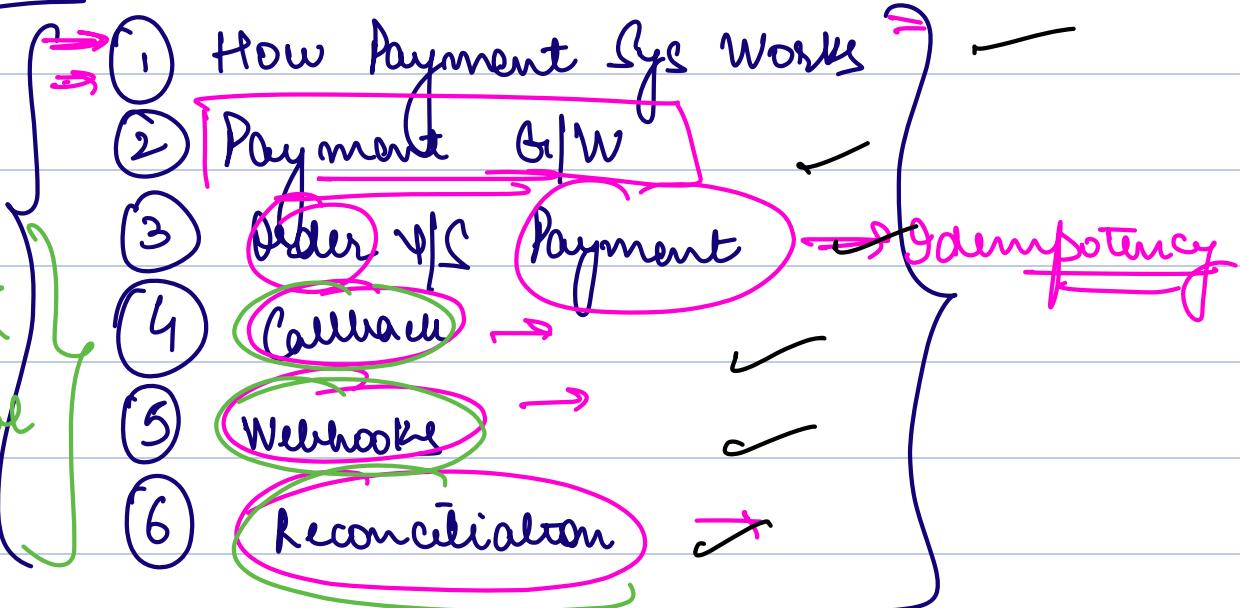


Payment G/W + 1

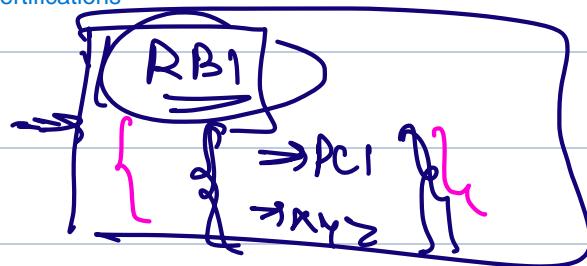
Agenda



Some complexities are tied to payment coz of the following:-

1. there are a lot of Regulations coz you have to take GST, create invoice, in invoice these details should be there, you should have a support of refund
2. there is a variety of payment sources - credit cards, phonepe wallet, netbanking, debit card, amazon pay
3. Security - RBI has imposed guidelines that if you are taking card details then you should have PCI certifications

