Data Analyst – Technical Test Answers

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1. What are your strategies to enable self-service analytics in the company?

A. Introduction

a. What is self-service business intelligence (SSBI)?

Self-service business intelligence is an approach that empowers business users to perform data analytics such as filter, sort, analyse, and visualize on their own without the needs for BI background or related fields.

b. What are the benefits of SSBI?

- Business users will be able to do their own ad-hoc analysis, meaning that BI and IT teams can focus more on higher-value priorities that require more technical skills.
- Accelerates business processes and decision-making.
- Creates a fully data-driven culture in the organization.

B. Strategies

a. Overview

My strategies would involve using specific application/software for the data input process so that the values are all in the uniform format. The data values will then be stored in a database server. Lastly, Tableau will be able to read the server database as a data source which will then able to continuously monitor the updates in the database.

b. Technology/tools that could be used

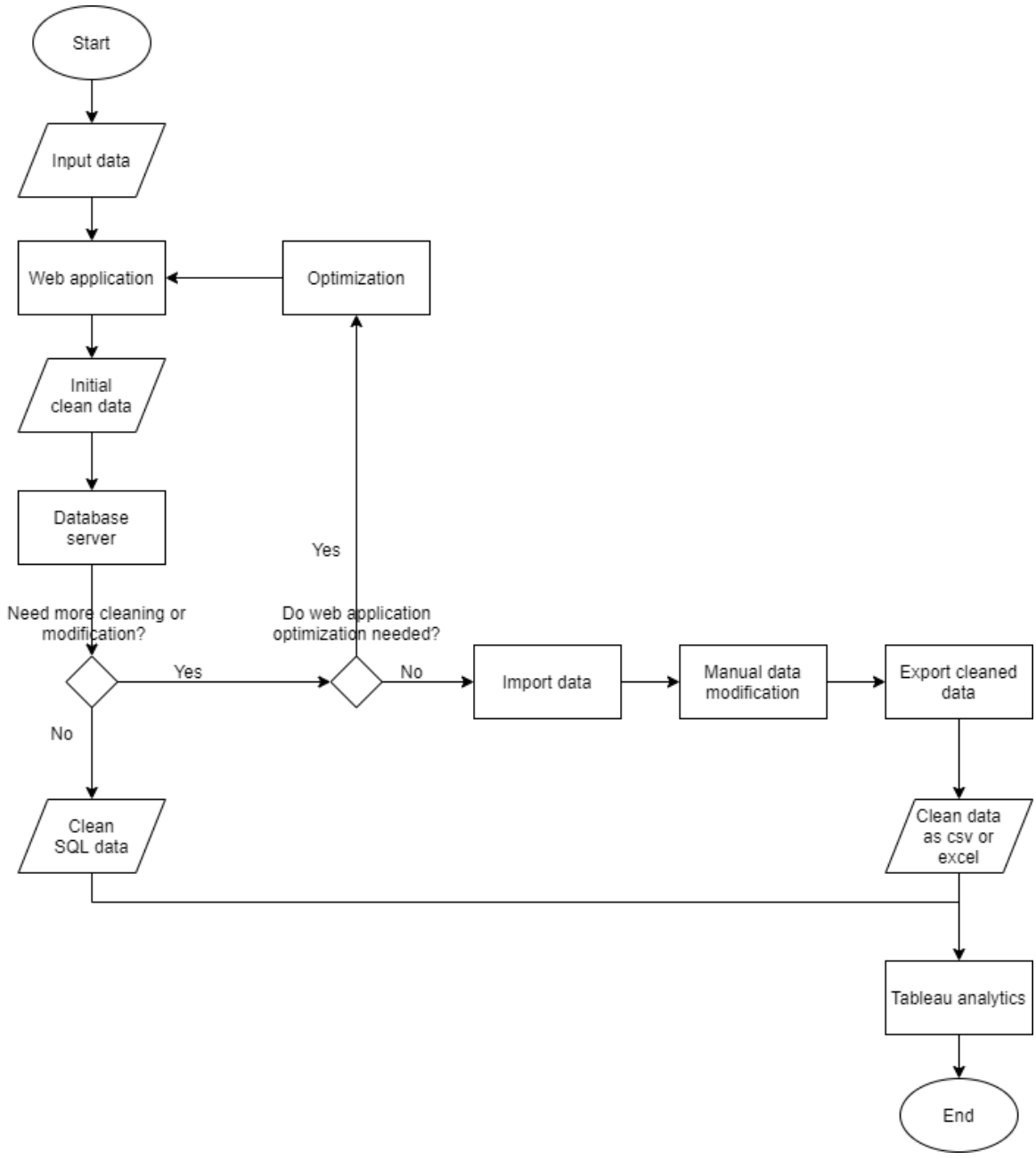
- Web application (with APIs)
- Python libraries
- Database server
- Tableau

c. Why Tableau?

Tableau is known for taking any kind of data from almost any system, and turning it into actionable insights with speed and ease. Tableau makes exploring data more intuitively and easily with only dragging and dropping the components. Tableau also supports different

devices such as mobile phone or tablet for displaying dashboards. Moreover, Tableau community has more than one million of active, diverse, creative, and supportive members worldwide.

d. Flowchart



Description:

- *Input data:* useful information such as names, location, dates, etc
- *Web application:* from my own experience and knowledge, web application can be built with backend and frontend development. The former requires API, which can be

developed using Python Flask, and database management while the latter JavaScript. This web application includes component like textboxes, dropdowns, buttons, etc.

- *Initial clean data:* data sent to the database after hitting the 'submit' button.
- *Database server:* Server to store data, e.g., using MySQL.
- *Clean SQL data:* data if the initial clean data does not need further cleaning or modification.
- *Optimization:* Optimize or modify the web application if further cleaning or modification needed and crucial for base data input.

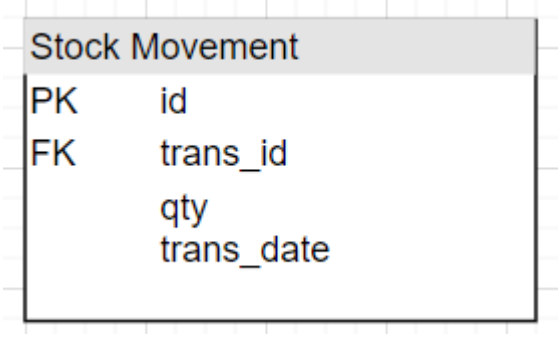
  For example, there is a column addition in database server. An additional input component will be needed in the web application.
- *Import data:* data from server will be imported if there is no need to optimize or modify the web application.
- *Manual data modification:* Data cleaning using tools like Pandas or NumPy.
- *Export cleaned data:* Export the data that had been cleaned or modified to csv or excel file.
- *Clean data as csv or excel:* data after manual cleaning and modification.
- *Tableau analytics:* Data either from SQL or as csv or excel file will then be analysed and visualized using tools in Tableau.

e. What will be our role as data analysts?

