Inventory – The Data Warehouse Toolkit

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# Case Facts

For a data warehouse to be useful, management must bring in all major operations into the data warehouse. Last week we discussed the architecture of the data warehouse for retail sales transactional data. This week we discuss another major business process, Inventory. Inventory is handled on two different levels before it reaches the retail sales end of business: Warehouse and Store. The below proposed summary of data warehouse design incorporates three different fact tables: Inventory Periodic Snapshot that records information per day for the last 30 days, Inventory Periodic Snapshot that summarizes information on a monthly basis, and an Inventory Accumulating Snapshot for the Warehouse side of business.

# Data Warehouse Concepts

## Step 1: Select the Business Process

The life cycle of the inventory process is as follows:

* Send a purchase order to a manufacturer
* Receive a delivery from a manufacturer
* Store product in the warehouse inventory
* Receive an order from a store
* Send an order to the store
* Product is at the store’s inventory
* Retail Sales

## Step 2: Declare the Grain

* One row per product offered, per month (Inventory Periodic Snapshot)
* One row per product offered, per day (Inventory Periodic Snapshot – Stored for 30 days)
* One row per product order (Inventory Accumulating Snapshot)

## Step 3: Identify the Dimensions/Attributes

* Month
  + Month Key (PK)
  + Month/Year
  + Number of Holidays
  + Season
* Date
  + Date Key (PK)
  + Calendar Date YYYY-MM-DD
  + Day of the Week
  + Quarter
  + Season
  + Holiday
  + Weekend
* Store
  + Store Key (PK)
  + Store Name
  + Store Address
  + Store City
  + Store State
  + Store Zip Code
  + Store Manager
* Product
  + Product Key (PK)
  + Product Description
* Warehouse
  + Warehouse Key (PK)
  + Warehouse Number (NK)
  + Warehouse Name
  + Warehouse Address
  + Warehouse City
  + Warehouse State
  + Warehouse Zip Code
  + Warehouse Total Square Footage
* Vendor
  + Vendor Key
  + Vendor Name
  + Vendor Address
  + Vendor City
  + Vendor State
  + Vendor Zip Code

### Grain-Dimension Table Summary

* One row per product offered, per month (Inventory Periodic Snapshot)
  + Month Key (FK) – Month Dimension
  + Product Key (FK) – Product Dimension
  + Store Key (FK) – Store Dimension
* One row per product offered, per day (Inventory Periodic Snapshot – Stored for 7 days)
  + Date Key (FK) – Date Dimension
  + Product Key (FK) – Product Dimension
  + Store Key (FK) – Store Dimension
* One row per product order (Inventory Accumulating Snapshot)
  + Product Key (FK) – Product Dimension
  + Warehouse Key (FK) – Warehouse Dimension
  + Vendor Key (FK) – Vendor Dimension
  + Date Received Key (FK) – Date Dimension
  + Date Inspected Key (FK) – Date Dimension
  + Date Bin Placement Key (FK) – Date Dimension
  + Date Initial Shipment Key (FK) – Date Dimension

## Step 4: Identify the Facts

* One row per product offered, per month (Inventory Periodic Snapshot)
  + Quantity On Hand
  + Quantity Sold
  + Inventory Dollar Value at Cost
  + Inventory Dollar Value at Latest Selling Price
* One row per product offered, per day (Inventory Periodic Snapshot – Stored for 7 days)
  + Quantity On Hand
  + Quantity Sold
  + Inventory Dollar Value at Cost
  + Inventory Dollar Value at Latest Selling Price
* One row per product order (Inventory Accumulating Snapshot)
  + Quantity Received
  + Quantity Inspected
  + Quantity Returned
  + Quantity Placed in BIN
  + Quantity Shipped to Store
  + Quantity Returned from Store
  + Quantity Damaged

# Summary

The above are details for the propose summary of data warehouse architecture for the inventory business process. You will begin to see that many of the dimension tables in this case study, are the same from the retail sales business process. Using the same dimension tables between different business processes will enhance our query results in order to better integrate data analysis between business processes.

The data for the inventory process is separated into 2 parts. The store level inventory for is summarized by two inventory snapshots based on recordings for every day for the past 30 days in one table and monthly recordings in the next. The inventory snapshot with daily, but limited information is purposed to provide short term analysis to managers who may be looking for more up to date and detailed information to make short term decisions. The monthly recordings provide historical information to supply management with to make long term strategic decisions. By storing the most recent information daily and more historical data in a summarized fashion instead of a transactional detailed method allows us to preserve storage capacity.

The data for the warehouse inventory levels are stored on an inventory accumulating snapshot table. This is beneficial because the warehouse inventory business process is more focused on timelines and bottlenecks. For example, a warehouse manager would be more concerned about how long did product take to arrive after sending a purchase order? How long do the products sit in the warehouse before sending to the store? It also answers questions of how many items are being returned for each purchase? How many items were inspected in each order? How many were damaged? If an abnormal or unacceptable number of products were being returned or damaged in a series of product orders, a data warehouse manager would be able to identify which vendor the products are coming from and take certain steps to rectify the issue. In contrast, perhaps it’s not the vendor, but a certain bin is defected and the products that are damaged are often as a result of being stored in a bin.

In summary, each fact table is designed to provide information relevant to the business process and will provide flexibility for any analysis management wishes to perform. Inventory and Retail Sales segment of the businesses rely on many of the same fact tables that provide even more flexibility for an end-to-end business operations analysis.