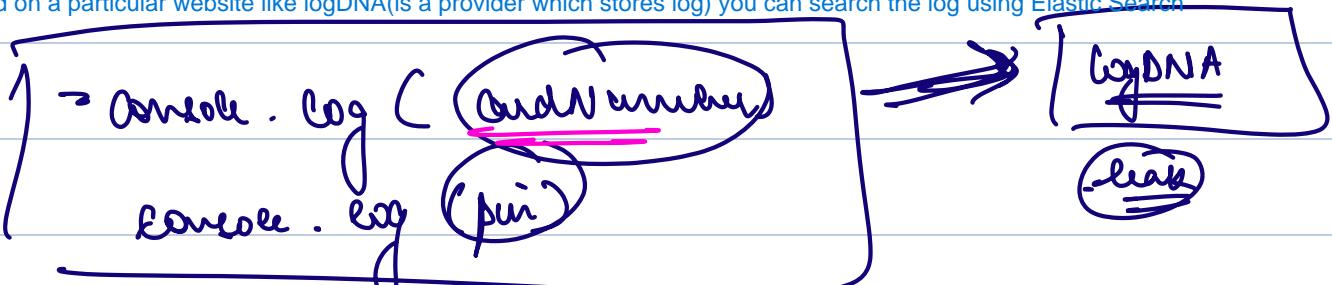
How Payment Sys Work



Complexities

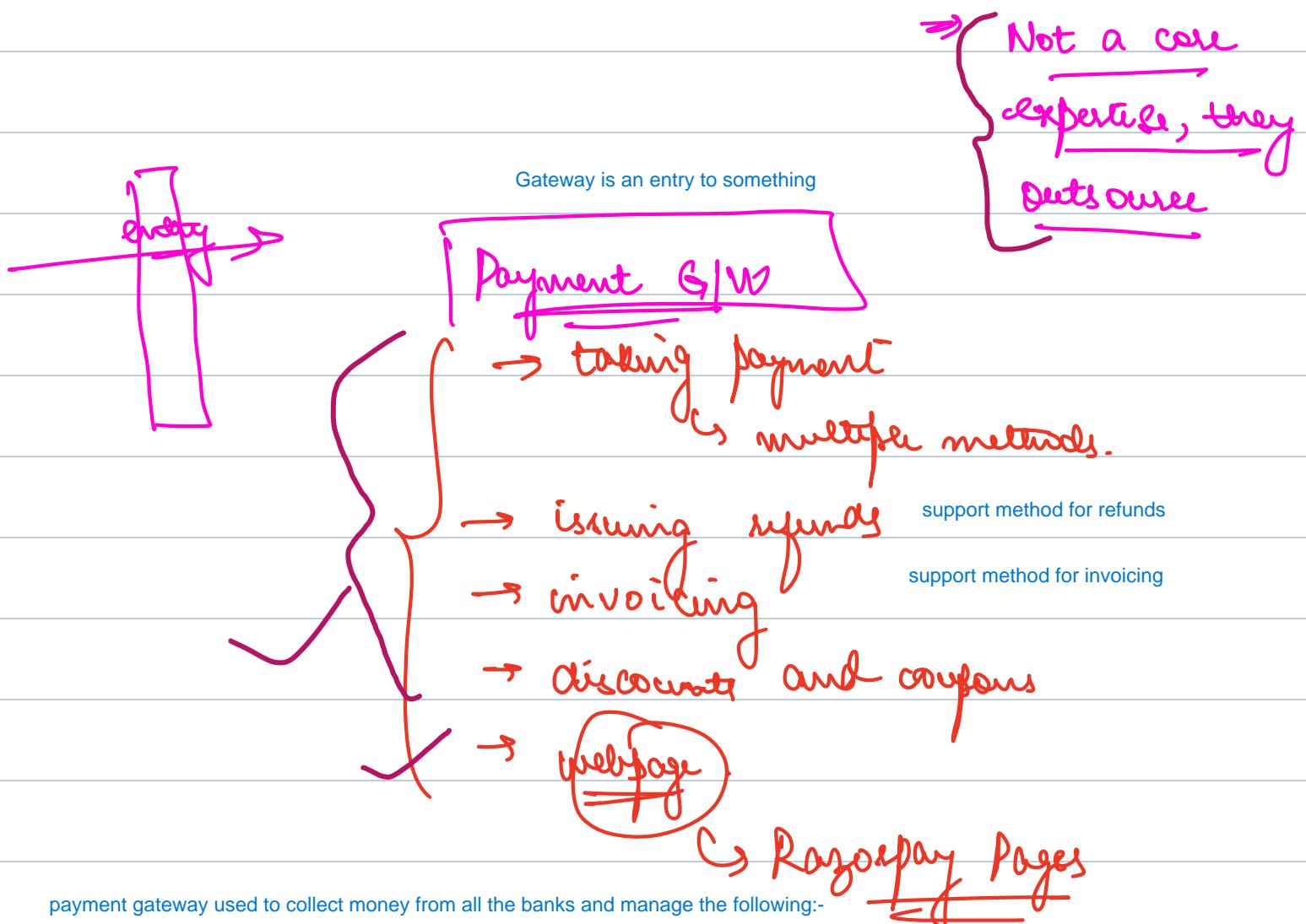
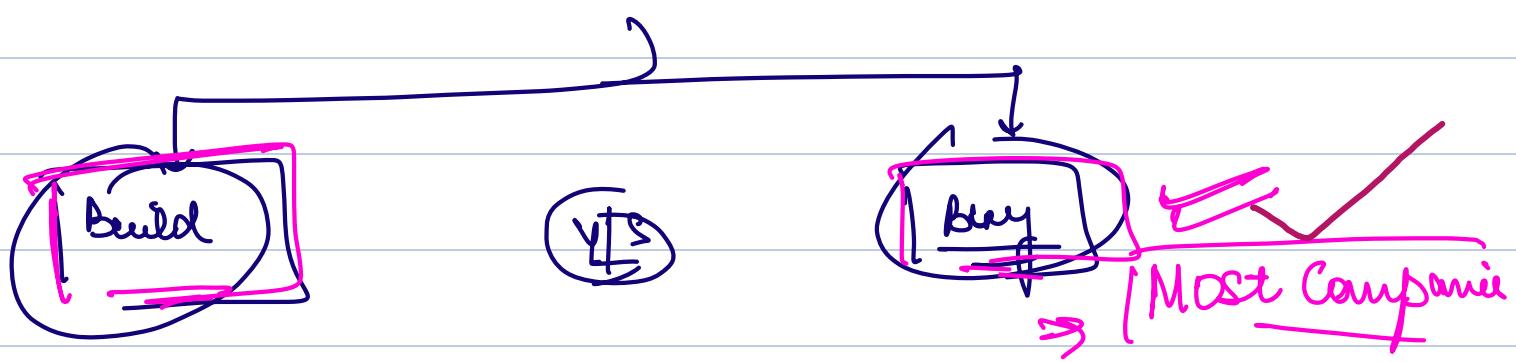
1. Regulations
2. Variety of Payment Sources
3. Security

Since your codebase saves the log of your code and lets say that while a customer was putting his card# and pin, this was logged and lets this was stored on a particular website like logDNA(is a provider which stores log) you can search the log using Elastic Search



Now if the log data of logDNA gets leaked, the card# and pin gets leaked that's why there are certain certifications to ensure that you are following the best standards of security

