

The Return Fraud Prevention in Reverse Logistics at X Retail

Source: 'Preventing Return Fraud in Reverse Logistics—A Case Study of ESPRES Solution by Ethereum' [1]

Aim: Analyze and develop solution strategies using knowledge presented in "Coding Basics"

Read the Section 1 through Section 2.2 in the source paper before starting this case study.

X retail has one headquarter (HQ) and four warehouses (WH) that are used for distribution (see Figure 1 for illustration). Warehouses 1, 2 and 4 can be used for shipping products to customers and accept returns from customers while Warehouse 3 can be used only for shipping and not accepting any returns. Warehouse 3 is designated as return collection and processing area, for this reason, other warehouses must ship the returned products to Warehouse 3. Every record regarding shipments and returns go to HQ for inventory information.

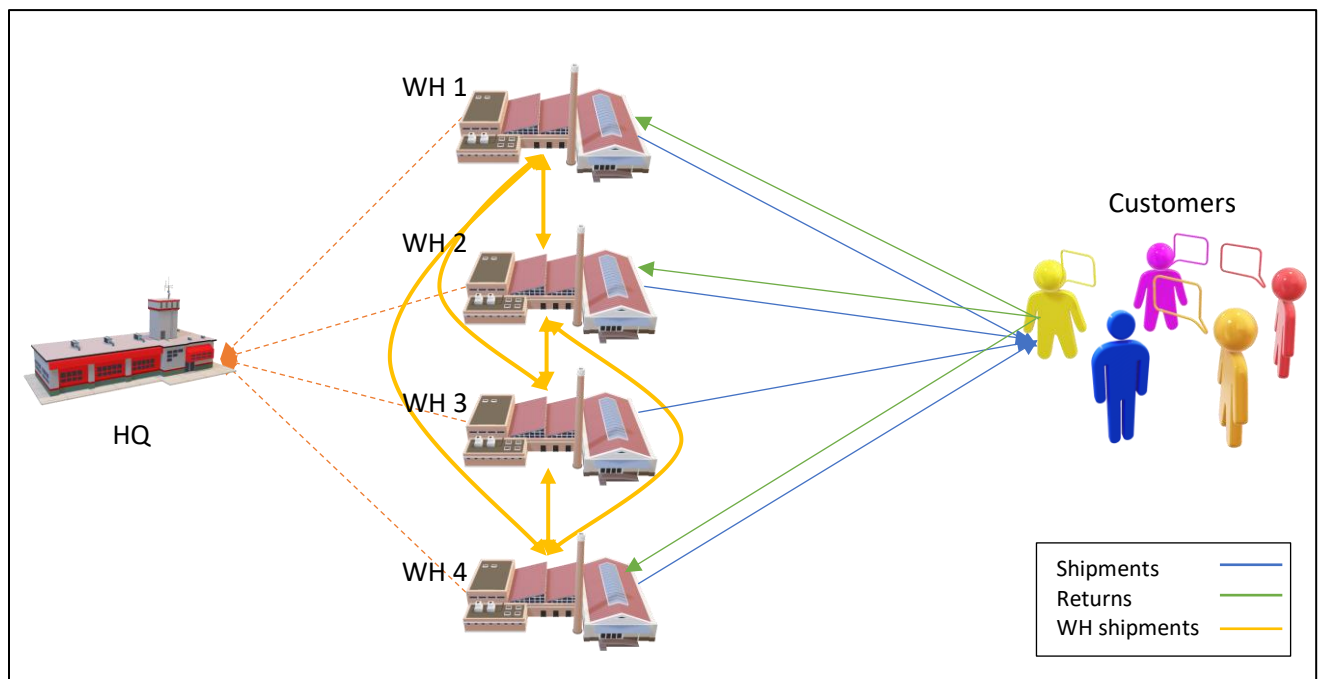


Figure 1 Service Network for X Retail

Cost of shipping and handling between warehouses are given in Table 1.