If self-service business intelligence is going to be implemented, as a data analyst, while we can help business users analyzing and visualizing using Tableau, we can also do database maintenance and produce cleaned data when needed.

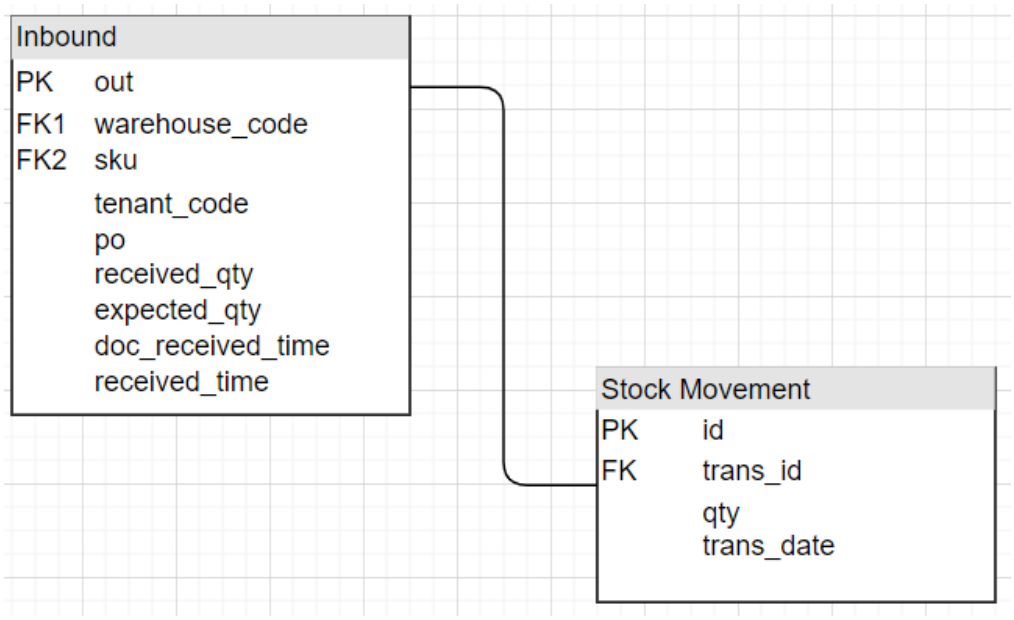
2. Please create a data warehouse schema and explain your steps.

a) Stock Movement



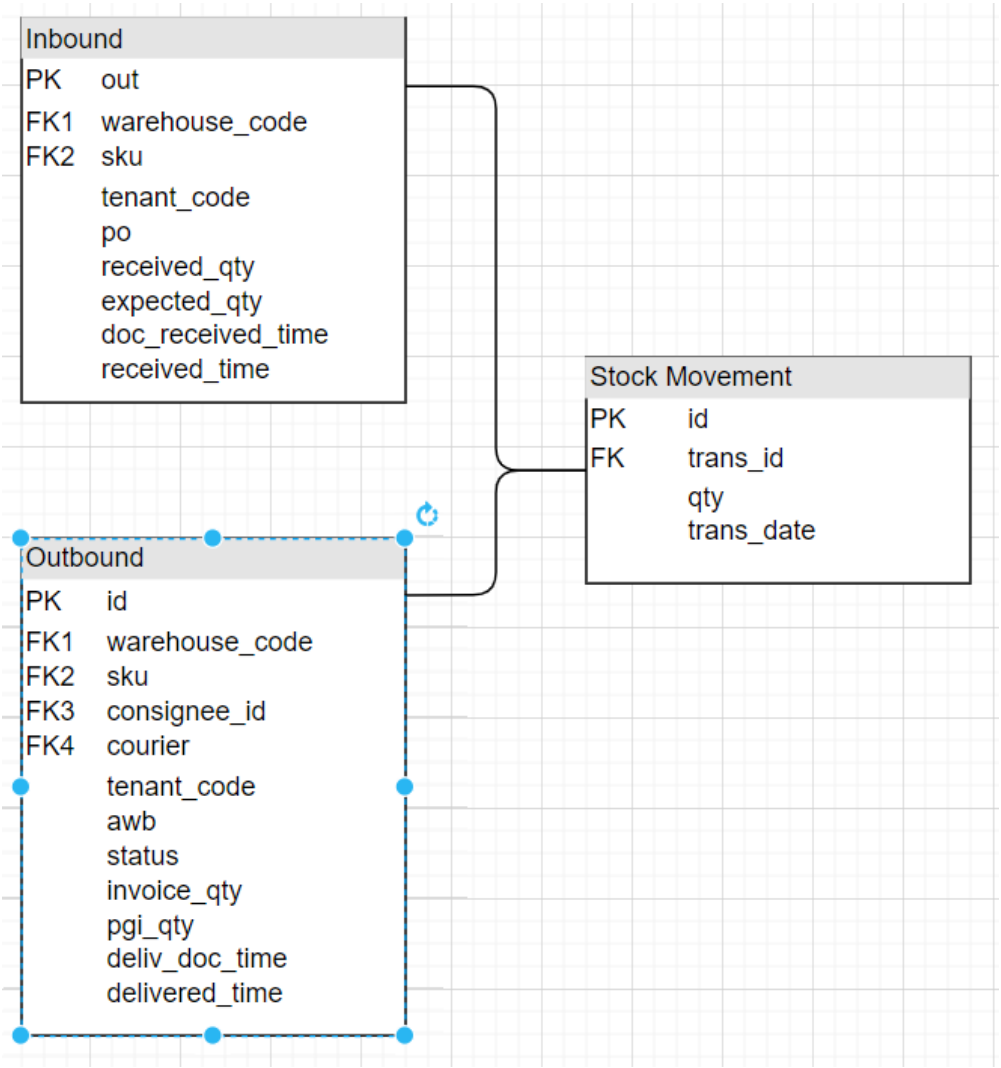
Stock Movement table has attributes: `id`, `trans_id`, `qty`, and `trans_date` with `id` as the primary key and `trans_id` as a foreign key.