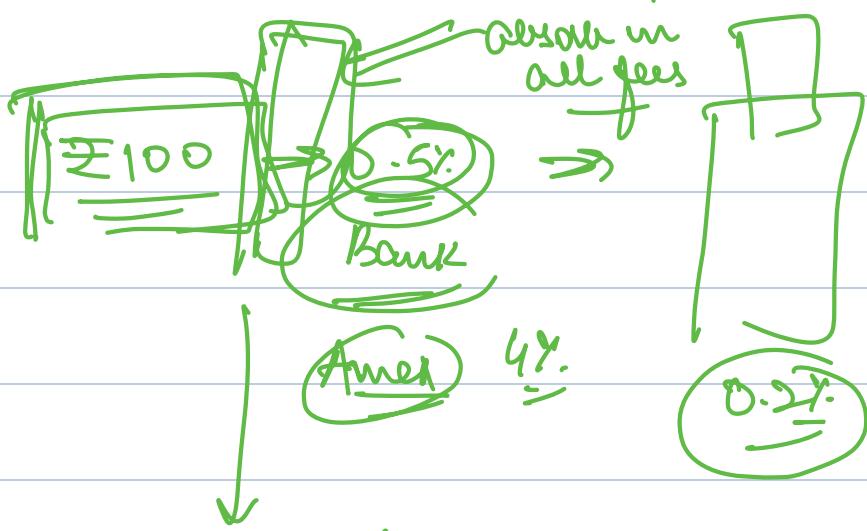
Interview will always ask Build vs Buy which New in house Vs Existing service. For payment system, most companies buy from 3rd party



{

- integrating with banks
- managing regulations and compliance.
- fees and other charges.

Why does some ppl call and ask us to take credit card -> these have processing fees, suppose if there is a bill of 100 rupees, 0.5% is taken by the bank, Amex card has high processing fees-4%, 0.2% by the swiping machine. Now payment gateway comes in between, they absorbs all the fees and charge a fixed rate. Razorpay charges 2%



