

Digital Transformation in Manufacturing: A Framework for Oracle Fusion Cloud Financials Adoption Using Modern Integration Platforms

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Abstract- Digital transformation in manufacturing organizations require a unified financial, supply chain, and operational backbone. Oracle Fusion Cloud Financials has emerged as a leading ERP platform for organizations seeking modernization, resilience, and real time decision making. This article presents a structured framework for adopting Fusion Financials using cloud native integration platforms such as Oracle Integration Cloud (OIC), Google Cloud Platform (GCP), and BigQuery (GBQ) based on real-world scenario. During Oracle Fusion Cloud Financials implementation, the Oracle Fusion Financials Integration is considered to be a critical component in the whole enterprise architecture where financial data (meta data and transaction) must seamlessly flow between multiple systems such as Order Management System (OMS), CRM, payroll, banking platforms, legacy ERPs, and third-party applications. During implementation lifecycle, integrations around Financials modules like General Ledger, Receivables, Payables, Purchasing, Cash Management will ensure data consistency, compliance and operation efficiency through data pipeline automation [1]. Oracle Fusion Financials Integration refers to the process of connecting Oracle Financial modules with external or internal systems to exchange financial data automatically.

Keywords— Oracle Fusion Cloud Financials; Ascend; OIC; GCP; BigQuery (GBQ); DBCS; FBDI; ERP Modernization; Manufacturing; Data Integration; UCM; Transform & Shift.

I. INTRODUCTION

Manufacturing organizations often operate with multiple legacy systems that have evolved over decades to support region specific business processes, regulatory requirements, and operational workflows. While these systems continue to serve daily transactional needs, they frequently lack the unified financial governance, cross functional visibility, and modern reporting capabilities required in today's global environment. As a result, many enterprises are adopting a hybrid modernization strategy in which legacy applications remain active for transactional processing, while Oracle Fusion Cloud Financials is introduced as the centralized enterprise accounting platform.

Under this model, Oracle Fusion Cloud Financials becomes the single source of truth for both transactional and accounting data. All master data and financial transactions generated in legacy systems are consolidated into Fusion for final accounting, management reporting, and statutory

compliance. This approach significantly improves financial accuracy, strengthens internal controls, and supports adherence to US GAAP, IFRS, and country specific regulatory reporting requirements. By centralizing financial processing in Fusion, organizations gain consistent accounting treatment, standardized reporting structures, and enhanced audit readiness across APAC, EMEA, LATAM, and NAM regions.

To achieve this level of integration and financial harmonization, Oracle Fusion Cloud Financials provides robust mechanisms for transaction automation and multi system interoperability [2]. However, high volume, multiregional data migration and synchronization require more than traditional point to point interfaces. Modern cloud native platforms play a critical role in enabling scalable data transformation, governance, and orchestration [3]. This article presents a solution framework for the manufacturing industry, demonstrating how inbound & outbound transactional data flow can be managed using cloud native architectures support to

ingest high volume data, region wise transformation, enterprise structure alignment, and controlled migration into Oracle Fusion Cloud Financials. The proposed inbound and outbound process flow models address the technical, operational, and governance challenges associated with cloud based ERP modernization and provides a structured pathway for organizations seeking to unify financial operations while preserving legacy transactional systems.

Scope of the document

Business Use Cases

Here are specific examples of external integration areas of Financials which are in scope of the article and framework. These are inbound and outbound integrations from / to Oracle Cloud ERP Financials. The data pipelines are created using the proposed framework to get the data from the source system in Fusion enterprise structure.

Module	Integration Type	FBDI based Import
General Ledger	Journal Import from external source system	Journal Import
Accounts Payable	Supplier Master data export from Oracle to Coupa.	It's outbound process
	AP Transaction (INV/CM/DM) Import from 3 rd party Coupa applications.	Payables Standard Invoice Import
Accounts Receivable	Customer Master AR Transaction (INV/CM/DM) Import from Order Management System (OMS)	Customer Import AutoInvoice Import
	Standard Customer Receipt Import	Receivables Standard Receipt Import
Cash Management	Bank Accounts Statements	Cash Management Bank Statement Data Import

Oracle Cloud support integration methods below:

- REST APIs (Primary approach)
- SOAP Web Services
- File-Based Data Import (FBDI)*
- ADFdi (Excel-based integration)
- Business Events (Event-driven integration)
- Oracle Integration Cloud (OIC)

*For the real-world example in the document, company has adopted File-Based Data Import (FBDI) automation through OIC integration approach across all major workstreams – Order-to Cash, Requisition-to Pay, Record-to Report and Acquire-to Retire.

