Take home assessment procedure followed -

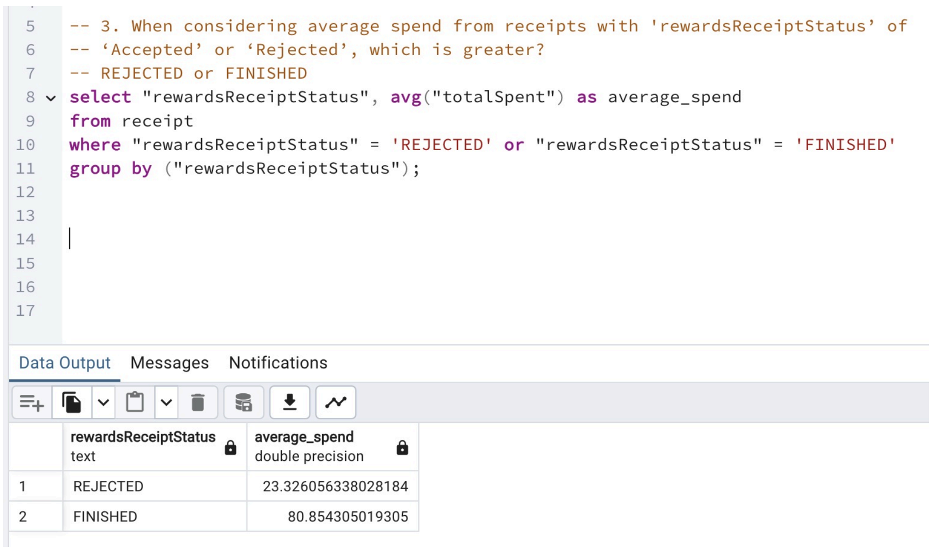
Step 1 - JSON data structuring process

I followed the below process to structure the given json data (Tools & Technologies used - Jupyter Notebook, Python, Stack overflow, Lucid Chart)

- Converted each json file (user, brand and receipt) to pandas dataframe by normalizing the columns. Normalization was required since the json data was nested.
- The receipt data contained a column called rewardsReceiptItemList which was a list of json data and normalizing it within the receipt dataset would not result in a good structure.
- Created another table for rewardsReceiptItemList by normalizing each json within the rewardsReceiptItemList where each row in the table would have details for individual items scanned and the receiptId associated with it.
- Total four tables - user, brand, receipt and rewardsitemlist. Created a relational data model for these four tables on Lucid chart
- The four tables were then loaded to the postgresql database by creating a sql engine and establishing connection with postgresql server.

Step 2 - Queries to answer questions from business stakeholders
Accessed the four tables and ran queries (Tools & Technologies used - Postgresql Admin, PostgreSQL)

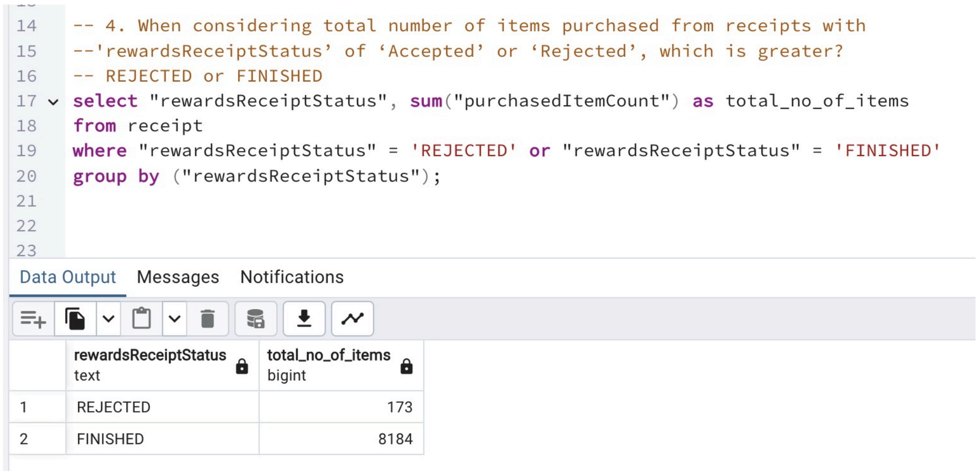
- When considering *average spend* from receipts with 'rewardsReceiptStatus' of 'Accepted' or 'Rejected', which is greater? I did not see any rewardsReceiptStatus with a value of 'Accepted'. Hence, I used 'FINISHED' in place of 'Accepted'. FINISHED rewardsReceiptStatus has a higher average totalSpent from the receipts



```
-- 3. When considering average spend from receipts with 'rewardsReceiptStatus' of
-- 'Accepted' or 'Rejected', which is greater?
-- REJECTED or FINISHED
select "rewardsReceiptStatus", avg("totalSpent") as average_spend
from receipt
where "rewardsReceiptStatus" = 'REJECTED' or "rewardsReceiptStatus" = 'FINISHED'
group by ("rewardsReceiptStatus");
```

	rewardsReceiptStatus text	average_spend double precision
1	REJECTED	23.326056338028184
2	FINISHED	80.854305019305

