

# Case Study: Uniside Enterprise E-Commerce Platform

Uniside Global Services Inc. is an e-commerce service provider for small to medium-sized businesses. It provides the following services:

- Online Web Shop – A branded e-commerce experience where businesses can maintain product content catalogs for items that can be sold online.
- Payment Integration – To facilitate movement of funds between customers, service providers and shop owners by offering integrations with credit card networks, traditional banking services, and financial liquidity providers.
- Inventory and Warehousing – The company offers inventory storage close to customers by forecasting demand to pre-position the right number of items at the right time to offer a next business day delivery experience.
- Fulfillment – Uniside Global Services' network of warehousing, fulfillment and delivery partners allows it to tap the next best available delivery services for its customers.

## Platform Overview

The E-Commerce platform consists of five subsystems, each owned by a different department:

### Web shop

The web shop subsystem is responsible for displaying the products and their details, such as the price, description, images, reviews, etc. It also handles the shopping cart and the checkout process, where the customer can enter their personal and payment information and place the order. The web shop subsystem communicates with the payment subsystem to process the payment, and with the inventory subsystem to check the availability of the products. It also provides information on order status.

### Payment

The payment subsystem is responsible for processing the payment for the order, using a third-party payment gateway or a liquidity provider. It enables payments via credit card, e-Wallet, direct bank deposits and "Buy Now, Pay Later" (BNPL) schemes. It verifies buyer information, authorizes the transaction, and sends a confirmation to the web shop subsystem. The payment subsystem also handles refunds and chargebacks, if any.

### Inventory

The inventory subsystem is responsible for managing inventory of the products, such as the quantity, location, and status. It updates the inventory whenever a product is sold, returned, or moved. It also communicates with the web shop subsystem to provide the availability of the products, and with the fulfillment subsystem to provide the details of the products to be shipped.

## Fraud detection

The fraud detection subsystem is responsible for detecting and preventing fraudulent orders, using a machine learning model. It analyzes the order details, such as the customer information, the payment information, the product information, etc., and assigns a fraud score to each order. It also flags the orders that exceed a certain threshold of fraud score and sends them to the fraud prevention team for manual review. The fraud detection subsystem communicates with the web shop subsystem and the payment subsystem to receive the order details, and with the fulfillment subsystem to block the fulfillment of the fraudulent orders.

## Delivery & Fulfillment

The fulfillment subsystem is responsible for fulfilling the orders. It receives order details from the inventory subsystem and assigns the order to a warehouse that has the products in stock. For large orders, items may be requested from multiple warehouses in different geographical locations if inventory from a single site is insufficient to fulfill the whole order. It also estimates shipping dates, prints the shipping labels, packs the products, and ships them to the customer. It also updates the order status and sends a shipping confirmation email to the customer. The fulfillment subsystem communicates with the web shop subsystem and the payment subsystem to update the order status, and with the fraud detection subsystem to check the fraud score of the orders. It also coordinates delivery with couriers, selecting the next best choice of providers depending on the customer's delivery address and service fees.

## Backoffice

The backoffice application is used by agents to handle exceptional events in the end-to-end sales process that need human intervention. Orders will not move on to the next phase of the process in the absence of active approval or denial of the state of the order. Exceptional events include:

- Insufficient Inventory Detected – Need to reach out to buyers when inventory is not sufficient to fulfill an order. A decision from the customer (either to cancel the order, change the order or wait until inventory is available) is necessary for the order to move to the next phase.
- Fraud score threshold breached – If the fraud detection system calculated a high enough fraud score, an order must be stopped from further processing to request more information from the customer. This event may occur at any stage of the sales process.
- Payment Method Rejected – For “Buy now, pay later” (BNPL) schemes, a liquidity provider may refuse to send payment due to various factors. Intervention is necessary to clarify payment issues.
- Payment Reconciliation Failed – The payment gateway may report that a chargeback occurred prior to fulfillment. Another case is when the expected remittance from the payment service provider was not credited to the designated bank account.
- Shipment Partner Assignment Failed – Delivery service providers could not be assigned due to budget limitations or availability of personnel. Need to acquire approval from seller to increase delivery budget to entice service providers to take the delivery request.

- Shipment Failed – A courier may report that the shipment failed, so a decision has to be made to figure out how to proceed with the delivery of items.

## Systems Analysis Workshop

During the interview, you'll need to:

- Depict high-level interactions between subsystems using a simple block diagram, showing transmitted data modeled as messages.
- Draw a simple workflow diagram of the order lifecycle: From user's webshop interactions to delivery completion.
- Explain how you would investigate a complaint from a customer whose order was successfully accepted in the webshop but remains in "Pending" for more than 10 business days by asking the interviewer several relevant questions to probe about how the system works.