Charge a fixed rate to wallet

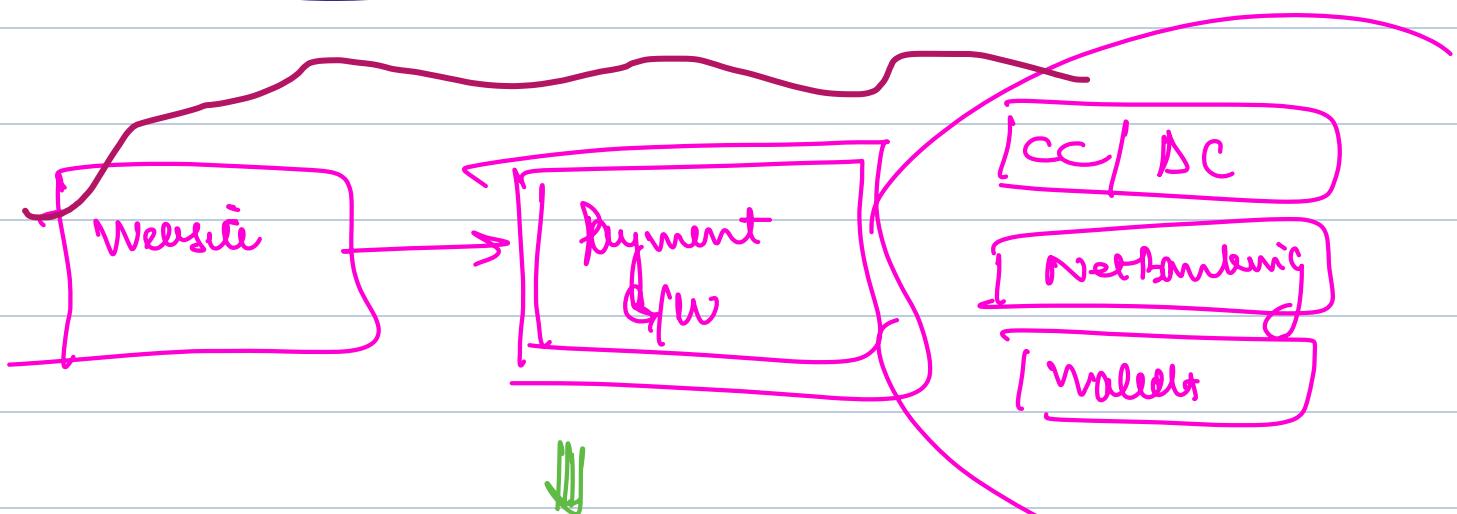
2%

Razorpay

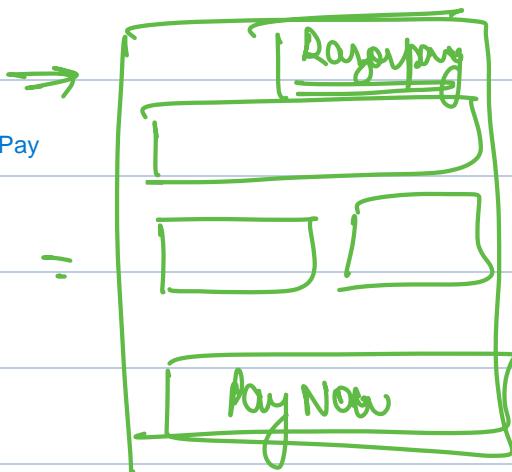
PhonePe 10%

300 00 -

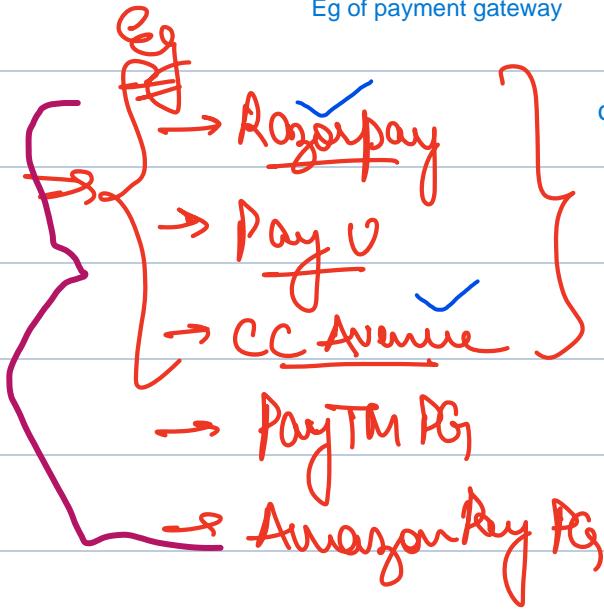
→ 6K → Razorpay



This is a UI of RazorPay

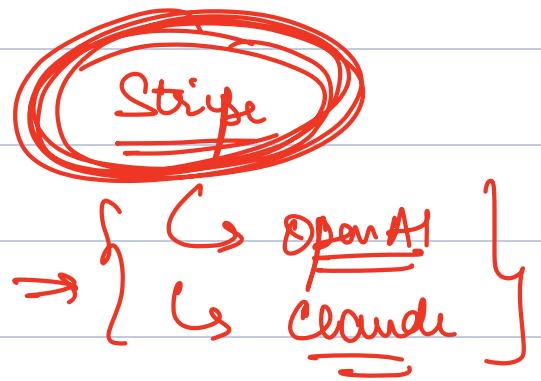


Eg of payment gateway



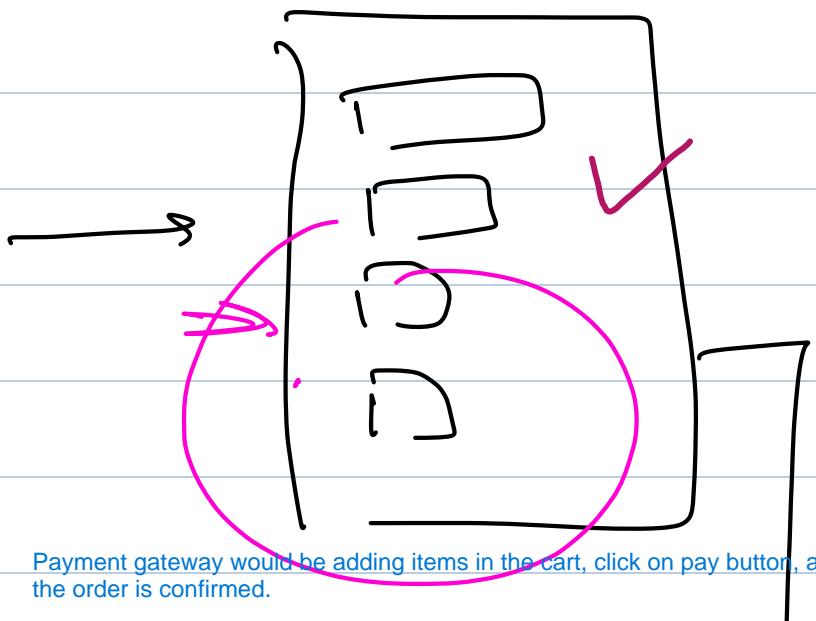
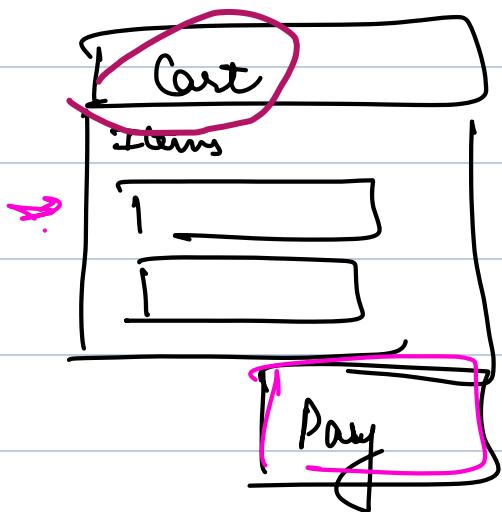
or JustPay ✓

Stripe is in abroad



Sometimes the quality of Payment Gw is determined by the Payment method, it might happens that for creditcards -> Razorpay is working better but for UPI, payU money is better so if a person says that you want to pay using UPI -> you will redirect to RazorPay or if some1 want that he wants to pay via credit card -> you redirect him to razorPay

How to use a payment G/W



Payment gateway would be adding items in the cart, click on pay button, and then the order is confirmed.

