COMPREHENSIVE QUESTION BANK

Subject: Retail Integration Architecture, SAP & MuleSoft

(Includes Previous Exam Sets 1, 2, 3 & Additional Practice Questions)

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1 UNIT I: Retail Ecosystem, OMS & WMS

Focus: Retail Strategy, Order Management Systems, Warehouse Operations, and Supply Chain Basics.

1.1 Short Answer Questions (2M / 3M)

1. Define **OMS** (Order Management System) and state its primary role in a modern retail ecosystem.
2. What is a **SKU** (Stock Keeping Unit) and why is it central to WMS operations?
3. Define **Dropshipping**. How does it differ from traditional retail fulfillment?
4. What is a **Planogram** in store operations?
5. Define **3PL** (Third-Party Logistics) in the context of retail fulfillment.
6. Differentiate between **Multichannel** and **Omnichannel** retail.
7. **[New]** What is the difference between ”Inventory Allocation” and ”Inventory Reservation”?
8. **[New]** Define **JIT** (Just-in-Time) inventory management.
9. **[New]** What is an **ASN** (Advance Shipping Notice)?
10. **[New]** Explain the term ”Reverse Logistics”.

1.2 Long Answer / Essay Questions (9M)

1. Explain the lifecycle of a Retail Order from placement on an E-commerce site to final delivery. Detail the roles of the **OMS**, **WMS**, and the Payment Gateway in this flow.
2. **Scenario:** A customer buys an item online but wants to pick it up in-store (BOPIS).
   - Explain the orchestration logic required in the OMS.
   - How does the OMS communicate with the specific Store’s inventory?
3. Discuss the functional architecture of a **WMS (Warehouse Management System)**. Explain the processes of Receiving, Put-away, Picking, Packing, and Shipping. How does MuleSoft trigger the ”Shipping Label Generation”?
4. Explain the core lifecycle of Retail: **Buy** $\rightarrow$ **Move** $\rightarrow$ **Sell**.
5. **Scenario:** A fashion retailer implements ”Endless Aisle” (ordering out-of-stock items in-store to be shipped to home). Explain the role of the OMS in viewing Global Inventory and how the POS interacts with APIs.
6. **[New] Scenario:** Handling Pre-Orders. How should an OMS handle an order for an item that has not yet arrived at the warehouse? Design a flow involving ”Backorder” status updates.
7. **[New]** Compare **Marketplace Integration** (e.g., selling on Amazon/eBay) vs. **Owned Channel** (own website). What are the specific integration challenges regarding inventory sync speed?

2 UNIT II: SAP Business Processes (OTC & PTP)

Focus: ERP Workflows, SAP Transactions, IDocs, and MuleSoft Integration Points.

2.1 Short Answer Questions (2M / 3M)

1. In an API-led architecture, which layer would directly interact with the SAP ERP system? Justify your answer.
2. Explain the term **PGI** (Post Goods Issue) in the context of SAP flows.
3. Define the **OTC** (Order to Cash) cycle.
4. List the standard SAP transaction code for creating a Sales Order.
5. What happens during the **Invoice Verification** step in SAP PTP?
6. **[New]** What is an **IDoc** (Intermediate Document) in SAP? Name its three structural records.
7. **[New]** Differentiate between an SAP **BAPI** (Synchronous) and an **IDoc** (Asynchronous).
8. **[New]** What is the purpose of the SAP **Partner Profile** (WE20)?

2.2 Long Answer / Essay Questions (9M)

1. Describe the **SAP OTC (Order to Cash)** process in detail. List the sequence of key SAP transactions (Sales Order $\rightarrow$ Delivery $\rightarrow$ PGI $\rightarrow$ Billing) and identify where MuleSoft integration points typically exist.
2. Compare and contrast **SAP OTC** and **SAP PTP (Procure to Pay)**. Explain why PTP is critical for Retail Supply Chain replenishment.
3. Explain the **SAP PTP (Procure to Pay)** cycle. Detail the flow from Purchase Requisition $\rightarrow$ PO $\rightarrow$ Goods Receipt (MIGO) $\rightarrow$ Invoice (MIRO).
4. Analyze the integration challenges in the OTC cycle. How do you handle a scenario where the SAP system is down during a Black Friday sale? Discuss the ”Store and Forward” pattern.
5. **[New] Scenario:** Real-time Pricing Check. A website needs to fetch customer-specific pricing from SAP S/4HANA.
   - Would you use an IDoc or a BAPI/OData service? Why?
   - Design a caching strategy in MuleSoft to prevent overloading SAP.
6. **[New]** Explain the structure of an IDoc (Control Record, Data Record, Status Record). How does MuleSoft interpret an IDoc status ”51” (Error) vs ”53” (Success)?

3 UNIT III: SAP CAR, POS & Inventory

Focus: Real-time Data, Point of Sale, Customer Activity Repository.