- When considering *total number of items purchased* from receipts with 'rewardsReceiptStatus' of 'Accepted' or 'Rejected', which is greater? I did not see any rewardsReceiptStatus with a value of 'Accepted'. Hence, I used 'FINISHED' in place of 'Accepted'. FINISHED rewardsReceiptStatus has a higher number of items purchased from the receipts



```
-- 4. When considering total number of items purchased from receipts with
--'rewardsReceiptStatus' of 'Accepted' or 'Rejected', which is greater?
-- REJECTED or FINISHED
select "rewardsReceiptStatus", sum("purchasedItemCount") as total_no_of_items
from receipt
where "rewardsReceiptStatus" = 'REJECTED' or "rewardsReceiptStatus" = 'FINISHED'
group by ("rewardsReceiptStatus");
```

	rewardsReceiptStatus text	total_no_of_items bigint
1	REJECTED	173
2	FINISHED	8184

Step 3 - Evaluate Data Quality issues

Below are some of the data quality issues I identified (Tools & Technologies used - Jupyter Notebook, Python) -

- **Duplicate records -** The users data has 283 duplicate records.

```python
#duplicate records
print("--------Users--------")
print(user_df.shape)
test_user_df = user_df.drop_duplicates()
print(test_user_df.shape)

print("--------Brand--------")
print(brand_df.shape)
test_brand_df = brand_df.drop_duplicates()
print(test_brand_df.shape)

print("--------Receipt--------")
print(receipt_df.shape)
test_receipt_df = receipt_df.drop_duplicates()
print(test_receipt_df.shape)

print("--------Rewards List--------")
print(rewards_item_list_df.shape)
test_rewards_df = rewards_item_list_df.drop_duplicates()
print(test_rewards_df.shape)
```

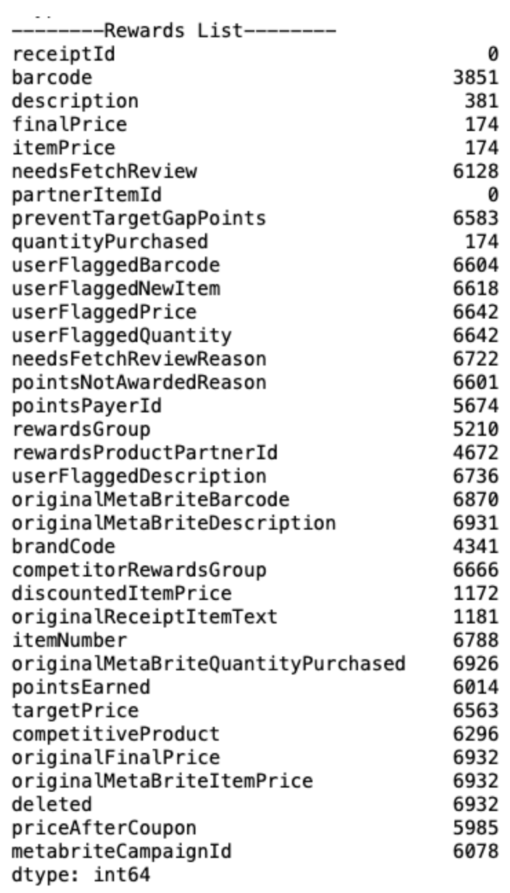
```
--------Users--------
(495, 7)
(212, 7)
--------Brand--------
(1167, 9)
(1167, 9)
--------Receipt--------
(1119, 14)
(1119, 14)
--------Rewards List--------
(6941, 35)
(6941, 35)
```

- **Null values** - What is the nature of these null values? How do we treat them?

```python
#null values
print("--------Users--------")
print(test_user_df.isnull().sum()) #using the user data without duplicates

print("--------Brand--------")
print(brand_df.isnull().sum())

print("--------Receipt--------")
print(receipt_df.isnull().sum())

print("--------Rewards List--------")
print(rewards_item_list_df.isnull().sum())
```

```
--------Users--------
userId          0
active          0
role            0
signUpSource    5
state           6
createdDate     0
lastLogin      40
dtype: int64
--------Brand--------
brandId           0
barcode           0
category        155
categoryCode    650
name              0
topBrand        612
cpgId             0
cpg_ref           0
brandCode       234
dtype: int64
```