What do you think, which row is created first -> in payment table or in orders table
Order is created first

⇒ Payments ✓

✓ Order confirmed

⇒ Orders ✓

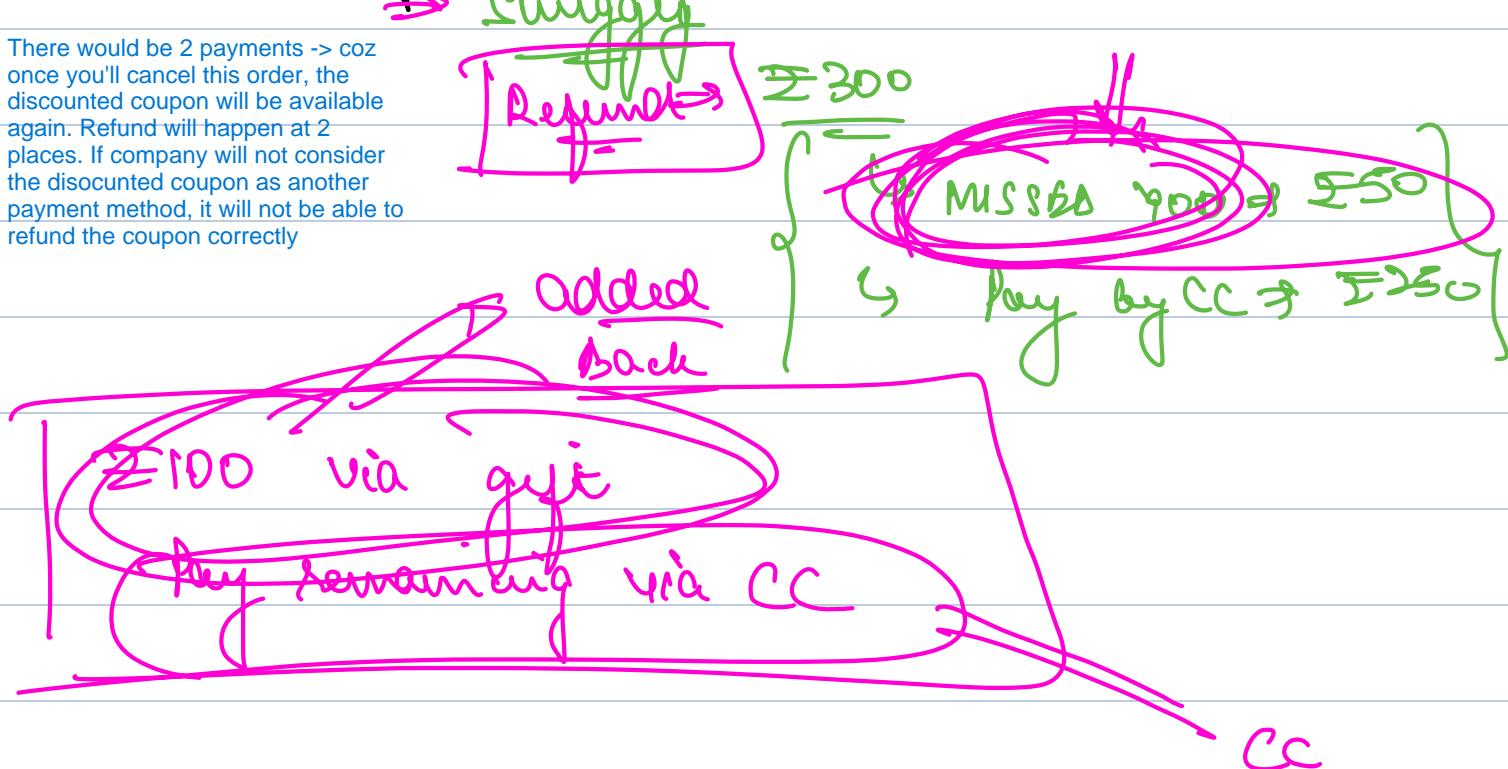


→ We create an order before payment

① ~~coz~~ Partial Payments

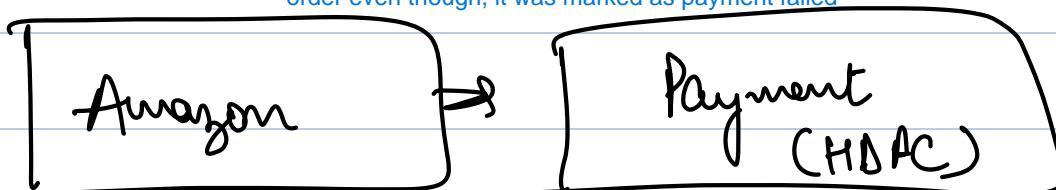
Lets say there is an order of Swiggy and order was of 300 rupees, there was a discount of 50 rupees and rest you have to pay by Credit Card -> so here there are 2 payments - one by discount code and 2nd by credit card

There would be 2 payments -> coz once you'll cancel this order, the discounted coupon will be available again. Refund will happen at 2 places. If company will not consider the discounted coupon as another payment method, it will not be able to refund the coupon correctly



② Failed Payments

If payment has been failed but the money is deducted, the company should know the source of that money. There should be some sort of traceability -> so that they can identify that the company received that order even though, it was marked as payment failed



