Risk Analyst.

Case Presentation.

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Agenda

01 Understanding the Industry.

02 Solving the problem.

03 Getting Hands Dirty.

04 Conclusions.

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01 Understanding the Industry.

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Money Flow.

Explaning the money flow, the information flow and the role of the main players in the payment industry.

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1
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5
Customer
Card
Merchant
Acquirer
VISA
Brand
Issuer Bank

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Roles

Customer

Our brave customer, who supports business, the one who buys something with a card.

Merchant

Merchant are basically someone providing a service.

Acquirer

Responsible for processing payments, meaning that it processes credit card payments on behalf of a merchant, such as InfinitePay, Cielo, Rede, GetNet.

Brand

Card brands are company responsible for defining the business rules for purchases, defining standards for the whole industry.

Issuer Bank

The one who isuues the card for the costumer, who approves or deny a purchase, depending on available credit or available monetary resources

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There's not only Acquirer...

Explaning the difference between acquirer, sub-acquierer and payment gateway

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Acquirer, Sub-Acquirer and Gateway

Acquirers

Acquirers are responsible for providing the communication between merchants, Brands and issuer Bank.

Sub-Acquirers

Sub-Acquirers are responsible for Intermedium the payment between the merchants and the acquirers, who's responsible for contacting the issuer bank. Gateway are already integrated.

PayPal

Gateway

Gateway transport information between acquires, merchants and issuer bank, grant the costumer data security, during an online purchase flow, totally customized. It can be integrated with multiple acquires and anti-fraud systems.

G Pay

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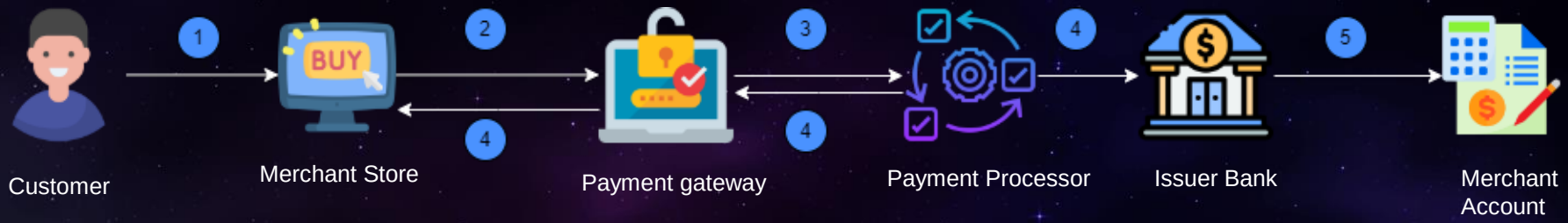
Payment Gateway Flow.



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Chargebacks

What are chargebacks, how they differ from cancellation and what is their connection with fraud in the acquiring world.

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Chargeback?

What ’s that?

Chargeback is the reversal of the value to the customer, whether due to a company or operator error, or because it is an improper purchase and not recognized by the buyer

Cancellation or Chargeback?

The main difference is that while chargeback is carried out by the customer, the cancellation comes from the merchant who made the sale

Chargeback Frauds

Scammers can take advantages of this loophole. Without proof, the financial institution have to return the fund, causing highly financial lost.

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02 Solving the Problem

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Real World Problem.

Leading with a real world problem, where a client contacts the company through e-mail asking for a chargeback status.

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Problem.

A client sends you an email asking for a chargeback status. You check the system, and see that we have received his defense documents and sent them to the issuer, but the issuer has denied it. They claim that the cardholder continued to affirm that she did not receive the product, and our documents were not sufficient to prove otherwise.

You respond to our client informing that the issuer denied the defense, and the next day he emails you back, extremely angry and disappointed, claiming the product was delivered and that this chargeback is not right.

Considering that the chargeback reason is “Product/Service not provided”, what would you do in this situation?

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Case Analysis

Analyzing the presented scenario, we can identify the possibile actors involved in the chargeback case

- *Client (Service Provider)*
- *Acquirer (CloudWalk)*
- *Issuer (Financial Institution)*
- *Client (Cardholder/who requested the product / service)*

Some hypotheses of fraud involved are:

- *Self-fraud*
- *Effective fraud*
- *Friendly fraud*
- *mislay*

As the documentation presented is not sufficient to identify fraud or mislay, it will be necessary to contact supplier for more evidence of the delivery of the product.

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Case Solution.

Dear Client, we apologize for the inconvinient, but we will not be able to proceed with your chargeback request, due to lack of evidences. I suggest providing appropriate documentations, related to product delivery, status and invoice. After sending concrete proofs, we will follow up with your chargeback request and have a better conclusion for both parts involved.