b) Inbound



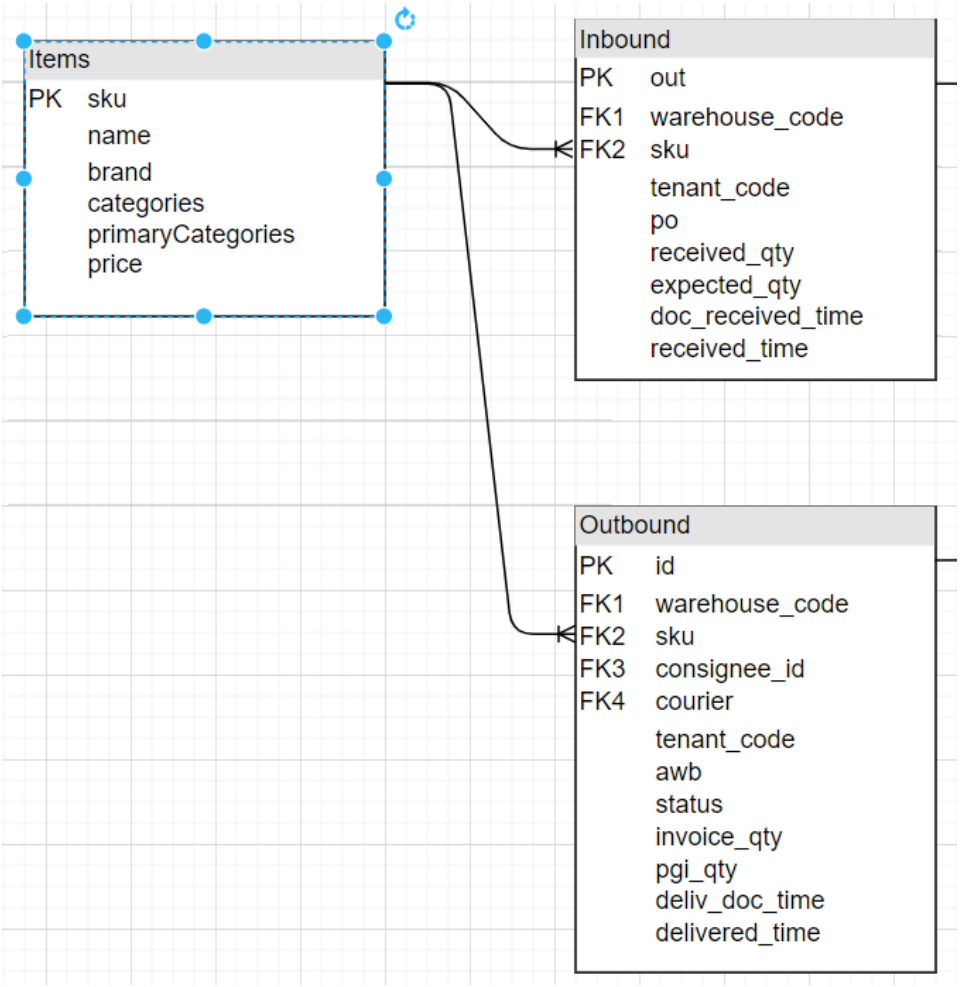
Inbound table has attributes: `out`, `warehouse_code`, `sku`, `tenant_code`, `po`, `received_qty`, `expected_qty`, `doc_received_time`, and `received_time` with `out` as the primary key and `warehouse_code` and `sku` as foreign keys. Attribute `out` from Inbound table has one-to-one relationship with attribute `trans_id` from Stock Movement table.

c) Outbound



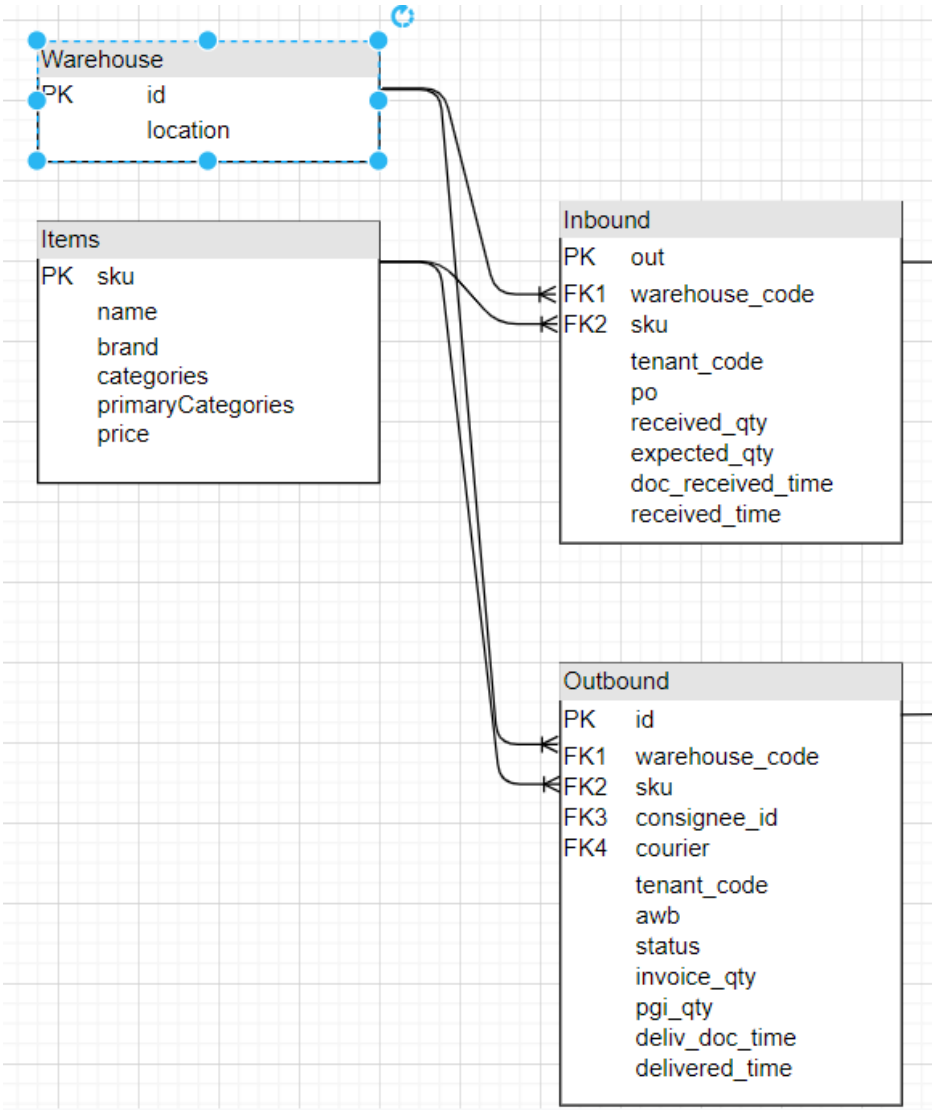
Outbound table has attributes: `id`, `warehouse_code`, `sku`, `consignee_id`, `courier`, `tenant_code`, `awb`, `status`, `invoice_qty`, `pgi_qty`, `deliv_doc_time`, and `delivered_time` with `id` as the primary key and `warehouse_code`, `sku`, `consignee_id`, and `courier` as foreign keys. Attribute `id` from Outbound table has one-to-one relationship with attribute `trans_id` from Stock Movement table.