Table 1 Shipping and handling cost matrix between warehouses

	WH1	WH 2	WH 3	WH 4
WH 1	-	\$8	\$12	\$18
WH 2	\$8	-	\$10	\$15
WH 3	\$12	\$10	-	\$7
WH 4	\$18	\$15	\$7	-

Cost of shipping and handling from warehouse to customers and vice versa are given in Table 2. Note that WH 3 does not accept returns from customers, therefore costs for WH 3 on the Table 2 should be only used for shipments from WH 3 to customers, not vice versa.

Table 2 Shipping and handling cost matrix from warehouses to customers and vice versa

	Customer (<5 miles)	Customer (5 to 10 miles)	Customer (>10 miles)
WH 1	\$4	\$8	\$12
WH 2	\$6	\$7	\$14
WH 3	\$5	\$10	\$10
WH 4	\$8	\$11	\$15

Answer the following questions.

- 1) Explain the benefits of reverse logistics. Elaborate the economic impacts on buyers and sellers.
- 2) Provide your own definition of digital footprint (DF). Discuss briefly what this DF could be and its relation to preventing return fraud in reverse logistics. (Hint: elaborate your thoughts on what kind of information could your defined “digital footprint” store, and what type of analytics could be performed using these information.)
- 3) Summarize the kind of information about the buyer that would be useful to determine fraudulent returns, as discussed [1]. Identify proper variable class (e.g., string, float) for each of these information.
- 4) Write a short program that asks to a customer the following information.
 - Name
 - Last Name
 - Email Address
 - Age
 - Address
 - Zip Code
 - State
 - Phone Number
 - Name of the Product
 - Value of the Product in USD

Your program should consider the following validation rules.

- a. Make all the letters lowercase in string values.
 - b. Phone number should not be longer than 10 characters. If an entry is longer than 10 characters, the program will return the message ‘Phone number cannot be more than 10 characters.’ and ask customer to re-enter a valid phone number.
 - c. Zip code cannot be a negative value. If an entry is negative, return the message ‘Zip code is wrong’ and prompt the user to enter all the information again. If the zip code is valid, prompt the user with a message ‘Information are entered correctly’. (Hint: Use while loop.)
- 5) Write a short program to perform the following tasks.

- a. Ask customer to enter which WH they would like to return the product and enter an estimated distance (in miles). Once completed and confirmed, the program will return a price quote as per Table 1. Due to the limited scope of the current knowledge area, confirmation is granted without retrieving and checking from an internal database.
 - b. Ask customer if they want to change their choice of warehouse as Y/N question. If the answer is Y, then ask again which WH they would like to use and quote the new price accordingly. If answer is N, print the message 'Return warehouse is {WH name}.' Check if the chosen WH is accepting returns, if not then print 'You cannot choose {WH name} for returning your product.'
 - c. Calculate the cost of handling and shipping from {WH name} to WH3.
- 6) The source paper [1] suggests that 40% of the mobile phones would be used in fraud. Develop a short program for mobile phones to perform the following.
- a. Ask customer to enter length, width, depth and weight of the package in centimeter and gram, respectively.
 - b. Define a function that uses below formula to calculate the volume of the package.
Centimeter cube formula = $L \times W \times D$
 - c. Check if the entered values for length, width and depth comply with the following inspection rule.
If volume is between 1200 cm^3 to 1700 cm^3 then print 'information is correct', otherwise print 'information is not correct'
If weight is between 50 g and 150 g, then print 'information is correct', otherwise print 'information is not correct'.
- 7) Write a short program that will:
- a. Prompt users to enter a phone number, state name and number of the products to return. Number of products cannot be more than 5.
 - b. For each product, prompt users to enter name of the products as many as defined in a.
 - c. Define a custom function to use phone number and state name as inputs. Take the last 4-digits of the phone number, the first 2 letter of the state and the product name in capital letters to create a return code and print the message 'Return code {Return Code} has been created for {Product Name}.'

References

- [1] Shih, Dong-Her, Feng-Chuan Huang, Chia-Yi Chieh, Ming-Hung Shih, and Ting-Wei Wu. "Preventing Return Fraud in Reverse Logistics—A Case Study of ESPRES Solution by Ethereum." *Journal of Theoretical and Applied Electronic Commerce Research*, vol. 16, no. 6, Sept. 2021, pp. 2170–91., <https://doi.org/10.3390/jtaer16060121>.