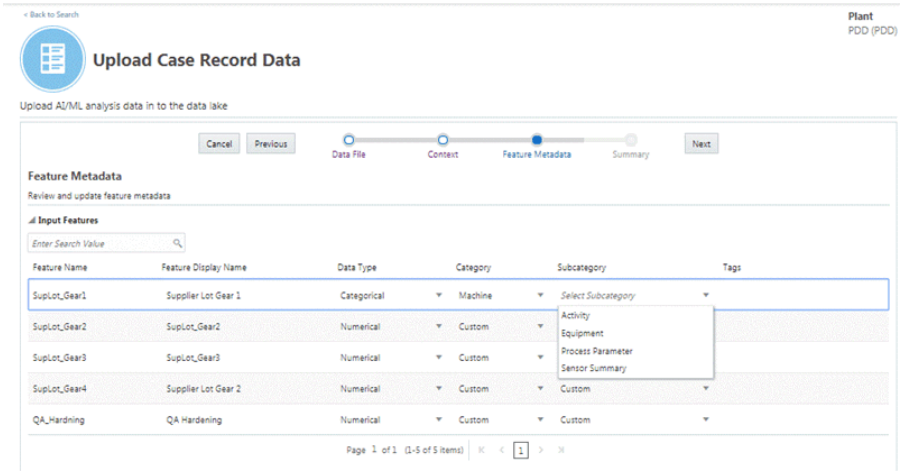
- Data Type: The data type derives from the values entered in the first 100 rows of the spreadsheet. The supported data types are Numerical and Categorical. If the data in the spreadsheet for the given columns, is alphanumeric, it is classified as categorical. Columns with only numbers are classified as numerical. You can update data types if the defaults is not as expected.

- Category: All input features are classified as Custom.You have the option to assign the right categories to the input features. Data set preparation and model building displays the input features against the assigned categories. If assignments are not changed, they are displayed as custom categories.

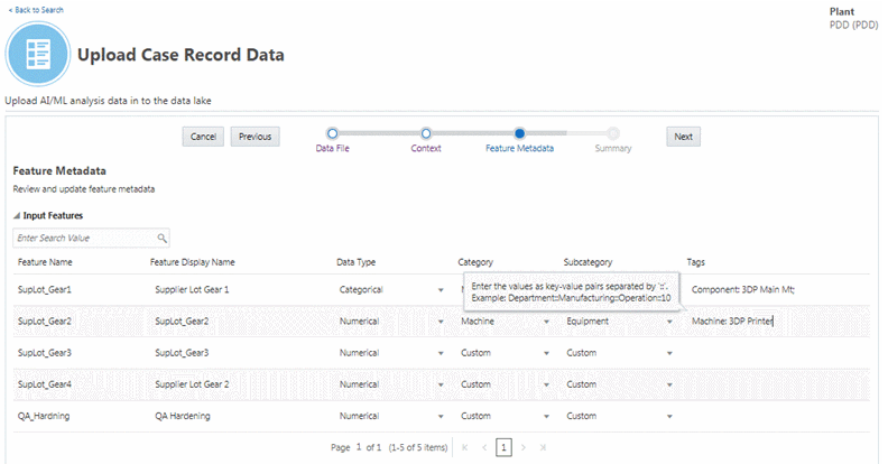


- Sub Category: All input features default with a custom sub category. You have the option to assign the right sub categories to the input features. Data set preparation and model building display the input features against the assigned categories and sub categories. If assignments are not changed, they will display against custom sub categories. The list of displayed sub categories is dependent on the category chosen.





- Tags: Enter Tags for the input features as Key::Value pairs and ensure that the tag is separated by ::. This additional value provides a higher level of hirerarchial relationship. These values reflect in the model building.



- Search: This feature enables search using feature names.

- **Quality Features**

  Like input features, quality features are also extracted from the data entered in the spreadsheet. The spreadsheet supports 30 quality features. For columns to be extracted as quality features, the column name must be prefixed with Q_ . These quality features can be used as both input features and quality target features when building models. Quality features consists of the following fields:

  - Target: This is the name of the Target Feature and is a display only field. The target name displays as the spreadsheet column name but with the prefix Q_ removed.