d) Items



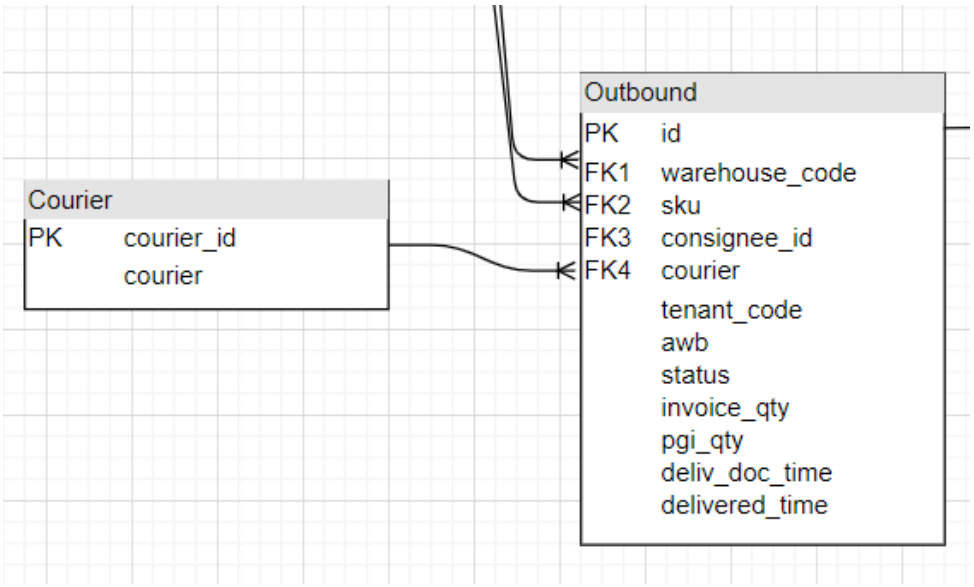
Items table has attributes: `sku`, `name`, `brand`, `categories`, `primaryCategories`, and `price` with `sku` as the primary key. Attribute `sku` has one-to-many relationship with attribute `sku` from both Inbound and Outbound table.

e) Warehouse



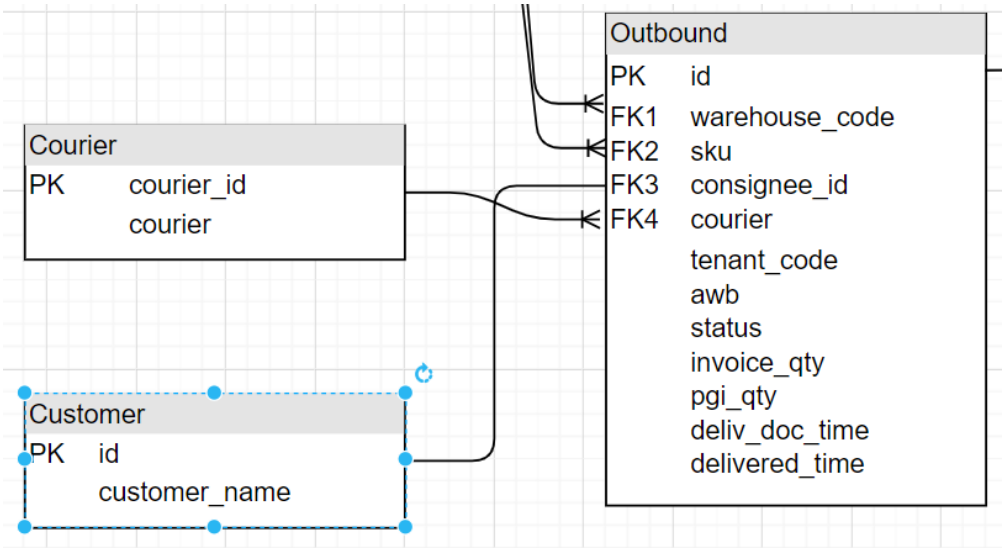
Warehouse table has attributes: `id` and `location` with `id` as the primary key. Attribute `id` has one-to-many relationship with attribute `warehouse_code` from both Inbound and Outbound table.

f) Courier



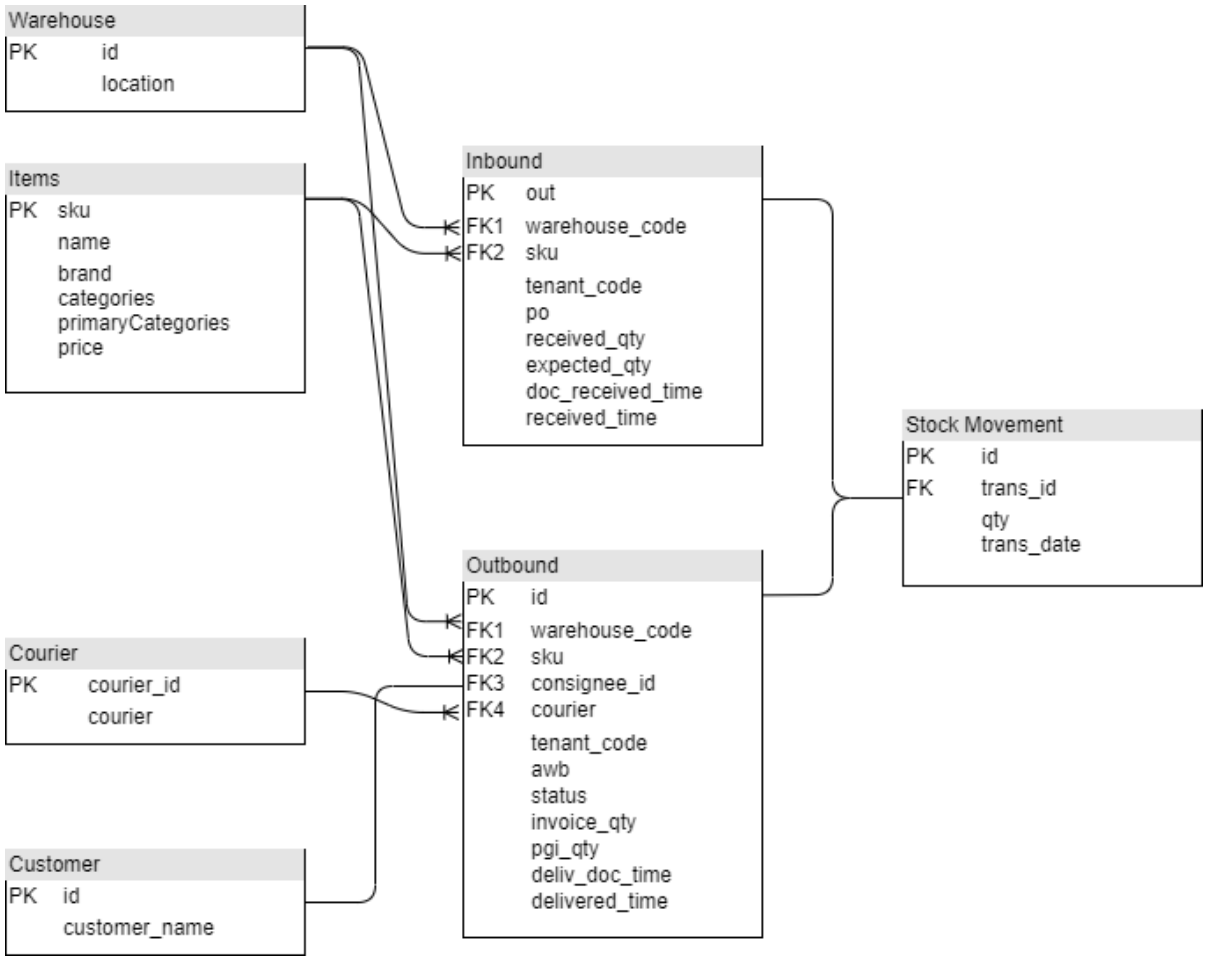
Courier table has attributes: `courier_id` and `courier` with `courier_id` as the primary key. Attribute `courier_id` has one-to-many relationship with attribute `courier` from Outbound table.