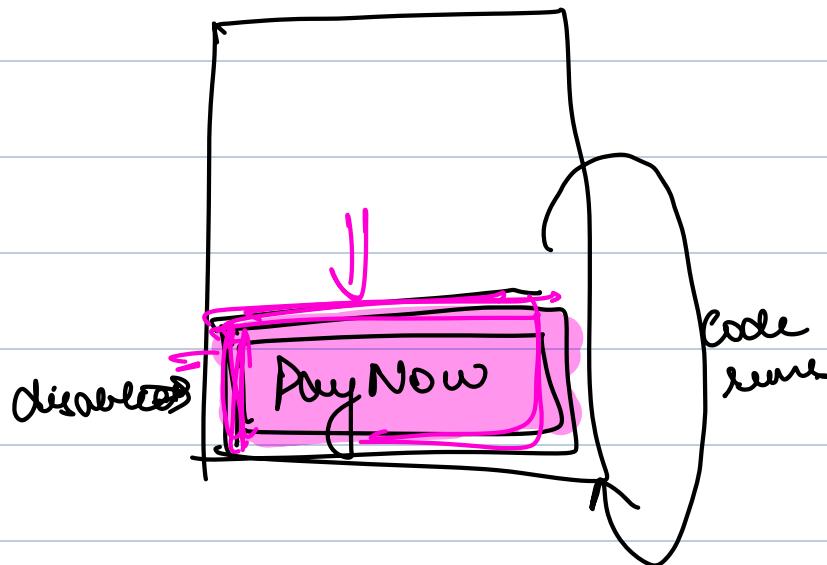
Payment failed

⇒ traceability

Payment successful
→ Money Deducted

→ ~~✓ Idempotency~~

Third reason is idempotency. This is when you click on the button twice maybe in older phones, when you click on Pay now button, some UI code runs in the background and click() is activated and somehow it disables the button. For that reason you click on the button twice and mistakenly pay twice



→ click()
→ answer()
→ Server. deduct Min

☰ Disabling ()

You clicked twice, click() method will disable twice but both will call the server and money is deducted twice

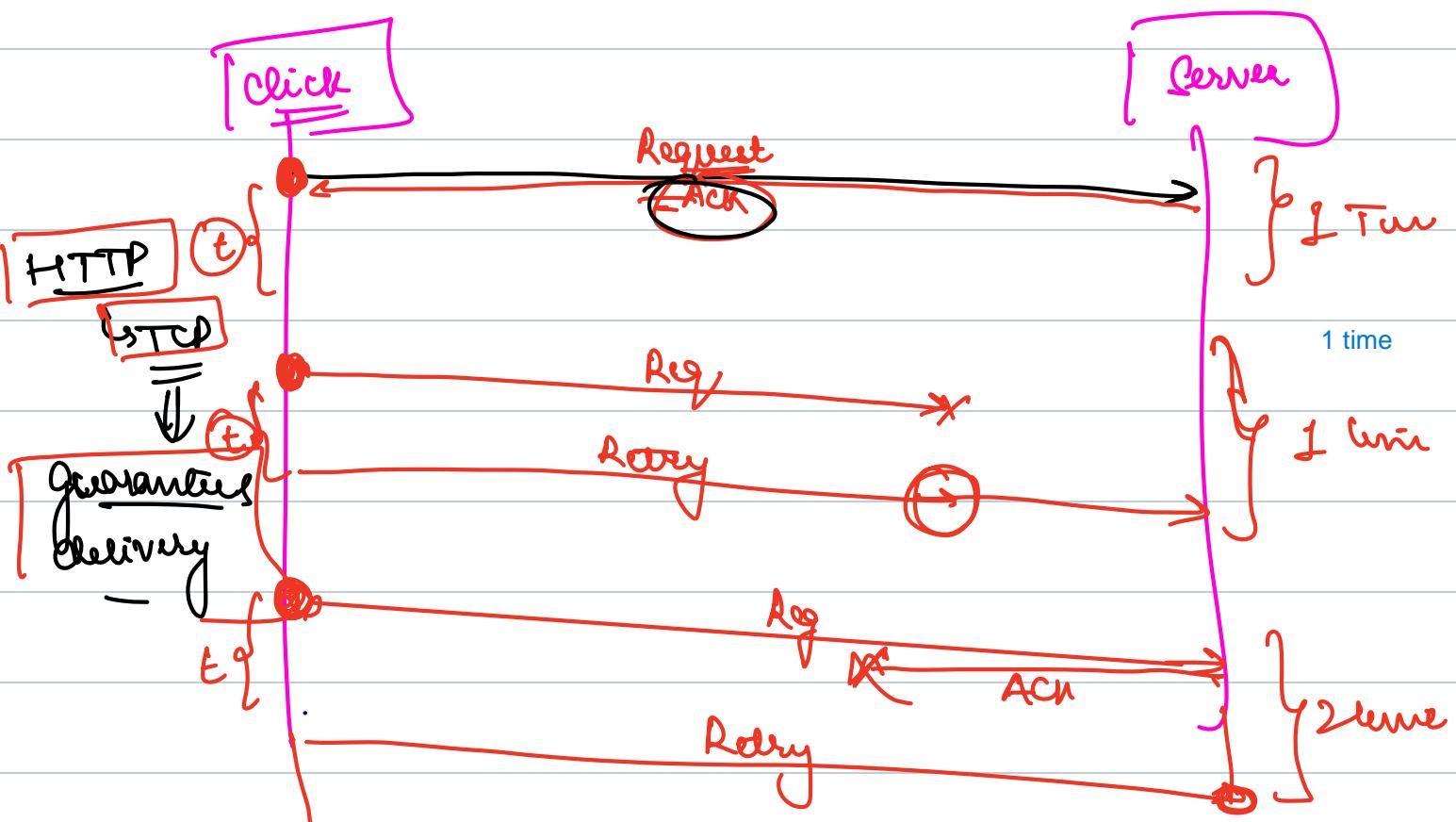
→ end up paying twice for same order
because of multi click.

