9.3.0 Sourcing Enhancements

Overview

- Real-Time Availability Monitor

- Smart Sourcing

Real-time Availability Monitor

- Business Problem
  - I want to be able to tell a customer browsing on a web site whether the item is available to purchase or not.
  - If the item is out of stock, prevent it from showing up on the web.

- Real-time Availability Monitor (RTAM)
  - Publishes inventory picture when it crosses a configurable threshold.
  - Triggered (YFS_INVENTORY_ACTIVITY) whenever an inventory adjustment of any type occurs.
    - Demand updated
    - Supply updated
  - Even though RTAM is triggered, it will only raise the event if the available quantity has crossed a threshold

RTAM Configuration

- Three modes that are configurable.
  - Full Synch: All items with inventory will have their availability calculated, YFS_INVENTORY_ALERTS (alerts) records created, and the event raised.
  - Quick Synch: All items with alerts will have their alerts published in the event.
  - Activity: Items who have a YFS_INVENTORY_ACTIVITY record will be processed.

RTAM: Activity-based Example (Pre-9.3.0 behavior)

- Thresholds configured
  - Low 0
  - Medium 1
  - High 10

- Available quantity is 15

- RTAM full synch created alert for 15 quantity.

- Order for 1 quantity is placed.
  - YFS_INVENTORY_ACTIVITY is created for order being placed.
  - RTAM picks up the activity and processes the item. No event raised as available quantity is 14 (above 10).

- Order is scheduled.
  - YFS_INVENTORY_ACTIVITY is created.
  - RTAM picks up the activity and processes the item. No event is raised as the available quantity is still 14.

- Order is released
  - Same behavior repeated.

Velocity Based RTAM

- Velocity: rate at which inventory is adjusted at a node

- As orders are placed and scheduled, the velocity of the item can be known.

- Based on this velocity, RTAM can predict when it needs to process the item.

Item Velocity

- Every 5 minutes, each JVM will dump data into the YFS_ITEM_NODE_VELOCITY_DUMP table containing the current velocities of that 5 minute period.

- A new agent will process these velocity dumps at an hourly rate and calculate the new peak velocity for the day (both hourly and 5 minute peaks)

- Each day's peak will be stored in YFS_ITEM_NODE_VELOCITY.

- This can be done manually as well with manageItemNodeVelocity API.

RTAM: Activity-based

- In 9.3.0, activities will not be created unless there is a net quantity change.

- Example
  - Releasing an order moves the demand from SCHEDULED to ALLOCATED
  - Normally, this would have caused an activity to be created as it is considered a demand change
  - However, since the net change is 0 (-1 SCHEDULED, +1 ALLOCATED) there is no need to have an activity

RTAM: Activity-based with Velocity Data

- When an activity is created, the time in which the threshold will change can be calculated based on peak velocity calculated.

- The above will be stored on the activity itself as NEXT_PROCESSING_TS.

- The peak hourly velocity used will be the max value in YFS_ITEM_NODE_VELOCITY for the item and node in the past configurable number of days .

- Allows for moving velocity rate

- During peak seasons, the velocity would be higher than other seasons

RTAM: Activity-based with Velocity Data

- RTAM only work on those items whose activities who have a NEXT_PROCESSING_TS in the next configurable number of minutes.

- If RTAM is configured to raise events on all availability changes, then RTAM will process all activities but in order of NEXT_PROCESSING_TS.

RTAM: Activity-based Example (9.3.0 behavior)

- Thresholds configured: Low=0, Medium=1, High=10

- Assuming velocity of 1 quantity an hour.

- Available quantity is 15

- RTAM full synch created alert for 15 quantity.

- Order for 1 quantity is placed for today (2014-03-06T08:00:00).
  - YFS_INVENTORY_ACTIVITY is created with NEXT_PROCESSING_TIME as 2014-03-06T13:00:00 (5 hours from now).
  - (Current available quantity (15) – next threshold (10))/(hourly velocity (1)) results in 5 hours. RTAM does not pick up this activity.

- Order is scheduled.
  - Activity record already exists. Nothing changes.

- 5 Hours Elapse
  - RTAM processes the activity and posts 14 available quantity. No event raised.

- Order is released
  - Activity not created as net availability has not changed.

RTAM: Suddenly Hot

- There may be cases where velocity for an item is really low and suddenly (due to a sale) the item may become hot.

- In such cases, the hourly velocity may not be accurate and the once created activity may need to be updated.

- A new agent is available to track the suddenly hotness of an item and update their activities so that RTAM will process them sooner.

RTAM: Suddenly Hot Example

- SKU123 has been on the market for some time, but a flyer has been leaked showing a 30% off sale.

- Normal velocity at the store is 1 quantity an hour with a peak of 1 in a 5 minute window.

- Current inventory at 100 would mean in 100 hours (or over 4 days).

- Within the first 5 minutes of the sale, 10 orders are placed.

- The suddenly hot agent will process the existing activity (which is said to run out in 4 days) and update it based on a new worst case peak based on the current data.

- Currently at 10 orders every 5 minutes (or 120 per hour), it would run out of stock in less than an hour. Thus activity will be updated to reflect this.

RTAM: Benefits

- Unnecessary processing of items can be reduced.

- Response times of RTAM allow for more items to be processed in the same amount of time.
  - Memory and processing overhead has been removed.
  - Refer to yfs.properties for yfs.rtam.algorithm for more information.

Smart Sourcing

- Business Reason
    - Shipping from store requires many nodes to be configured and sourcing rules to be broken down into smaller, more detailed chunks in order to meet acceptable response times.
    - Due to the hard configuration, the sourcing rules aren't dynamic.
    - Due to the region based sourcing, cost optimizations are not ideal.

- Smart Sourcing
    - Sourcing: Determining what nodes to read inventory for and optimize.
    - Smart Sourcing: Using RTAM node level alert data to determine the best configurable number of nodes to source from.
    - Reduces the amount of memory needed.
    - Only considers nodes with inventory.
    - Chooses the most ideal nodes based on your optimization type

Smart Sourcing: Optimization

- Cost
  - RTAM will update YFS_INVENTORY_ALERTS the estimated cost of the node for a particular item based on internal cost calculations including outbound handling costs and item costs.
  - Smart sourcing will determine the nodes to source from based on the cheaper cost.

- Date
  - Smart sourcing will determine the nodes to source from based on the earliest OnhandAvailableDate or FirstFutureAvailableDate.

- Others
  - RTAM will also populate the ship node's latitude and longitude.
  - Smart sourcing will use the latitude and longitude to determine the closest nodes.

Smart Sourcing: Consolidated Inventory

- In the context of multiple items, smart sourcing will take into account nodes that are common between the items.

- Common nodes will be considered to help reduce costs and number of shipments.

- Example
  - Item1 and Item2 are located in several stores across the nation.
  - But in the east coast, the items cannot be found in the same node.
  - Item1 and Item2 are located in Store100 on the west coast and is the only node that has both these items
  - Smart sourcing will consider the nodes that Item1 and Item2 are physically located in when shipping to a customer on the east coast.
  - In addition, it will pull in Store100 to be considered to help reduce the costs of shipping.

Smart Sourcing: Benefits

- Reduces memory overhead required for availability as less nodes are considered.

- Simplifies sourcing configuration; may no longer need to split distribution groups into region specifics.

- Improves response times when dealing with hundreds or thousands of nodes.
  - As a result reduces the locking time in such cases.

Questions

- Any questions?