g) Customer



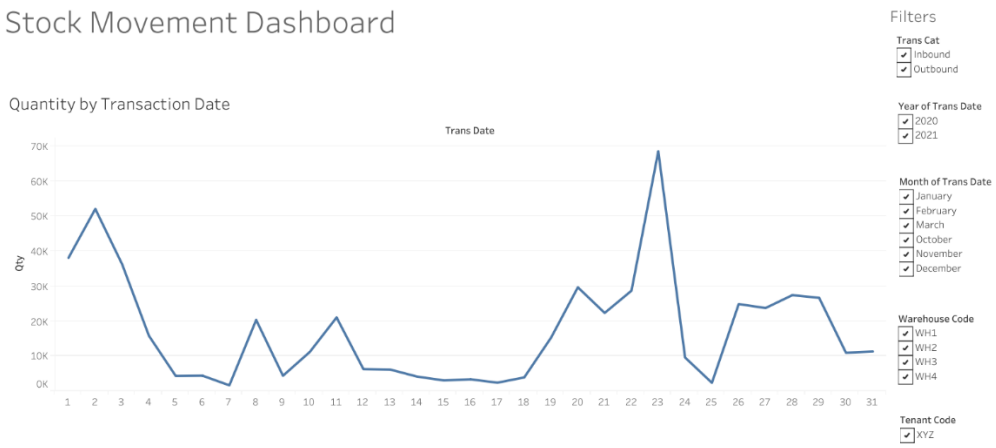
Customer table has attributes: `id` and `customer_name` with `id` as the primary key. Attribute `id` has one-to-one relationship with attribute `consignee_id` from Outbound table.

Final diagram



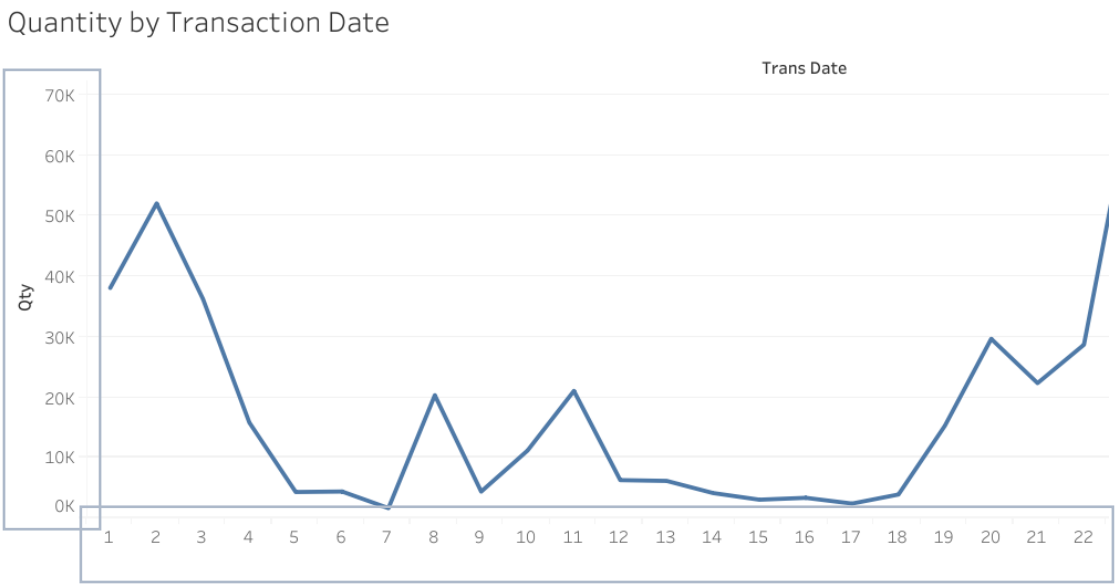
3. Please create dashboard mock-ups for these use cases. (At minimum you can provide stock movement dashboard)

   The dashboard can be found on this link: https://public.tableau.com/app/profile/jafar.shodiq/viz/MIG-assessment-dashboard/stock-movement-dashboard

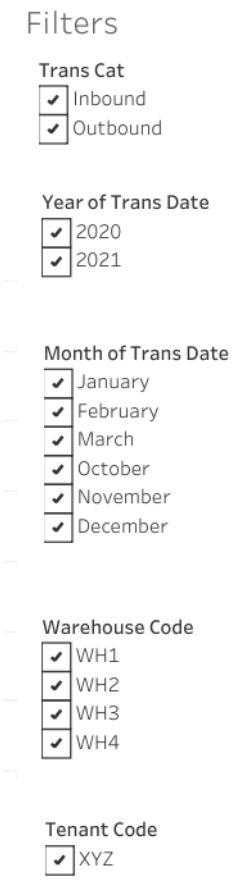


Before I loaded the excel file into Tableau, I did some modification on the Stock Movement table so that it contains additional information such as transaction category, warehouse code, and tenant code. Transaction category (`trans_cat`) is based on the `trans_id` column, while `warehouse_code` and `tenant_code` are based on Inbound and Outbound tables.

	A	B	C	D	E	F	G	H
1	id	trans_id	qty	trans_date	trans_cat	warehouse_code	tenant_code	
2	1	INB003594	40	2020-10-22 14:20:00	Inbound	WH3	XYZ	
3	2	OUT00000	1	2020-10-24 11:46:00	Outbound	WH3	XYZ	
4	3	OUT00003	1	2020-10-26 14:04:00	Outbound	WH3	XYZ	
5	4	OUT00001	1	2020-10-28 14:20:00	Outbound	WH3	XYZ	
6	5	INB00360	7	2020-10-28 14:58:00	Inbound	WH3	XYZ	
7	6	INB00360	36	2020-10-29 11:49:00	Inbound	WH3	XYZ	
8	7	INB00360	92	2020-10-30 17:21:00	Inbound	WH3	XYZ	
9	8	OUT00003	1	2020-11-03 12:16:00	Outbound	WH3	XYZ	
10	9	OUT00007	1	2020-11-03 12:18:00	Outbound	WH3	XYZ	
11	10	INB00361	21	2020-11-03 15:21:00	Inbound	WH3	XYZ	
12	11	OUT00359	5	2020-11-03 17:12:00	Outbound	WH3	XYZ	
13	12	INB00361	6	2020-11-03 20:07:00	Inbound	WH3	XYZ	
14	13	OUT00004	1	2020-11-04 12:20:00	Outbound	WH3	XYZ	
15	14	OUT00004	1	2020-11-04 12:23:00	Outbound	WH3	XYZ	
16	15	OUT00004	1	2020-11-04 16:11:00	Outbound	WH3	XYZ	



This dashboard takes the sum of the `qty` column as the y-axis and the day from `trans_date` column as the x-axis .