Lets say this was server method will causes deduction of money. Was there any way for server to identify that this was a duplicate call

Server. deduct Money
(CardNo, amount)

There can be other case, that you clicked once, but server received 2 API calls. Now lets see how Http works, http uses TCP protocol, TCP guarantees delivery. How does it guarantees delivery.
When a http request is send, an acknowledgement msg send by the server:ack.

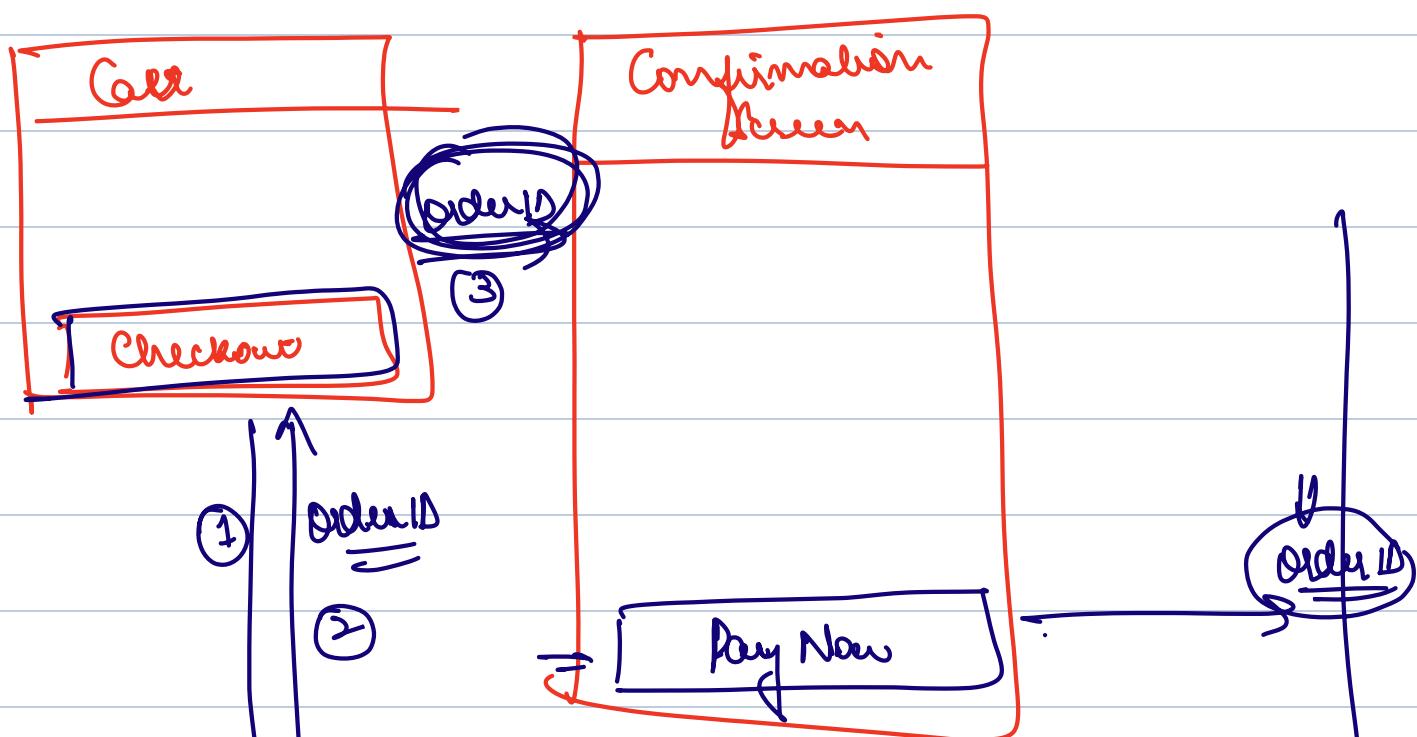
But when it does not get ack back from the server, it waits for sometime and assumes that server did not receive http request. unfortunately, the



we need something that tells server this is a duplicate request -> that is where OrderID helps

we need something that tells server this is a dup req!
 ie a dup reg!
 → Order ID

When we checkout and go to payNow page -> it takes time to load the page coz behind the scene, it is checking the Order details and creating the OrderID and all this OrderId also goes along