Best regards.

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03 Getting Hands Dirty.

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Data Analysis I

Analyze the data provided and present conclusions. What suspicios behaviors are presented? What's the conclusion?

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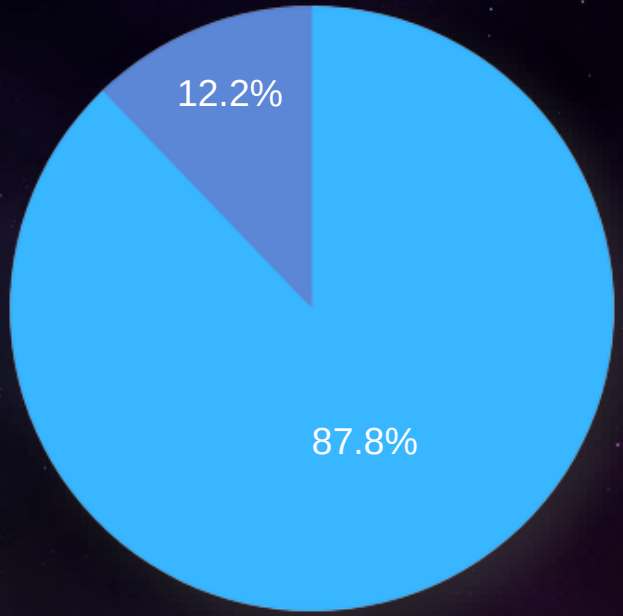
ChargeBack



The first analyse made, which got my attention was the chargeback cases, which was 12.2% over 3199 transactions made. Excessive chargebacks can cause financial damage, which related me to think that this could be a potential problem that should be investigated.

```
type = df["has_cbk"].value_counts()

chargebackStatus = type.index
quantity = type.values
import plotly .express as px
figure = px.pie(df, values=quantity, names=chargebackStatus, hole=0.4, title="Distribution of
Transactions that had chargeback")
figure.show()
```

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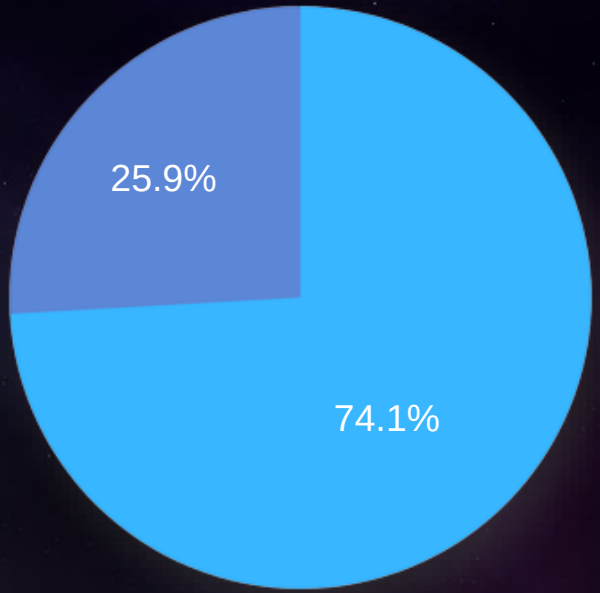
Client Device



25.9% over 3199 transactions were made without registering a client_device_id , which let me thinking this could be a possible system error, or all of those transactions were made in person, without using a properly device, which gets harder to track suspicious client behaviour.

```
notnullDevices = df['device_id'].notnull().sum()
nullDevices = df['device_id'].isnull().sum()

values = [notnullDevices, nullDevices]
labels = ['device_id', 'device_id_null']

plt.pie(values, labels=labels, autopct='%1.1f%%')
plt.axis('equal')
plt.title("Transaction without device_id registred")
plt.show()
```

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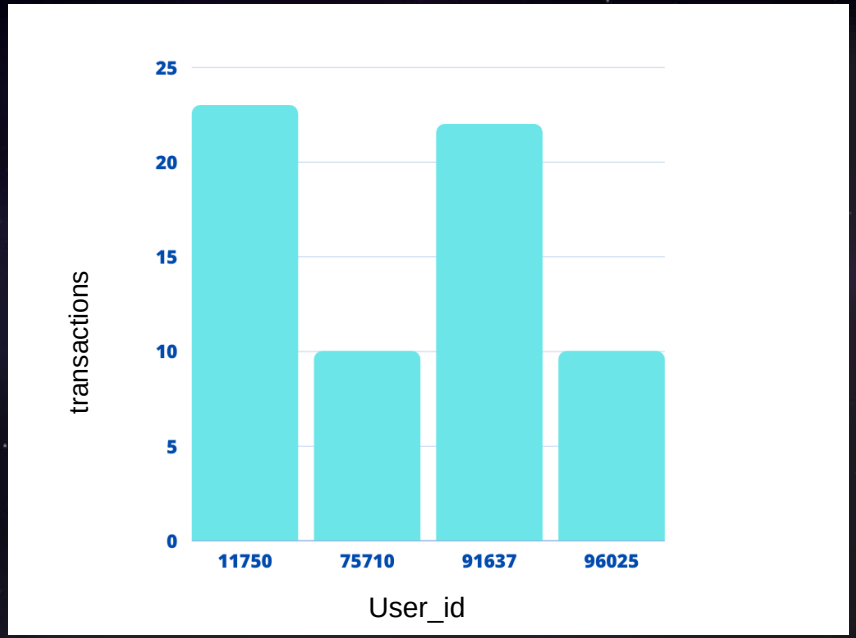
Transactions Analysis