2. Literature Review

Gartner's 2023 report on ERP modernization highlights that organizations with multi regional operations face significant challenges in harmonizing financial structures across legacy systems. To address this requirement, Oracle best practice suggest for integrating Fusion Cloud Financials with external systems using REST APIs, SOAP services, and FBDI based ingestion.

Gartner Report - Magic Quadrant for Data Integration Tools, 2025 shows what are the mandatory features required while selecting Data Integration Tool. The cloud platforms such as Google Cloud Platform (GCP) and BigQuery (GBQ) supports extraction, ingestion and delivery of data and high-volume data transformation. GBQ has capabilities of AI use ready, broad usability and Agentic Data Engineering while supporting ELT based enrichment, metadata cleansing, and enterprise structure alignment, which are critical for multiregional financial consolidation [4].

However, existing research lacks a unified architectural model that combines OIC, GCP, GBQ, DBCS, and FBDI into a single end to end framework. This article addresses that gap by presenting a comprehensive Transform & Shift based architecture tailored for manufacturing organizations undergoing Oracle Cloud ERP modernization.

3. Research Contribution

This article contributes a unique, real Oracle Cloud ERP implementation project-based validated framework for Oracle Fusion Cloud Financials modernization in manufacturing organizations. Its unique point lies in integrating multiple cloud native components — Oracle Integration Cloud (OIC), Google Cloud Platform (GCP), BigQuery (GBQ), Database Cloud Service (DBCS), and File Based Data Import (FBDI) — into a unified, scalable architecture for inbound and outbound flows.

This framework demonstrates how integration can be used to enable high volume, multi regional data ingestion, transformation, enrichment, and orchestration. The article also introduces a formalized Transform & Shift methodology for clean data migration, providing a structured approach for enterprise level financial harmonization. The inbound and outbound integration models show how automation can be achieved for organization without manual key-in operational transaction data while preserving legacy transactional systems.

III. INBOUND DATA MANAGEMENT

Business organizations typically have a recurring need to streamline management of inbound and outbound data in areas such as initial data conversion, master data creation and maintenance, regular transaction processing, and compliance [5]. Oracle ERP integration scenarios generally involve system-to-system integration flows between distinct on-premises systems, third-party or legacy systems, and Cloud systems.

Scenarios for all 4 regions where data from on-premises or external business source systems needs to be imported into Oracle Fusion Cloud Financials:

- Customer Master: Parties, Party Sites, PartySiteUses, Accounts, AccountSites, AccountSiteUses, Locations, CustomerProfile, CustomerBanks, ReceiptMethods
- Regular Receivable Billing Transactions (AR) – INV/CM/DM originating from on-premise source system needs to be imported into Oracle Fusion Accounts Receivable

- Customer Remittance files – Receipt Applications
- Import Accounts Payable Transactions from Coupa to Oracle Cloud ERP
- Journal Entries from the legacy applications which needs to be imported into Oracle Fusion General Ledger
- Bank Statements in BAI2 and MT940 formats

1. Solution Approach in Manufacturing company

Connecting Oracle Cloud Financials with external systems to exchange financial data automatically through Integration. (Data Pipeline)

The company has adopted the 'Transform and Shift' approach for region wise Customer Master, Billing, External Source GL Entries, Import Payable Transactions, Bank Statements. To handle region wise data volume for APAC, EMEA, LATAM, and NAM, the Google Cloud Platform (GCP) and Google BigQuery (GBQ) have been installed to act as a high-performance Transformation layer. The transformation business rules based on Oracle Fusion Financials enterprise architecture have been defined in the GCP layer to handle company code (Balancing Segment Value) as Legal Entity, Business Unit and Primary Ledger and COA value mapping.

Due to the scale, complexity, and regional diversity of the inbound integrations, Oracle Integration Cloud (OIC) alone cannot efficiently process or transform such large datasets. OIC has limitation in handling high volume ingestion, transformation, enrichment, and structured delivery into Oracle Fusion Cloud Financials directly from the source system.

For inbound integration, master and transactional data are first extracted from the source systems into the Ascend middleware, which acts as a controlled ingestion point. From Ascend, the data is transferred to Google Cloud Platform (GCP), where BigQuery (GBQ) performs large scale transformations and enrichment.

BigQuery (GBQ) enables region wise harmonization, metadata cleansing, and structural alignment based on mapping with Oracle Fusion's Chart of Accounts

(COA), Legal Entity (LE), Primary Ledger, and Business Unit (BU) configurations.