  - Description: This is the description that defaults:

    - From the current value stored in the application, if the quality feature already exists in the application either through manual entry or through upload creation.

    - From the spreadsheet column name, if the quality feature does not already exists in the application.

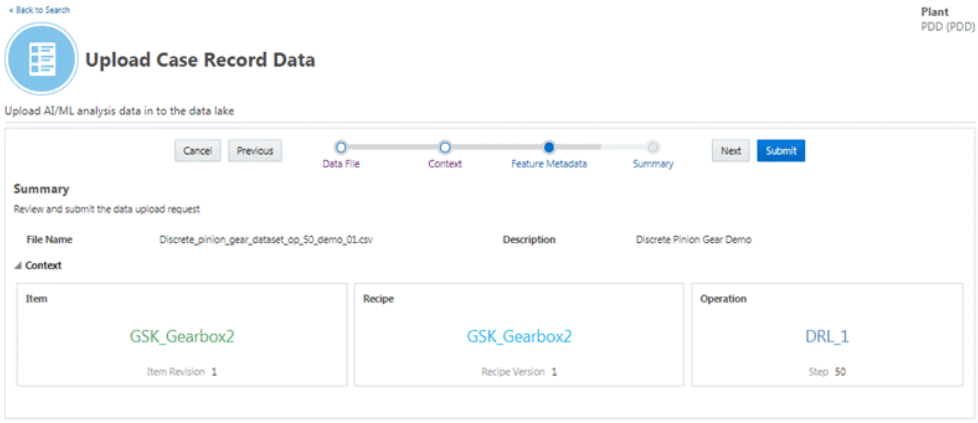
    You can update the description to a more relevant description and future imports will display this new value you enter for the quality feature description.

  - Data Type: The data type of the quality features can only be numeric.

  - Unit of Measure: This is the unit of the measure of the quality feature which defaults:

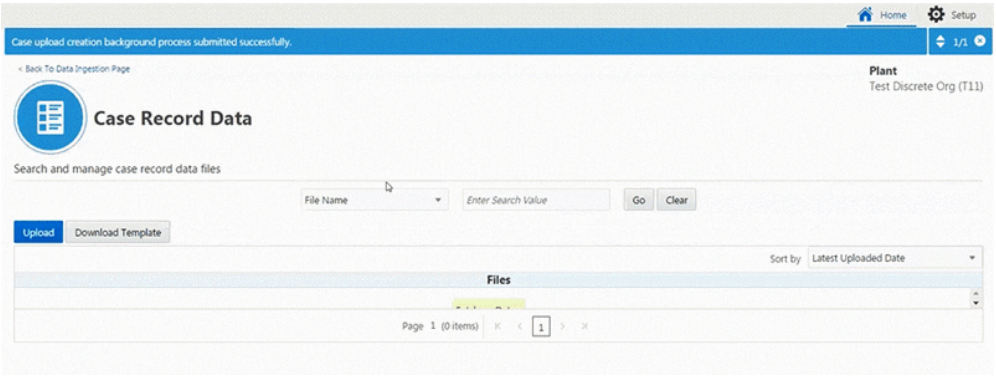
- From the current value stored in the application, if the quality feature already exists in the application either through manual entry or through upload creation.
- As null, if the quality feature does not already exist in the application. You must update the Unit of Measure.

10. Click **Cancel** to cancel the process. Click **Previous** to go back to the Context step. Click **Next**, to continue the upload.
11. In the Summary region, review the details of the information entered in the previous steps.
12. Click **Cancel** to cancel the process. Click **Previous** to go back to the Features Metadata step. Click **Next**, to continue the upload.



13. After review, click **Submit** to complete the file upload.

    Upon successful submission of the upload program, the Case Record Data Search and Results Page appears with the following message: Case upload creation background process submitted successfully.