Checking the user_id, (our customers) who purchased more than 10 times at the same merchant. The idea is to check, because frauds may happen frequently at the same merchant. After seeing that, we can assume that we had 4 customers with suspicious behavior, some reaching over 20 transactions at the same merchant in a short period of time.




```
grouped = df.groupby(
  ['user_id', 'merchant_id']
).size().reset_index(name='counts')

result = grouped[grouped['counts'] >= 10]

result = grouped[grouped['counts'] >= 10]

result.plot(kind='bar', x='user_id', y='counts')

plt.show()

print(result)
```

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Transactions Analysis

After creating a local database instance, importing all transactional_sample present, I had to query this data, to see exactly the merchant_id corresponded to the user_id, exactly the merchants which our customers had purchased.

```
MariaDB [transactional_sample]> SELECT user_id, COUNT(*), merchant_id, COUNT(*)  FROM datasets GROUP BY user_id, merchant_id HAVING COUNT(*) >= 10;
+---------+----------+-------------+----------+
| user_id | COUNT(*) | merchant_id | COUNT(*) |
+---------+----------+-------------+----------+
|   11750 |       23 |       17275 |       23 |
|   75710 |       10 |       77130 |       10 |
|   91637 |       22 |        4705 |       22 |
|   96025 |       10 |        1308 |       10 |
+---------+----------+-------------+----------+
4 rows in set (0.006 sec)

MariaDB [transactional_sample]>
```

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Transactions [Different Card Number]

After carefully analysing, I select a specific user_id to visualize the transactions, and we can figure out that, this customer had over 10 transactions at the same merchant, besides, bought it with different cards, an amount more than average in the dataset, in addition to that, all the transactions were chargebacks.

```
MariaDB [transactional_sample]> SELECT * FROM datasets WHERE user_id = 96025 AND has_cbk = "TRUE";
+----------------+-------------+---------+-----------------+------------------+--------------------+-----------+---------+
| transaction_id | merchant_id | user_id | card_number     | transaction_date | transaction_amount | device_id | has_cbk |
+----------------+-------------+---------+-----------------+------------------+--------------------+-----------+---------+
|       21320963 |        1308 |   96025 | 406655******4980 | 2019-11-29       |            2141.93 |    438940 | TRUE    |
|       21320967 |        1308 |   96025 | 406655******7343 | 2019-11-29       |            2259.99 |    438940 | TRUE    |
|       21320994 |        1308 |   96025 | 406655******7343 | 2019-11-29       |            2288.47 |    438940 | TRUE    |
|       21321001 |        1308 |   96025 | 406655******4980 | 2019-11-29       |            2261.25 |    438940 | TRUE    |
|       21321107 |        1308 |   96025 | 406655******5764 | 2019-11-29       |            2412.28 |    438940 | TRUE    |
|       21321121 |        1308 |   96025 | 406655******5764 | 2019-11-29       |             2486.7 |    438940 | TRUE    |
|       21321122 |        1308 |   96025 | 406655******4572 | 2019-11-29       |             1648.3 |    438940 | TRUE    |
|       21321127 |        1308 |   96025 | 406655******5764 | 2019-11-29       |            2774.51 |    438940 | TRUE    |
|       21321129 |        1308 |   96025 | 406655******4608 | 2019-11-29       |            2819.59 |    438940 | TRUE    |
|       21321132 |        1308 |   96025 | 406655******5763 | 2019-11-29       |             2904.6 |    438940 | TRUE    |
|       21321203 |       18267 |   96025 | 406655******2133 | 2019-11-28       |            2029.76 |    438940 | TRUE    |
|       21321210 |       18267 |   96025 | 406655******5812 | 2019-11-28       |            2040.15 |    438940 | TRUE    |
|       21321226 |       18267 |   96025 | 406655******4332 | 2019-11-28       |            2081.98 |    438940 | TRUE    |
+----------------+-------------+---------+-----------------+------------------+--------------------+-----------+---------+
13 rows in set (0.003 sec)

MariaDB [transactional_sample]>
```