Once transformation is complete, the enriched dataset is extracted into Oracle Cloud (PaaS), specifically into the Database Cloud Service (DBCS) layer. DBCS serves as a secure, structured staging environment optimized for downstream ERP ingestion. OIC then retrieves the transformed data from DBCS, applies final validations, and formats the dataset into Fusion compliant FBDI templates (CSV files). These FBDI files are transmitted to the Universal Content Management (UCM) repository, from which Fusion's scheduled processes load the data into the appropriate interface tables for further validation and posting.

2. Automated Real-time End-to-End Inbound Orchestration Flow:

Process Steps

- Source Systems (OMS / External JE / Coupa / Kyriba Layer) — Region wise source systems APAC, EMEA, LATAM, and NAM generate transactional, master data (customers, suppliers, invoices) and bank files.
- Ascend Middleware (Data Extract P2) — Acts as the initial extraction layer, consolidating data from multiple source systems and preparing it for ETL processing.
- GBQ (ETL – Customers, AR Trax, AP Trx, GL Journals etc. P3) — Performs region wise and business unit wise data transformation and enrichment. GBQ aligns all data with Oracle Fusion enterprise structures — including Chart of Accounts (COA), Legal Entity (LE), Primary Ledger, and Business Unit (BU) setups.
- Ascend (Data Extract P3) — Extracts the transformed dataset from GBQ and transfers it securely to Oracle Cloud PaaS.
- Oracle Cloud – PaaS (P4/P5) —
- DBCS Layer: Validates and stages the transformed data in the Database Cloud Service layer
- OIC/FBDI Layer: Converts validated data into Fusion compliant FBDI templates (CSV files) for import. This is done through Trigger Adapter (scheduled integration), File Processing and ERP Adapter invocation.

Oracle Cloud Applications (P6)

- FBDI files are uploaded to the UCM folder.
- Loads data from the file on the UCM server to the respective Fusion subledger interface table(s). (Customer Master, Billing Transactions, Payables Trx, Bank Statement, GL External source journals etc)
- The system performs final validations and posts transactions to Fusion ledgers.
- Imports the data from the product interface table(s) to the respective Oracle ERP product main / base table(s).
- Extracts errors and logs into a ZIP file and IT needs to resolve it.
- Purges the interface and errors tables related to the respective import job.
- Notifies users upon completion of all ESS jobs using bell, email, or callback URL as defined in the payload.

3. Generating Inbound Data Files

The File-Based Data Import include integration templates to prepare external data for loading and importing. Each template includes table-specific instructions, guidelines, formatted spreadsheets, and best practices for preparing the data file for upload. Use the templates to ensure that your data confirms to the structure and format of the target application tables [6].

4. Architecture for Importing FBDI Files

The file-based data import process generates a file-based data import (FBDI) file, uploads the file to ERP, and then receives a callback from the ERP service. In Oracle Integration Cloud (OIC), use the ERP Adapter feature to implement bulk import that automates the uploading of data/property zip file to Content Manager (UCM) followed by invoking the ERP Integration service.

Oracle Integration can be used to schedule, package, load, and report on the success of data transfers into Oracle Cloud ERP by using following proposed architecture shown in the Fig-1 [7]:

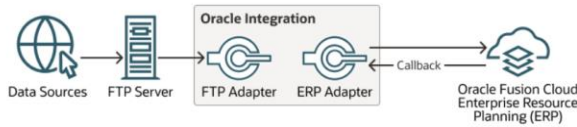


Figure-1: High Level illustration of FBDI based Oracle Cloud ERP integration

Importing file-based data for use in enterprise resource planning (ERP) uses the following services and technologies:

- Oracle Integration
- Oracle Fusion Cloud Enterprise Resource Planning (ERP)

These are the roles needed for each service.

5. Overview of FBDI Template Structure

The integration templates include the following characteristics:

- Each interface table is represented by a separate worksheet.
- Each interface table field is represented by a worksheet column with a header in the first row.
- Each column header contains with instruction / details text about the column.
- Columns are formatted where applicable to match the target field data type to eliminate data entry errors.
- The worksheet columns are in the order that the control file processes the data file.

6. Error Correction

The Load Interface File for Import process ends in error when the load of the data file fails for any individual row. The Load File to Interface child process ends as an error or warning. All rows that were loaded by the process are deleted and the entire batch of records is rejected.

If the import process fails with errors:

- Review the errors in the import log, download the zip file from the File Import and Export page.
- Correct the error records using the business object wise ADFdi correction spreadsheets. Select the erroneous data records from the interface file and correct them.
- Follow the FBDI process to resubmit the corrected data.