To view the status of the background process, you can navigate to the Background Process page. See: Running Background Processes, *Oracle Adaptive Intelligent Apps for Manufacturing User's Guide*.

14. When you click Submit, the file appears in the list of uploads in the Case Record Data page, along with the details of file, the status, and actions that can be performed.

    The following information displays for the uploaded file:

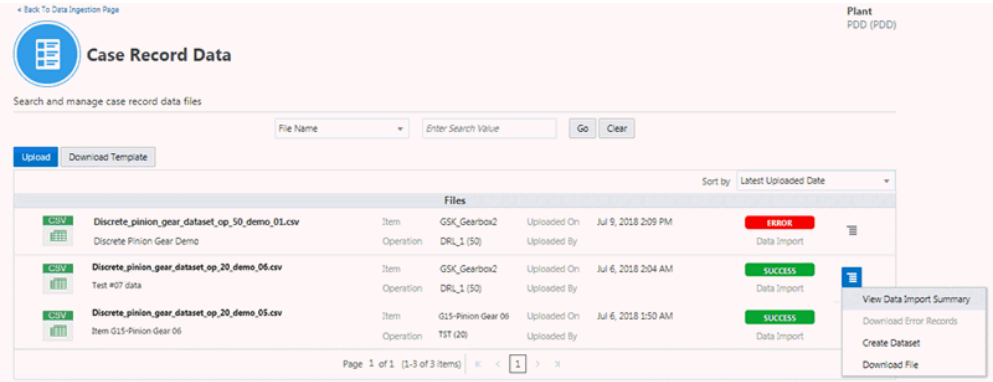
    - File Name
    - Description
    - Data Context Information:
        - Item
        - Operation
    - Uploaded On
    - Uploaded By
    - Status of the Upload:
        - IN PROGRESS: This indicates that the a file has been submitted and the background processing is in progress.
        - WARNING: This indicates that from a set of uploaded case records data, a subset has been imported successfully, but that the import of another subset has failed due to errors.
        - SUCCESS: This indicates that all case records data in the spreadsheet has been imported successfully.

- ERROR: This indicates that the import of all the case records data has failed due to errors.

- Action link

15. Click the Action link, next to the upload status that displays for an upload. Depending on the enabled actions available for you to perform, you can select from the following actions on the upload:

    - View Data Import Summary
    - Download Error Records
    - Create Dataset
    - Download File

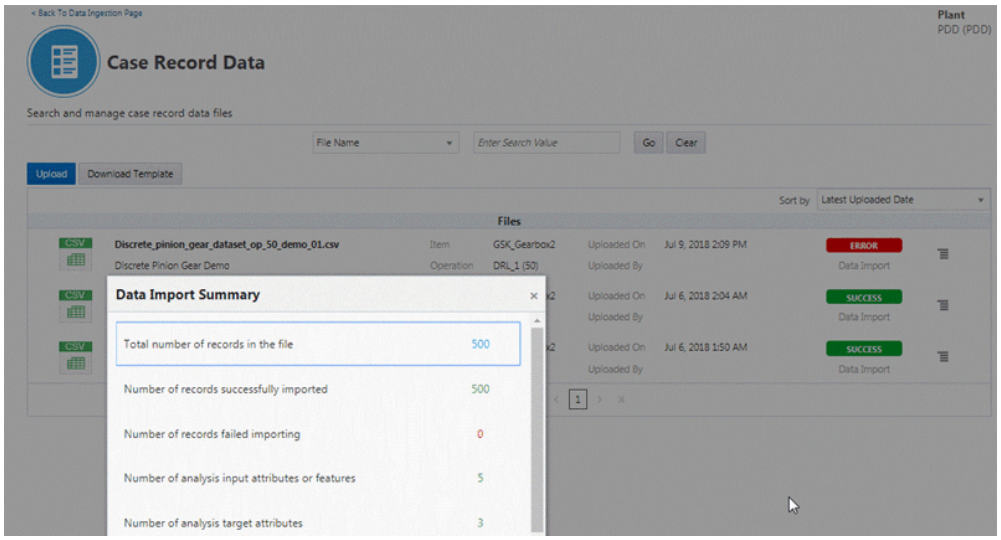


These actions are enabled or disabled, based on the status of the data import, as given in the following table:

Import Status	View Data Import Summary	Download Error Records	Create Dataset	Download File
IN PROGRESS	Disabled	Disabled	Disabled	Enabled
WARNING	Enabled	Enabled	Enabled	Enabled
SUCCESS	Enabled	Disabled	Enabled	Enabled
ERROR	Enabled	Enabled	Disabled	Enabled

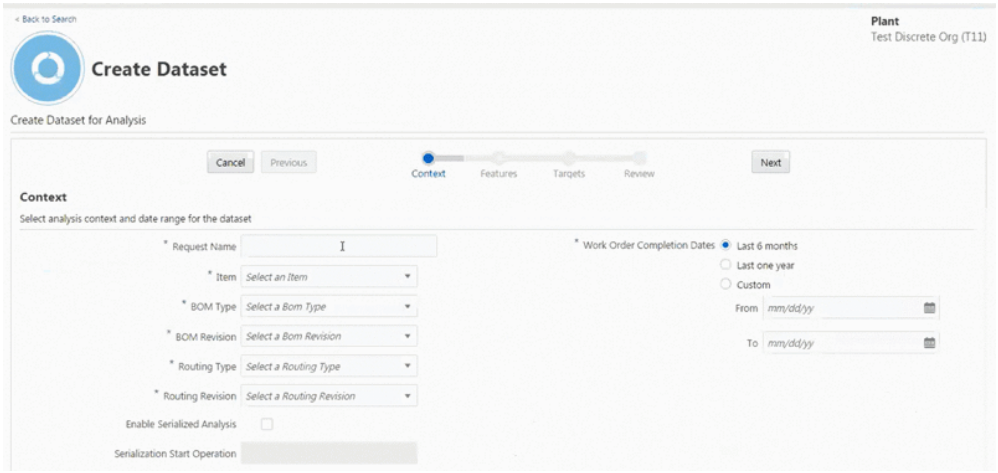
16. Click the View Data Import Summary action. You can view details like number of uploaded records, successful imports, failed imports, and the number of input features as well as the number of target output attributes which are defined in the spreadsheet. The Data Import Summary displays the following:

    - Total number of records in the file
    - Number of records successfully uploaded
    - Number of records failed importing
    - Number of analysis input attributes or features
    - Number of analysis target output attributes



17. Click the Download Error Records action. You can to download the CSV file containing all the errors records with error details to your local machine.

18. Click the Create Data Set action. You will be directed to the Create Dataset page which displays the context, feature, and target details which defaults from the Case Record Data file that was uploaded.



19. Click the Download Error Records action. You can to download the CSV file containing all the errors records with error details to your local machine.

    To prepare data you have uploaded for analysis, see Preparing Data, *Oracle Adaptive Intelligent Apps for Manufacturing User's Guide*.

Using Case Record Data Templates

AIAMFG provides the following case record data templates for process manufacturing and discrete manufacturing organizations:

Discrete Manufacturing Template

Tip: You can download the template as described in Uploading CSV Files Using the Case Record Data User Interface, page 5-3 or from this location [https://www.oracle.com/webfolder/technetwork/mfg/AIMDIG/ProcessCaseRecordDataTemplate.xlsx]..