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Transactions [Amount]

Getting historical highest transactions to check if there's similar purchases, mostly close to the same value as before, made by the same customer, who can perform in fraudulent behavior

```
MariaDB [transactional_sample]> SELECT user_id, transaction_amount FROM datasets ORDER BY transaction_amount DESC LIMIT 10;
+---------+--------------------+
| user_id | transaction_amount |
+---------+--------------------+
|   78262 |            4097.21 |
|   17929 |            4095.82 |
|   31561 |            4091.83 |
|   78262 |            4089.88 |
|   78262 |            4089.73 |
|   75771 |            4080.03 |
|   54976 |             4078.8 |
|   78262 |            4077.47 |
|   49106 |            4077.07 |
|   78262 |             4076.4 |
+---------+--------------------+
10 rows in set (0.003 sec)

MariaDB [transactional_sample]>
```

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Transactions [Amount]

Considering the highest transactions, who had chargeback, we can notice that there's an user_id who purchased over the average transactions, frequently in a short period of time.

```
MariaDB [transactional_sample]> SELECT user_id, transaction_amount, has_cbk FROM datasets WHERE has_cbk = "TRUE" ORDER BY transaction_amount DESC LIMIT 10
+---------+--------------------+---------+
| user_id | transaction_amount | has_cbk |
+---------+--------------------+---------+
|   78262 |            4097.21 | TRUE    |
|   17929 |            4095.82 | TRUE    |
|   78262 |            4089.88 | TRUE    |
|   78262 |            4089.73 | TRUE    |
|   78262 |            4077.47 | TRUE    |
|   78262 |             4076.4 | TRUE    |
|   24644 |             4072.9 | TRUE    |
|   78262 |            4058.92 | TRUE    |
|   17929 |            4058.61 | TRUE    |
|   16644 |            4055.58 | TRUE    |
+---------+--------------------+---------+
10 rows in set (0.003 sec)

MariaDB [transactional_sample]>
```

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Transactions [Different Card Number]

The same customer, who had the highest historical values, also had transactions with diferente card numbers, not only in the same Merchant but others.

```
MariaDB [transactional_sample]> SELECT user_id, transaction_amount merchant_id, card_number FROM datasets WHERE user_id = 78262 ORDER BY transaction_amount DESC;
+---------+-------------+-----------------+
| user_id | merchant_id | card_number     |
+---------+-------------+-----------------+
|   78262 |     4097.21 | 498401******7580 |
|   78262 |     4089.88 | 514868******3935 |
|   78262 |     4089.73 | 553636******6301 |
|   78262 |     4077.47 | 553636******6676 |
|   78262 |      4076.4 | 553636******4313 |
|   78262 |     4058.92 | 553636******6300 |
|   78262 |     4028.55 | 553636******3478 |
|   78262 |     3996.79 | 515590******2057 |
|   78262 |     2257.43 | 406655******6489 |
|   78262 |     1329.55 | 515590******4614 |
|   78262 |     1082.03 | 553636******6300 |
|   78262 |     1068.03 | 553636******6301 |
|   78262 |      943.14 | 553636******4313 |
+---------+-------------+-----------------+
13 rows in set (0.009 sec)

MariaDB [transactional_sample]>
```

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Full Fraud Analysis Case [version 1.0.0]

Python:

https://github.com/Deividev365/payment_fraud_analysis/blob/main/fraud_analysis.ipynb

SQL Queries:

https://github.com/Deividev365/payment_fraud_analysis/blob/main/queries.sql

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Data Analysis II

In addition to the spreadsheet data, what other data would you consider to find patterns of possible fraudulent behavior?

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Possibilities Beyond

IP Adress: Containing transaction's Location

- **Shipping information: If the transaction involves physical goods, the shipping information (e.g., address, name) could be compared against the billing information to identify inconsistencies.**

- **Email or phone number: Verifying the email or phone number associated with the transaction could help identify fake or stolen identities.**

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Data Analysis III

Considering the conclusions, what are the others suggestions in order to prevent frauds or chargebacks?

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Fraud Prevention

Using AI fraud detection Softwares to prevent fraudelent actions, including chargebacks operation;

ClearSale

Being accurately to PCI DSS compliance rules to stay up to the market secure environment;

Providing excellent customer service. It can reduce chargebacks by addressing customer concerns;

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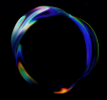
04 Conclusions.



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“Imagination will often carry us to worlds that never were. But without it we go nowhere”
—Carl Sagan

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