It can do filters on the transaction categories (inbound or outbound), year, month, warehouse code, and tenant code.

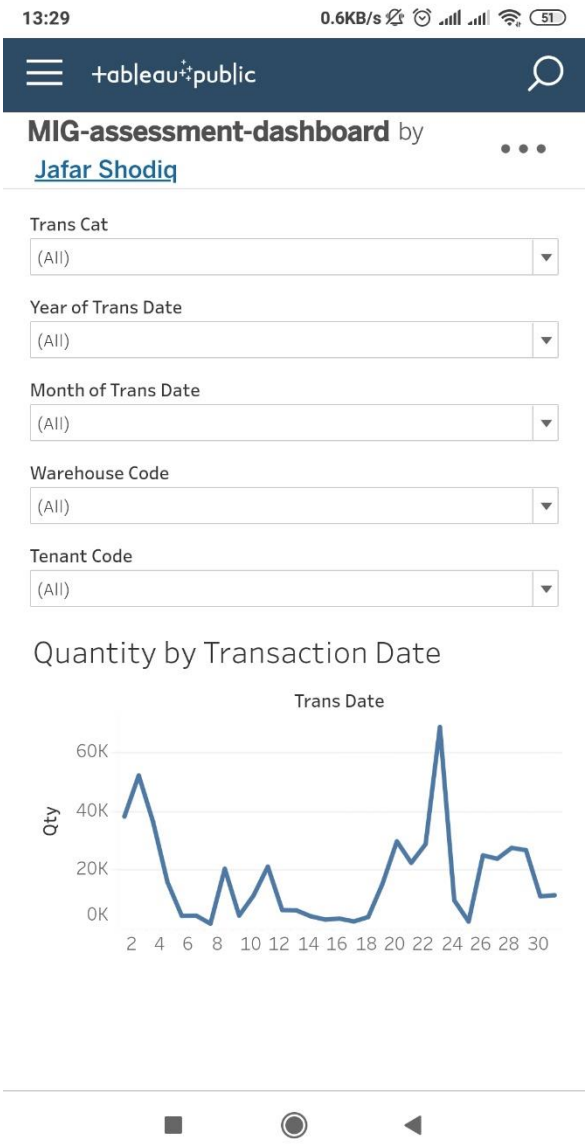
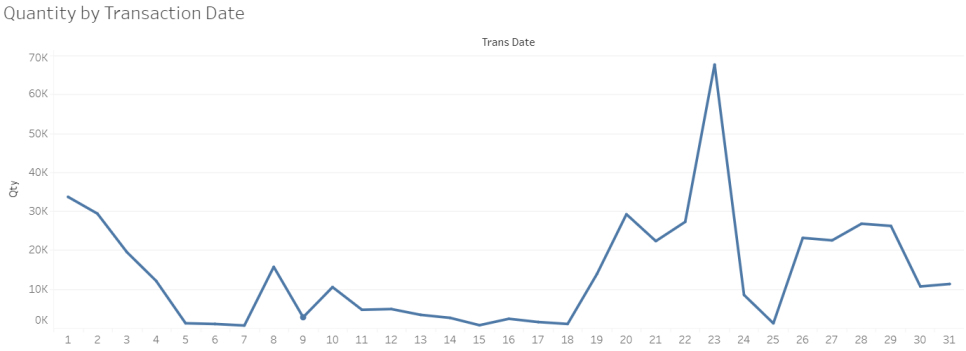


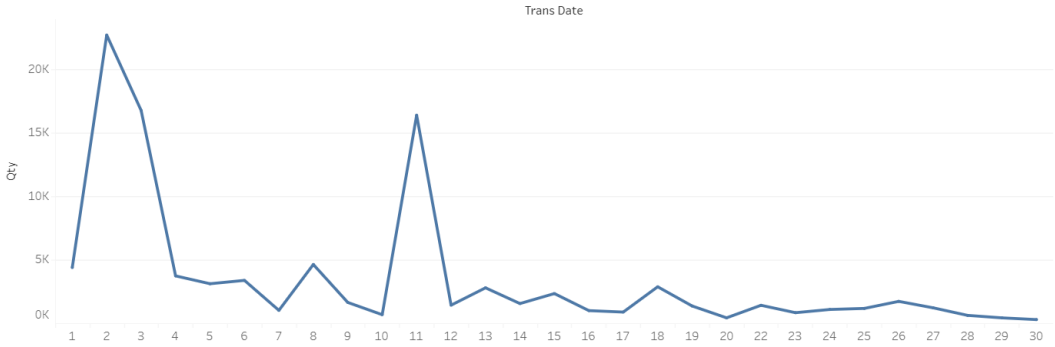
Tableau also supports dashboard view on different devices like mobile phone.

4. Give us top 3–8 interesting insights you could find from the datasets.

a. Overall quantity



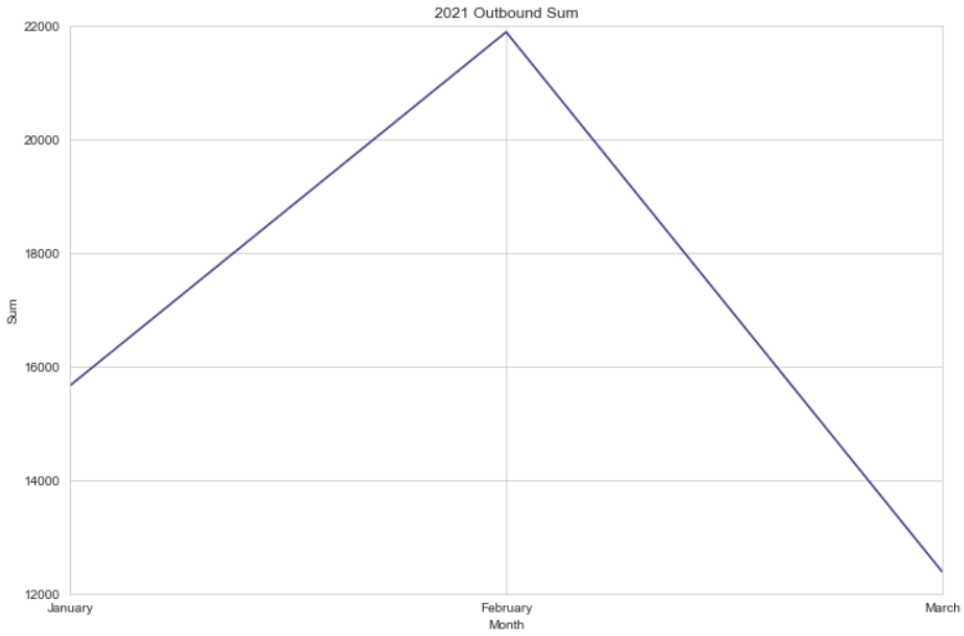
Overall quantity movement the most in 2020 is at the near end of the month.