7. Purge – UI Based Approach

In addition to the automated approach, interface and error data can also be purged through the Oracle ERP Cloud user interface. Schedule New Process 'Purge Interface Tables' process with necessary parameters.

8. Process Flow

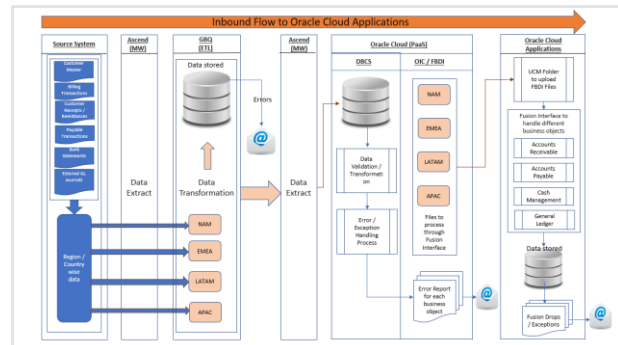


Figure-2: Inbound data import from Source System to Oracle Cloud ERP Applications

IV. OUTBOUND DATA MANAGEMENT

In any manufacturing organization, global statutory requirements drive data extract and reporting requirements. Mfg organization real-world use-cases for outbound integration:

- To extract data from Oracle Cloud ERP (Financials & SCM Applications) to perform additional downstream tasks. Here the use case is to send Customer Master and AR Transactions data to target system say High Radius (HRC) cloud applications or extract Supplier Data from Oracle Cloud Payables to target system Coupa to complete Requisition to Invoice processing flow. The business has huge data volume originating from APAC, EMEA, LATAM, and NAM geo locations and to handle Transactional data in Oracle Fusion Enterprise structure (Legal Entity-BSV, Business Unit, Primary Ledger), automation is required through integration.
- Update Customers' Bill-To Sites Balance back to Order Management System (OMS). (Ref to Inbound Process flow for Customer Master)
- Automated Payment data extract from Oracle Cloud Payments to update in Kyriba Cloud

applications to manage supplier payments through payment gateway.

- End-state reporting to statutory / tax authorities, third-parties or internal stakeholders. BI Publisher report capabilities with custom reporting tools.
- Oracle Business Intelligence Cloud Connector (BICC) can be used to extract business intelligence and other data in bulk and load it into designated external storage areas. BICC extract queries process very large volumes for mfg organization for each region.
- Extract data from Oracle Cloud ERP Applications to feed in Oracle Business Intelligence Publisher (BIP) - a reporting tool that can be used to create, manage, and deliver highly formatted documents.

1. Solution Approach for data extract from Oracle Cloud ERP and send to target system

To handle outbound integration, company has adopted the Middleware application to export and transform data from the Oracle ERP Cloud to external system(s). The Oracle ERP Integration Service is an external web service supporting the bulk data export along value-added operations to retrieve files and purge interface and error data.

High Level Flow

- The Ascend Middleware is used for initial data extraction layer and preparing it for ETL processing. It extracts incremental data from the Oracle ERP Cloud applications.
- GBQ Raw Layer is used to load the data through Ascend and validate it. Any exceptions from Ascend extraction will be send to the user to resolve it.
- Ascend will again extract data from GBQ Raw Layer and send to GBQ External Layer for data storing, validation and transformation and update the historical data within this layer.
- Finally, incremental (current) data will be sent to the external target system in .csv / .txt files.

2. Automated Real-time End-to-End Outbound Orchestration Flow

Process Steps

- Oracle ERP Cloud Applications (Source Layer): Generate structured data sets for various business objects, (payables transactions / payment files / BIP reports) for downstream processing.
- Ascend (Extract Data Layer): Extract data from Oracle Cloud ERP and moves data securely to the GBQ raw layer for ETL processing.
- GBQ Raw Layer: It performs initial loading and validation of extracted data. It runs validation to check completeness and format integrity, captures errors in dedicated repository, stores validated record and generates email notifications for exceptions.
- Ascend (Data Extract Layer – Stage2): It bridges the raw layer and the GBQ External Layer for data enrichment.
- GBQ External Layer (ETL – Transformation stage): It conducts transformation, validation and enrichment based on value sets maintain within it. It stores raw data, and segregate into Current, Error and Historical data sets. Generates error reports for audit and correction. Finally, it passes validated data through a Firewall for secure transmission to external target systems.
- Target System: Finally, data reaches to target systems like HRC, OMS, Coupa, Kyriba (Customers Balance, Supplier Bank Payment) etc. for operational or analytical / reporting use. It also generates interface error reports for user review and correction.

