

Palantir Developer Technical Challenge: Business Process Automation and Ontology Design

Context

You have been hired as a Palantir Foundry developer at a mid-sized logistics company aiming to automate and streamline its supply chain operations. The company uses multiple systems to track orders, inventory, and shipments, but data silos prevent efficient decision-making. Your task is to integrate these datasets, create an ontology that allows for better business logic application, and develop a scalable system that can be leveraged for multiple business use cases.

Objective

- Ingest, clean, and integrate multiple datasets from different business systems.
 - Create an ontology that enables data interoperability and supports automation.
 - Develop a simple business process automation system that provides operational insights.
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Task 1: Data Integration and Ontology Definition

The company provides three datasets that (along with other information, includes):

1. Orders.csv

- `order_id`: Unique order identifier
- `customer_id`: Unique customer identifier
- `product_id`: ID of the purchased product
- `order_date`: Date of purchase
- `order_status`: Status (Pending, Shipped, Delivered, Canceled)

2. Inventory.csv

- `product_id`: Unique product identifier
- `warehouse_id`: Warehouse storing the product
- `stock_quantity`: Available stock

3. Shipments.csv

- `shipment_id`: Unique shipment identifier
- `order_id`: Associated order
- `carrier`: Shipping provider
- `status`: Shipment status (In Transit, Delivered, Delayed)

Requirements

- Load all datasets into Foundry or a python notebook.
- Identify and remove duplicate or inconsistent records.
- Convert dates into standardized formats.
- Design an **ontology model** that connects orders, inventory, and shipments, ensuring:
 - Orders are linked to shipments.
 - Products are associated with warehouse inventory.
 - Customers' order histories are trackable.
 - There are clear definitions for every data attribute.
 - There are clear constraints defined for the data.

Key Question: How does your ontology allow for cross-functional use of data beyond its original system (e.g., how can shipment data be leveraged to predict inventory needs)?

Task 2: Business Process Automation

Now that the ontology is defined, your next task is to automate an inventory replenishment process based on stock levels and order history.

Requirements

- Develop a logic that triggers **restocking recommendations** when stock levels fall below a threshold, considering:
 - The last 30 days of sales data.
 - The average shipment time from warehouses to customers.
- Output a list of **recommended restocks** with:
 - `product_id`, `warehouse_id`,
`recommended_restock_quantity`
- Write a script in the language of your choice to automate this recommendation logic.

Key Question: How does this automation reduce manual workload and improve business efficiency?

Task 3: Business Insights & Decision Making

With the system in place, your final task is to generate insights that help the company optimize its supply chain.

Requirements

- Calculate the **average delivery time** for shipments per carrier.
- Identify the **top 5 best-selling products** in the last quarter.
- Create a visualization showing **inventory shortages per warehouse** based on demand trends.

Optional Advanced Challenge:

- Propose an enhancement to the ontology that would **further optimize** logistics automation, such as integrating external supplier data.
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Delivery Requirements

- **Foundry Workbooks or Python notebooks** for data processing and automation logic.
 - **An ontology diagram** illustrating relationships between Orders, Inventory, and Shipments.
 - **A brief report (PDF)** explaining:
 - The approach taken for ontology design.
 - The automation logic.
 - The business value of your solution.
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Evaluation Criteria

1. **Ontology Design** – Does it enable interoperability across business functions?
2. **Automation Effectiveness** – How well does the system reduce manual effort?
3. **Code Quality & Performance** – Is the code structured, efficient, and documented?
4. **Business Impact** – Does the solution drive better decision-making?