Overall quantity movement the most in 2021 is at the start of the month.

b. Outbound in 2021 from January – March

	Month	Sum
0	January	15664
1	February	21888
2	March	12382



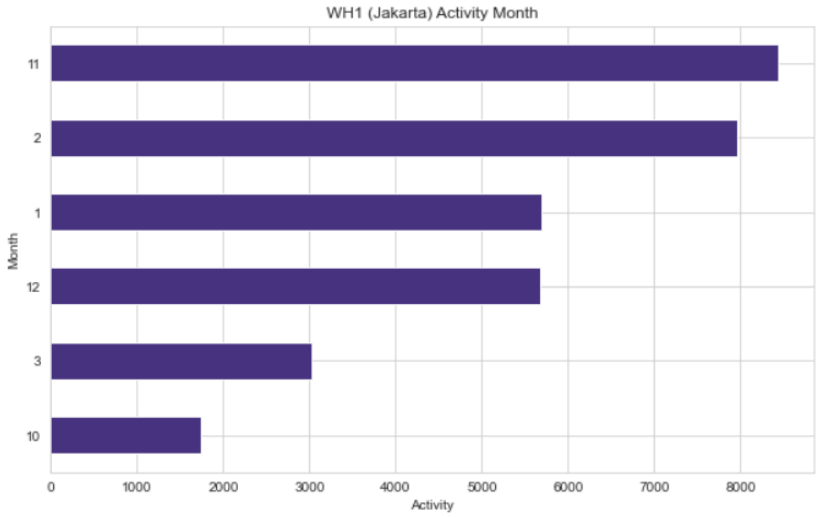
There's an increase of 39.73% from January to February and decrease of 43.43% from February to March.

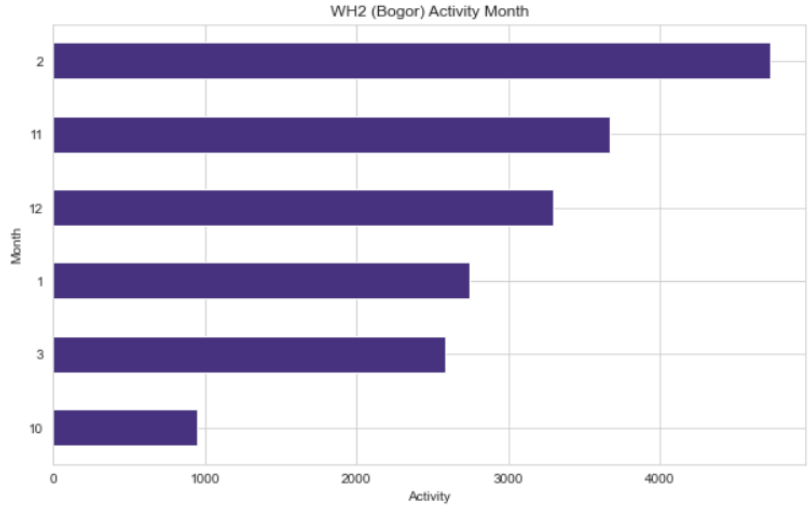
c. Busiest warehouse

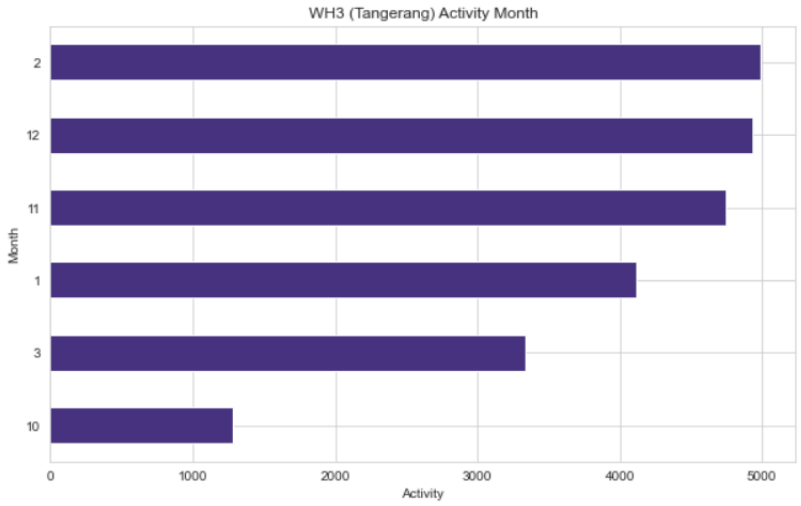
Activities (inbound and outbound) in each warehouse.

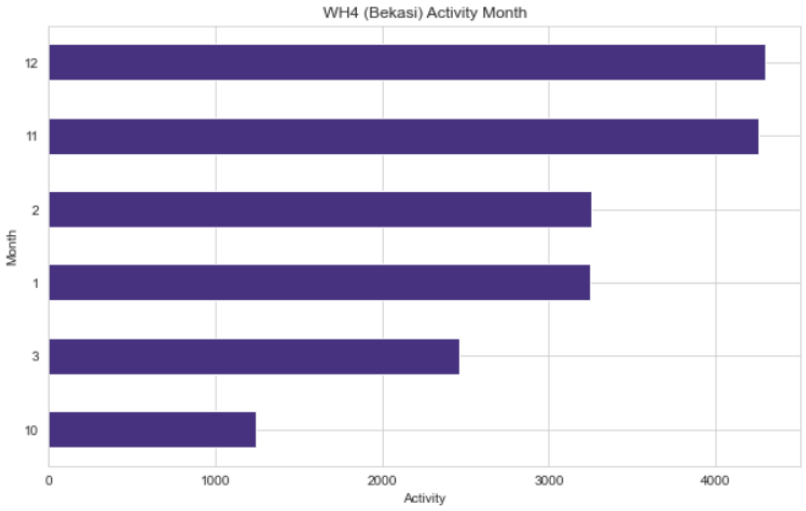
```
Warehouses Inbound
WH3     1380
WH1     1356
WH2     1242
WH4     1233

Warehouses Outbound
WH1     31167
WH3     22005
WH4     17533
WH2     16725
```

Looking at what month each warehouse has the most activities.







