

SMART WAREHOUSE

Distributed System

Designing and building distributed systems

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1 Introduction

This proposal is developing application domain for the Smart Warehouse. The Smart Warehouse means that it provides some smart services (Inventory Management Service, Order Management Service, and Tracking Delivery Service in here) and these services interact each other with their data.

- Domain Description

Purpose of the services is for managing the warehouse with smart and automatic environment. So, it allows administrations to manage warehouse without problems (e.g., Inventory mismatch, missing ordered items, unable to track product status and so on).

The Smart warehouse application will be developed with program language (Java) and gRPC.

2 Service 1: Inventory Management Service

This service provides 3 main functionalities (Check Item, Modify Quantity, and Alert Out of Stock). And the services are interacting with the other services. So, it helps to make sure for administrative to maintain sufficient the number of Items. The detail functionalities of these services is like below.

2.1 Method

2.1.1 RPC Method 1 : Check Item (Unary RPC)

- The client sends a request with Item ID to server and server checks the quantity of the corresponding Item. And server returns the current quantity.

Request	Response
- Item ID	- Current Quantities

2.1.2 RPC Method 2 : Modify Quantity (Client Streaming RPC)

- The client can send multiple requests to the server to modify the quantities. After the client sends the last request, the server can send a response message to return the results.

Request	Response
- Item ID - Quantity	- Success/Failure Message

2.1.3 RPC Method 3 : Alert Out of Stock (Server Streaming RPC)

- The client can receive multiple messages for the products with low inventory quantities. Through this method, the client can monitor the inventory situation in real time and take appropriate actions.

Request	Response
- Threshold	- Alert Message (Item ID + Quantity)

3 Service 2: Order Management Service

This service is for managing order system. It provides 3 functionalities (Create Order, Update Order Status, and Cancel Order). It helps clients to check and update information in real time. The detail functionalities of these services is like below.

3.1 Methods

3.1.1 RPC Method 1 : Create Order (Unary RPC)

- The client sends a request to the server with Customer Name, Item ID, and Quantity. The server returns an Order ID, Current Status and a Success/Failure Message. This method lets client know if their order is created or not.

Request	Response
<ul style="list-style-type: none">- Customer Name- Item ID- Quantity	<ul style="list-style-type: none">- Order ID- Current Status- Success/Failure Message

3.1.2 RPC Method 2 : Update Order Status (Bi-Directional Streaming RPC)

- The client sends a request with Order ID and New Status of the order to be updated and the server updates the status of the corresponding Order ID. At the same time, the server can also receive multiple requests from client and return to client many times.

Request	Response
<ul style="list-style-type: none">- Order ID- New Status	<ul style="list-style-type: none">- Order ID- Current Status

3.1.3 RPC Method 3 : Cancel Order (Unary RPC)

- The client sends a request with Order ID that client wants to cancel. The server checks if the order corresponding with the Order ID exists or not and processes the cancellation. And then returns a success/failure message.

Request	Response
<ul style="list-style-type: none">- Order ID	<ul style="list-style-type: none">- Success/Failure Message

4 Service 3: Tracking Delivery Service

This service provides 2 functionalities (Check Shipping Details and Update Shipping Details). It helps clients to check and update information in real time. The detail functionalities of these services is like below.

4.1 Method

4.1.1 RPC Method 1 : Check Shipping Details (Server Streaming RPC)

- The client can check real-time shipping details whenever the order status changes. The client can continuously monitor the Delivery Detail, Current Location, and Estimated Delivery Date.

Request	Response
- Order ID	- Delivery Detail - Current Location - Estimated Delivery Date

4.1.2 RPC Method 2 : Update Shipping Details (Client Streaming RPC)

- The client can send multiple requests to the server to update the shipping details. After the client sends the last request message, the server can send a Response message to return the results.

Request	Response
- Order ID - New Delivery Details	- Success/Failure Message