Field Name	Required	Data Type	Length (Max)	Description	Sample Data
Item Category		Char	40	Item Category	Product
Item Number	Y	Char	40	Item Number	G15 Pinion Gear

Item Description	Y	Char	240	Item Description	Pinion Gear Assembly
BOM Type	Y	Char	10	BOM Type	Primary
BOM Revision	Y	Char	3	BOM Revision	A
Routing Type	Y	Char	10	Routing Type	Primary
Routing Revision	Y	Char	3	Routing Revision	A
Operation Sequence Number	Y	Number		Operation Sequence	10
Serialized Start Operation		Number		Required for Serial Analysis	10
Operation Code		Char	3	Operation Code	OPI
Work Order Number	Y	Char	240	Work Order Number	WO-PG-1001
Serial Number		Char	30	Required for Serial Analysis	SN00000100
Work Order Yield		Number		Required for Work Order Yield Analysis	90
Serial Unit Yield		Char		Required for Serial Unit Yield Analysis	ACCEPTED_WITH_FIRST_PASS

Serial Unit Operation Yield		Char		Required for Serial Unit Operation Yield Analysis	ACCEPTED_WITH_FIRST_PASS
Operation Yield		Number		Required for Operation Yield Analysis	90
Actual Start Date	Y	Date			01/01/2015 10:00:00
Actual End Date	Y	Date			01/02/2015 10:00:00
Categorical Features 1…450		Char	240	MainMtlSupplie MaterialGrade Column Name can be a max of 30 Characters.	John Smith High
Numerical Features 1...450		Number		InternalTemperature Vibration Column Name can be a max of 30 Characters.	120 80
Quality Features 1…30		Number		Q_SurfaceCrack Q_SurfaceCrack Column Name can be a max of 30 Characters.	.15 5.5

Note: The following maximum numbers of features are supported:

- 450 Categorical Features
- 450 Numerical Features
- 30 Quality Features

Process Manufacturing Template

Tip: You can download the template as described in Uploading CSV Files Using the Case Record Data User Interface, page 5-3 or from this location [https://www.oracle.com/webfolder/technetwork/mfg/AIMDIG/CaseRecordDataTemplate.xlsx]..

Field Name	Required	Data Type	Length (Max)	Description	Sample Data
Item Category		Char	40	Item Category	Product
Item Number	Y	Char	40	Item Number	Strawberry Jam
Item Description	Y	Char	240	Item Description	Bulk Processed Strawberry Jam
Item Revision		Char	3	Item Revision	A
Recipe Number	Y	Char	32	Recipe Number	Strawberry Jam
Recipe Version	Y	Number		Recipe Version	1
Step Number	Y	Number		Step Number	10
Operation Code	Y	Char	16	Operation Code	FILLINF

Work Order Number	Y	Char	32	Work Order Number	WO-PG-1001
Work Order Yield		Number		Required for Work Order Analysis	80
Operation Yield		Number		Required for Operation Yield Analysis	80
Actual Start Date	Y	Date			01/01/2015 10:00:00
Actual End Date	Y	Date			01/02/2015 10:00:00
Categorical Features 1…450		Char	240	MainMtlSupplie MaterialGrade Column Name can be a max of 30 Characters.	John Smith High
Numerical Features 1...450		Number		AyerageOvenTemp AverageVacuumTemp Column Name can be a max of 30 Characters.	120 80

Quality Features 1…30	Number	Q_PectinGrade Q_SolubleSolids Q_PhTest Column Name can be a max of 30 Characters.	50 60 3.4

Note: The following maximum numbers of features are supported:

- 450 Categorical Features
- 450 Numerical Features
- 30 Quality Features

Validating Case Record Data and Handling Errors

Case Record Data Validations:

The following are the validations for Case Record Data:

- Storage Cloud requires file names to be unique across a folder. To satisfy this requirement, case record data file names must be unique.
- Case record data in the template must match with the context organization. Context Organization is the organization that you select to access all AIMFG features and invoke the Data Ingestion user interfaces.
- The data context information must be identical for all records in the spreadsheet. You must upload a separate data file when the data context is different.
- For Date format fields, the time zone must be the same as the application server time zone and the data format must be MM/DD/YYYY HH24:MI:SS.
- Number fields can only have a maximum precision of five decimals.
- When multiple sets of data are imported for the same item or business context, the items are created the first time the import is submitted. Future import runs for the same item will reuse the existing item.