3. Process Flow

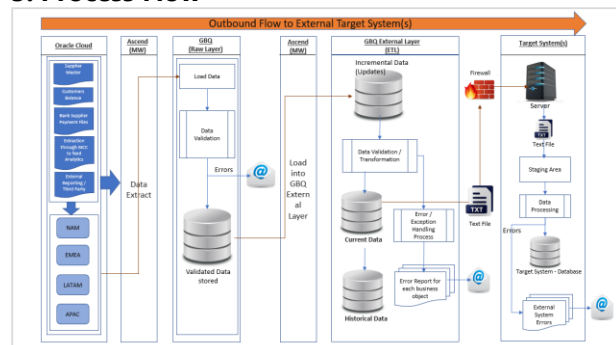


Figure-3: Outbound Flow from Oracle Cloud ERP applications data to Target System(s)

Best Practices for High Volume Data Import

It is recommended to perform these functional validation and performance optimization procedures in test environment for data import [8].

Data Cleansing

- Ensure data is in the correct format reduces the number of errors that are encountered during data import.
- Cleaning data may include Field Length, Data Type, Required / Optional, Conditionally Required, Foreign Keys.

Validate Functional Import

- Validate Functional Import in test environment with a small set of data. It will ensure the data is imported to the correct object, fields have been mapped correctly, and relationships are imported properly save the variations present in full data set.
- Identify any data issues that are reported in the import log files. Fix any specific issues reported for rows with errors.

Optimization Process

- To optimize high volume of data, allocate time for the actual import of data and for the design and optimization of the import process for your data set.
- Identify the number of records to be included in input data file as well as the number of concurrent import activities that can be activated. Trigger concurrent import activities by running more than multiple data import operations simultaneously to optimize concurrent import activities. This can improve your overall throughput v/s serially running the same imports.

Establish Baseline Performance

- After cleaning data and validation before import, you should begin the process of scaling up import volumes. To establish a performance baseline, perform a set of serial imports using a high volume of records is recommended. Oracle recommends to begin importing a small number of records (a few hundred to a few thousand) in a single import activity.

- After data import activities completed, note the time required to complete the import of records and calculate the overall throughput (number of records imported per sec).

Scale Up Import Volume

- After having established a baseline, you can increase the number of records in input file and begin to run multiple imports concurrently. Scale the volumes in a controlled manner and note throughput at every step.

Challenges

- High Level of architectural process flow is required to be finalized holistically considering all the major Oracle Cloud Financials workstreams.
- Additional tools, time, resources and mapping methodology with source systems are required
- Planning and development may be required for historical data conversion and reporting for workstream wise each business object
- Designing robust and scalable solutions using right integration approach for complex Transformations, Orchestration and Error Handling process.
- Acceptance of dependency on middleware and GBQ cost
- Managing Source system and historical data complexity and region wise mapping standards

V. CONCLUSION

The digital transformation journey for manufacturing organizations demands a unified, intelligent, and scalable financial backbone capable of integrating diverse regional systems and business processes. This article has demonstrated how Oracle Fusion Cloud Financials, supported by cloud native integration platforms such as Oracle Integration Cloud (OIC), Google Cloud Platform (GCP), and BigQuery (GBQ), provides a robust framework for achieving this goal.

The proposed Transform & Shift approach enables organizations to migrate clean, validated, and enriched data from legacy systems into Oracle Fusion applications while maintaining operational

continuity. By leveraging GCP and GBQ for high volume data transformation and enrichment, and OIC for orchestration and automation, enterprises can ensure seamless data flow across regions — APAC, EMEA, LATAM, and NAM — and across critical financial modules including General Ledger, Payables, Receivables, and Cash Management.

The inbound and outbound integration models outlined in this framework establish a repeatable pattern for managing complex data pipelines, ensuring compliance with US GAAP, IFRS, and local statutory requirements. The architecture promotes data governance, auditability, and performance optimization through structured validation, error handling, and automated scheduling.

Finally, this framework empowers manufacturing organizations to modernize their financial operations without disrupting existing transactional ecosystems. It transforms Oracle Fusion Cloud Financials into the single source of truth for enterprise accounting and reporting, driving consistency, transparency, and strategic decision making. The integration of cloud native technologies not only enhances scalability and resilience but also positions organizations for future innovations in analytics, automation, and AI driven financial management.

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