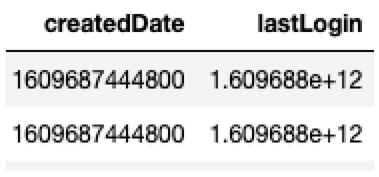
```
--------Receipt--------
receiptId                    0
bonusPointsEarned          575
bonusPointsEarnedReason    575
pointsEarned               510
purchasedItemCount         484
rewardsReceiptStatus         0
totalSpent                 435
userId                       0
createDate                   0
dateScanned                  0
finishedDate               551
modifyDate                   0
pointsAwardedDate          582
purchaseDate               448
dtype: int64
```



```
--------Rewards List--------
receiptId                              0
barcode                             3851
description                          381
finalPrice                           174
itemPrice                            174
needsFetchReview                    6128
partnerItemId                          0
preventTargetGapPoints              6583
quantityPurchased                    174
userFlaggedBarcode                  6604
userFlaggedNewItem                  6618
userFlaggedPrice                    6642
userFlaggedQuantity                 6642
needsFetchReviewReason              6722
pointsNotAwardedReason              6601
pointsPayerId                       5674
rewardsGroup                        5210
rewardsProductPartnerId             4672
userFlaggedDescription              6736
originalMetaBriteBarcode            6870
originalMetaBriteDescription        6931
brandCode                           4341
competitorRewardsGroup              6666
discountedItemPrice                 1172
originalReceiptItemText             1181
itemNumber                          6788
originalMetaBriteQuantityPurchased  6926
pointsEarned                        6014
targetPrice                         6563
competitiveProduct                  6296
originalFinalPrice                  6932
originalMetaBriteItemPrice          6932
deleted                             6932
priceAfterCoupon                    5985
metabriteCampaignId                 6078
dtype: int64
```

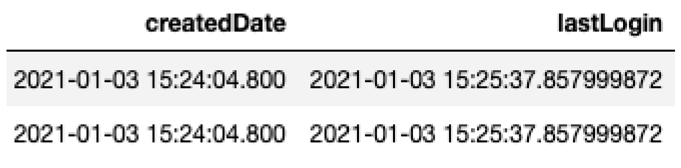
- **Formatting** - The date format by default were in the below format. I converted them to datetime format for better readability and analysis.

Before -



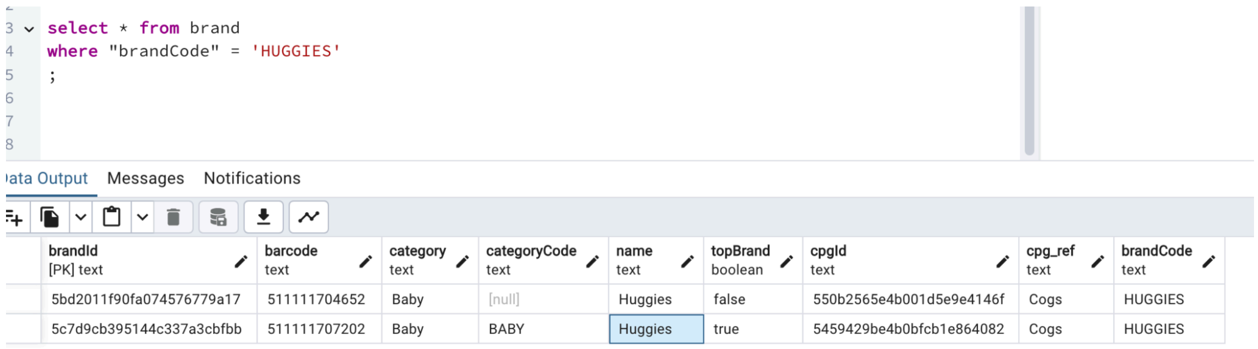
createdDate	lastLogin
1609687444800	1.609688e+12
1609687444800	1.609688e+12

After -



createdDate	lastLogin
2021-01-03 15:24:04.800	2021-01-03 15:25:37.857999872
2021-01-03 15:24:04.800	2021-01-03 15:25:37.857999872

- **Multiple rows -** brandCode has multiple rows in the brand dataset. There are also null brandCodes.



```sql
select * from brand
where "brandCode" = 'HUGGIES'
;
```

Data Output Messages Notifications

brandId [PK] text	barcode text	category text	categoryCode text	name text	topBrand boolean	cpgId text	cpg_ref text	brandCode text
5bd2011f90fa074576779a17	511111704652	Baby	[null]	Huggies	false	550b2565e4b001d5e9e4146f	Cogs	HUGGIES
5c7d9cb395144c337a3cbfbb	511111707202	Baby	BABY	Huggies	true	5459429be4b0bfcb1e864082	Cogs	HUGGIES