- When users upload a new case record data set that reuses an existing item, the program:
  - Creates new transactions. If there are existing transaction records, they will be updated.
  - Creates new customer predictors or updates custom predictors for existing transactions.
  - Creates new quality target measures or updates quality target measures for existing transactions.
- A case record data row can upload the following data elements:
  - Custom predictors or Input Features
  - Quality results
  - Operation and work order yield values
- Quality Attributes:
  - Add Quality Attributes as additional columns to the standard template.
  - The spreadsheet can support a maximum of 30 quality attributes.
  - To be categorized as a quality attribute, the column name must be prefixed with Q_. For example, Q_tensile_strength, Q_hardness, Q_noise_level, and so on.
  - Provide meaningful names for the attributes as this information will be provided as a default value in all related user interfaces.
  - Quality attribute names must be alphanumeric and an underscore is allowed.
  - Quality attribute data type must be numeric only.
- Input Features
  - Add Input Features as additional columns to the standard template.
  - The spreadsheet can support a maximum of 450 numerical and 450 categorical predictors.
  - Feature names are user defined and must not be prefixed with Q_. For example, mainMaterialSupplier, materialGrade, and so on.
  - Provide meaningful names for the attributes as this information will be provided as a default value in all related user interfaces.

    - Input Feature names must be alphanumeric and supports underscore only.

- For installations that use both Golden Gate synchronization and Case Record Data upload, it is required to create a new organization for case record data upload. The same organization cannot be used for both features. A separate organization must be created.

- As each import runs on MERGE mode, the transactions are always updated if they exist and inserted if they do not exist. If you have already created a model (or dataset), that model will refer to the old data set, whereas new models will refer to the updated data set.

- When the upload program errors out due to setup or context data, the user must fix the data before submitting the case record upload again.

- When the upload program errors out due to transactional data, the background processor will import transactions that were successfully validated and only error our incorrect transactions. You can download the file with the error transactions, fix the data, and upload the transactions in a new data file again.

Error Messages

The following are the error codes and mesages for Case Record Data:

Error Code	Error Message
DUPLICATE_SERIAL_NUMBER	Serial number already exists.
DUPLICATE_WORK_ORDER	Work order number already exists.
INCORRECT_SERIAL_OPRN_YIELD	Serial unit yield is missing or invalid
INCORRECT_SERIAL_YIELD	Serial unit operation yield is missing or invalid.
INVALID_OPRN_YIELD	Operation yield value is invalid
INVALID_RECIPE_ITEM_PAIR	Invalid Item for this Recipe. Another Item is already associated with this Recipe.
INVALID_STEP_OPRN_PAIR	Invalid Operation for this Recipe Step. Another operation is already associated with this step number of the Recipe.

INVALID_WORK_ORDER_YIELD	Work order yield value is invalid.
INVALID_WO_END_DATE	Work Order Actual End date is invalid.
INVALID_WO_RECIPE_PAIR	Work Order Number already exists for another Recipe.
INVALID_WO_START_DATE	Work order actual start date is invalid
OPRN_CODE_NULL	Operation Code not provided.
QUALITY_DESC_LENGTH	Target quality test description length is greater than 240 characters.
QUALITY_NAME_LENGTH	Target quality test name length is greater than 240 characters.
QUALITY_UOM_LENGTH	Target quality test UOM length is greater than 3 characters
RECIPE_NO_NULL	Recipe Number not provided.
TEST_NOT_NUMERIC	Target Quality Test datatype is not numeric.
WORK_ORDER_EXISTS	Work order already exists for a different Item, BOM or Routing combination.
INSERT_ERROR	This row cannot be inserted.
PARSE_ERROR	This row cannot be parsed.
INV_ORG_NAME_EXISTS	Organization name already exists.
INV_ORG_CODE_EXISTS	Organization code already exists.
INV_ORG_NOT_EXISTS	Organization is invalid.
INV_OPERATION_CODE_NULL	Operation code is missing.
INCORRECT_SERIAL_NUMBER	Serial number is missing or invalid.
INCORRECT_SERIAL_START_OPRN	Serial start operation is missing or invalid.