3.1 Short Answer Questions (2M / 3M)

1. What is the specific purpose of **SAP CAR** (Customer Activity Repository)?
2. What is the **TLOG** (Transaction Log) in SAP Retail?
3. Define **ATP** (Available to Promise).
4. What is a **Golden Record** in MDM?
5. **[New]** Define **OAA** (Omnichannel Article Availability) in SAP CAR.

6. **[New]** What is ”Clienteling” in a modern retail store?
7. **[New]** Explain the difference between ”Safe Stock” and ”Physical Stock”.

3.2 Long Answer / Essay Questions (9M)

1. What is **SAP CAR**? Explain its architecture and how it processes POS Data Transfer Logs (TLOGs) to provide real-time inventory visibility.
2. Compare **SAP ERP** (S/4HANA) and **SAP CAR**. Why can’t a retailer just use the ERP for real-time inventory checking?
3. Explain the flow of data involved in a **Return Merchandise Authorization (RMA)**. How does the system handle inventory updates when a customer returns a damaged item?
4. **Scenario:** A retailer has 500 physical stores. Explain the flow of data from a POS terminal scan to the SAP Backend.
5. The modern POS is more than a cash register. Discuss its role in Endless Aisle, Clienteling, and Store Inventory Management.
6. **[New] Scenario:** Loyalty Integration. A customer scans their app at the POS. Design the flow to:
   - Retrieve points balance (Real-time).
   - Update points after purchase (Async).

4 UNIT IV: Integration Architecture & Messaging

Focus: Anypoint MQ, IBM MQ, Reliability Patterns, API-led Connectivity.

4.1 Short Answer Questions (2M / 3M)

1. When integrating a high-volume ”Flash Sale” website, would you choose Anypoint MQ or HTTP? Explain.
2. Explain how a **Correlation ID** is used to track a lost retail order.
3. Explain the difference between a **Queue** and an **Exchange**.
4. Why should the **Experience API** never call the System API directly?
5. Explain the concept of ”Idempotency”.
6. **[New]** What is the **Circuit Breaker** pattern?
7. **[New]** Define **DLQ** (Dead Letter Queue) and its purpose.
8. **[New]** What is the difference between ”At-Least-Once” and ”Exactly-Once” delivery?

4.2 Long Answer / Essay Questions (9M)

1. Design an **Anypoint MQ** architecture for a retailer handling Black Friday traffic. Explain FIFO vs Standard queues and handling ”Poison Messages”.
2. Compare **IBM MQ** and **Anypoint MQ**. In a scenario connecting Salesforce Cloud to an on-premise Mainframe, which would you choose?

3. **Scenario:** Smart Shelf IoT. Design a 3-layer API architecture where sensors detect low stock. Where would you use MQ?
4. Explain **Transaction Tracking** in distributed architectures. How do you implement end-to-end tracing using headers and logging?
5. **[New] Scenario:** The "Claim Check" Pattern. You need to send a 50MB PDF invoice via a messaging system that only supports 10MB payloads. Design a solution using MuleSoft, Object Store/S3, and Anypoint MQ.
6. **[New]** Discuss the **Until Successful** scope in MuleSoft. How does it differ from a standard specific error handler with retries?

5 UNIT V: DataWeave & Transformation

Focus: Data Transformation Logic, Complex Mappings, Error Handling.

5.1 Short Answer Questions (2M / 3M)

1. Write a DataWeave expression to filter an array of Orders where status is "SHIPPED".
2. How do you prevent a `NullPointerException` using the `default` operator?
3. Write an expression using `flatten` to merge `[[1,2], [3,4]]`.
4. How does `distinctBy` help in processing duplicate records?
5. **[New]** What is the difference between `map` and `mapObject`?
6. **[New]** How do you import a custom DataWeave module (dwl file)?
7. **[New]** Write a script to format the current date as "yyyy-MM-dd".

5.2 Long Answer / Essay Questions (9M)

1. **Scenario:** XML to JSON. You receive an SAP IDoc line item list. Write a script to:
   - Transform to JSON.
   - Rename `id` to `sku`.
   - Filter out 0 stock.
   - Add `status: "AVAILABLE"`.
2. Explain the `reduce` operator. Write a script to calculate Total Order Value from `[{price: 100}, {price: 50}]`.
3. **Scenario:** Joining Arrays. Join an `Orders` array and a `Details` array based on a common ID into a single object structure.
4. Explain the `map`, `mapObject`, and `groupBy` operators. Provide a retail example grouping items by category.
5. **[New] Scenario:** Complex Mapping. You have a deeply nested JSON response from a legacy system.

```
{ "A": { "B": { "C": "Value" } } }
```

   Write a script using the **Multi-value selector** (`*`) and **Descendant selector** (`..`) to retrieve all keys named "C" regardless of depth.

6. **[New]** Explain **Pattern Matching** in DataWeave using the `match` case. Write a function that takes a Status Code (String) and returns ”Success” for ”200”, ”Client Error” for ”400”, and ”Server Error” for everything else.