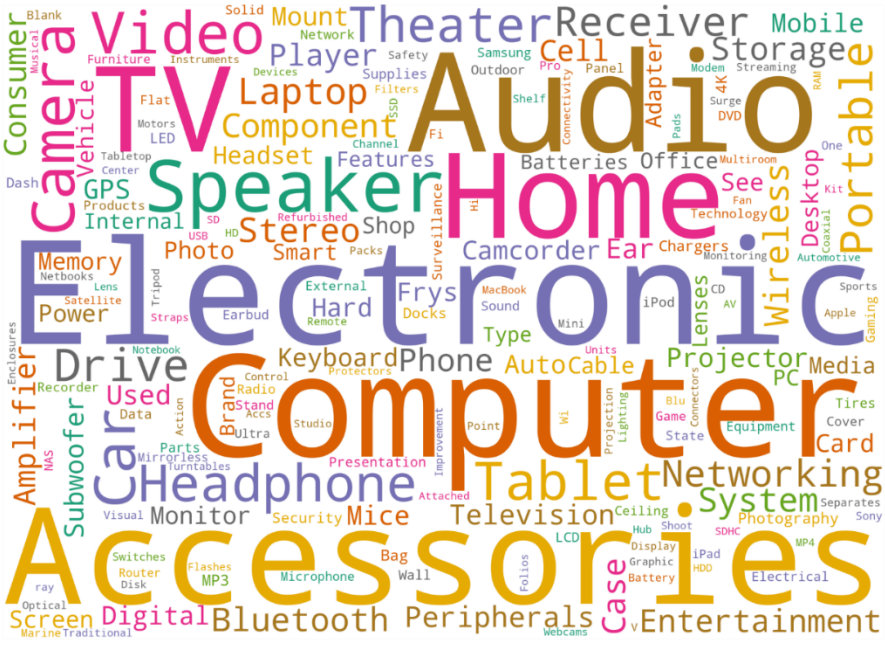


d. Categories in Items table

Table Items has 1546 rows. In `categories` column, values are stored on top of each other with multiple comma splits inside. In result, there are 782 unique values in column `categories`.

categories
Audio & Video Accessories,TV Mounts,TV Accessories & Parts,Electronics,A/V Presentation,Accesso
Stereos,Portable Bluetooth Speakers,TV, Video & Home Audio,Speaker Systems,Portable Audio & Vi
Computers,Office,Computer Accessories,Computer Accessories & Peripherals,Laptop Accessories,L
Portable Bluetooth Speakers,Bluetooth & Wireless Speakers,Portable Audio & Video,Electronics,Por
Surround Speakers,Electronics Features,Surround Sound Systems,Frys,Electronics,All Home Theater
Audio & Video Accessories,Remote Controls,Electronics,TV Remote Controls,Universal Remote Cor
Surround Speakers,TV, Video & Home Audio,Surround Sound Systems,Electronics,All Home Theater
Internal Solid State Drives,Solid State Drives,Computers & Accessories,Computer Accessories & Peri
Computers,Memory (RAM),Computers & Accessories,Computer Components,Memory Upgrades,Me
Bluetooth & Wireless Speakers,Portable Audio & Video,Electronics,MP3 & MP4 Player Accessories,P
Electronics,Cameras & Camcorders,All Camcorders,Home, Garage & Office,Pet Supplies & Technolo
Headphones,Bluetooth Headphones,All Headphones,Consumer Electronics,Portable Audio & Headp
Computers,Internal Hard Drives,Internal Drives,Drives, Storage & Blank Media,Computers & Accesso
Audio Power Conditioners,Consumer Electronics,A/V Surge Protectors & Power,Musical Instrument
Parts & Accessories,Car Speakers,6.5\\ Car Speakers,Electronics,Car Electronics,Speakers,eBay Mot
Computers,Hard Drives,Internal Drives,Solid State Drives,Computers & Accessories,Computer Acces
Accessories,Portable Power Banks,Portable Chargers/Power Packs,Cell Phones & Accessories,Cell P
Headphones,Bluetooth Headphones,Bluetooth Headsets,Accessories,Wireless Headphones,Electro
In-Wall & In-Ceiling Speakers,In-Ceiling Speakers,Home Audio,Speakers,Audio
Office,Projectors & Presentation Equipment,Audio Visual Presentation,TV Stands, Mounts & Furnitu
Marine Audio,6.5\\ Car Speakers,Electronics,Car Electronics,Speakers,Fishing,Car Audio,Powersport
Computer Accessories & Peripherals,Electronics,TV & Home Theater,Surge Protectors,Surge Protect
Electronics,Computers,Computer Accessories,Keyboards, Mice & Joysticks,Keyboards,All Keyboards
Portable Bluetooth Speakers,Bluetooth & Wireless Speakers,Portable Audio & Video,Electronics,Por
Audio & Video Accessories,Speaker Accessories,Auto Electronics,Selector Switch Boxes,Speaker Sel
In-Wall & In-Ceiling Speakers,Electronics,In-Ceiling Speakers,Home Audio,Speakers,Ceiling & In-Wal
Computers & Accessories,Computer Components,Memory,Electronics,Computers & Tablets,Compu
Computers,Computer Accessories,Computer Accessories & Peripherals,Laptop Accessories,Laptop C
Straps & Hand Grips,Camera & Photo Accessories,Camera Accessories,Cameras & Photo,Digital Can
Backpacks ffvzrevebzuqvcddwzzxeuwva,Camera Accessories,Digital Camera Accessories,Camera Ba
LCD TVs,Samsung TVs,Electronics,Shop TVs by Type,Televisions,TVs Entertainment,TV & Home Thea
Portable Bluetooth Speakers Stereos Computers Bluetooth & Wireless Speakers Computer Accesso

What words are the most frequent within this wall of text can be found with a wordcloud. The bigger the word, the more frequent that word appears in `categories` column.



Turns out that Electronic, Computer, Accessories, Audio, and TV are the top 5 frequent words.

5. Top 5 metrics to define the success of this product, what, why and how would you choose?

a. Inventory Accuracy

   Based on the dataset, which is about stock movement, inventory accuracy is extremely important because every inbound or outbound should be in order so that every action is effective and efficient.

b. Inventory Turnover

   Measures how many times per year each warehouse goes through the entire stock. A warehouse management system should be able to not let items sit in the warehouse for a long time.

c. Order Picking Accuracy

   Based on the Outbound table, each order has to be accurate so that clients will not go somewhere else.

d. Receiving Accuracy

   Based on the Inbound table, the proportion of received orders have to be accurate against purchase orders.

e. Days Sales Outstanding

   Based on the Outbound table, how quickly does the organization receive payment from customers.

Links and references:

What is self-service BI	https://searchbusinessanalytics.techtarget.com/definition/self-service-business-intelligence-BI
Why choose Tableau	https://www.tableau.com/why-tableau
MySQL with Tableau	https://help.tableau.com/current/pro/desktop/en-us/examples_mysql.htm
Draw.io	https://app.diagrams.net/
My dashboard assessment	https://public.tableau.com/app/profile/jafar.shodiq/viz/MIG-assessment-dashboard/stock-movement-dashboard
Warehouse success metrics	https://www.newcastlesys.com/blog/20-warehouse-success-metrics-that-matter-most
Warehouse success metrics (2)	https://articles.cyzerg.com/warehouse-kpi-tracking-top-24
Warehouse success metrics (3)	https://www.infopluscommerce.com/blog/warehouse-metrics-kpis