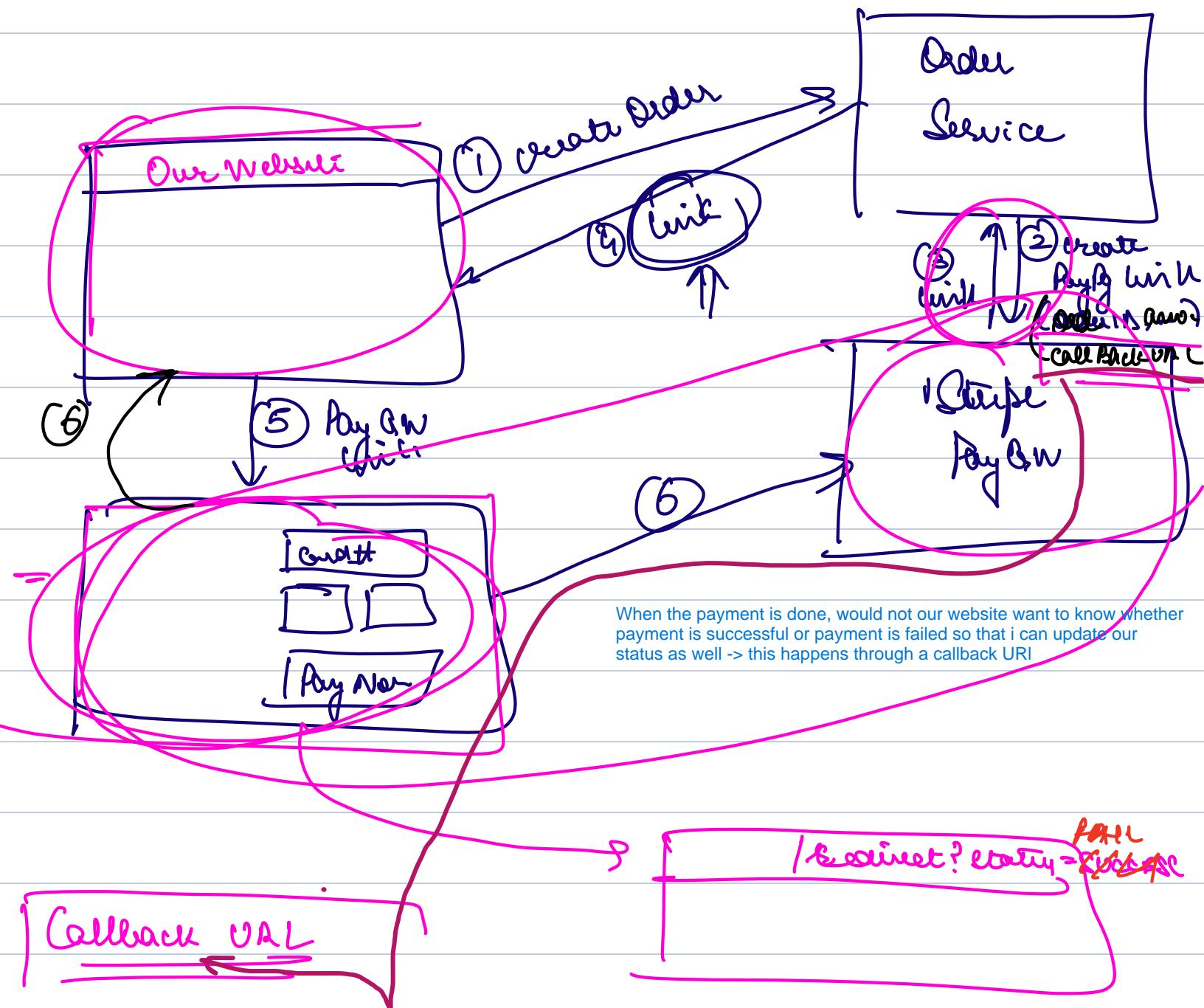


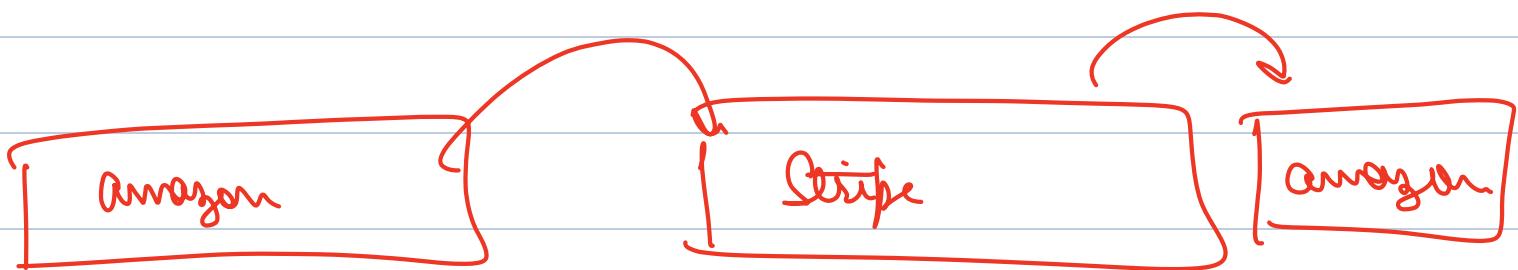
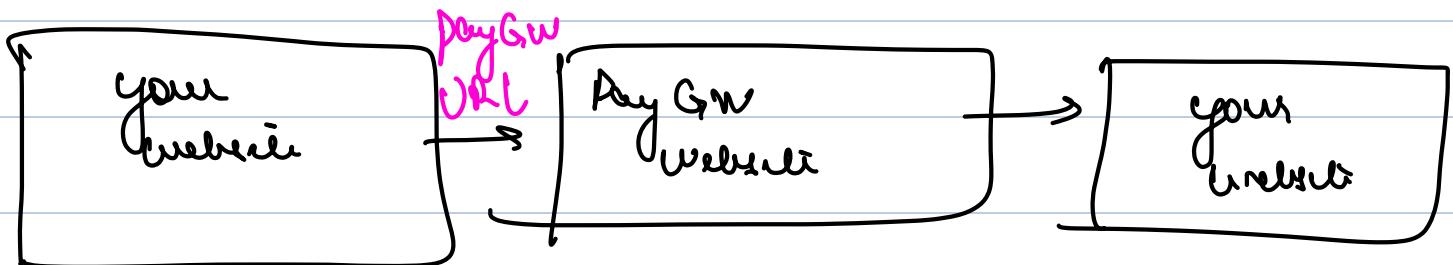
Create Order

browser creates request to send order and it goes to Order Service

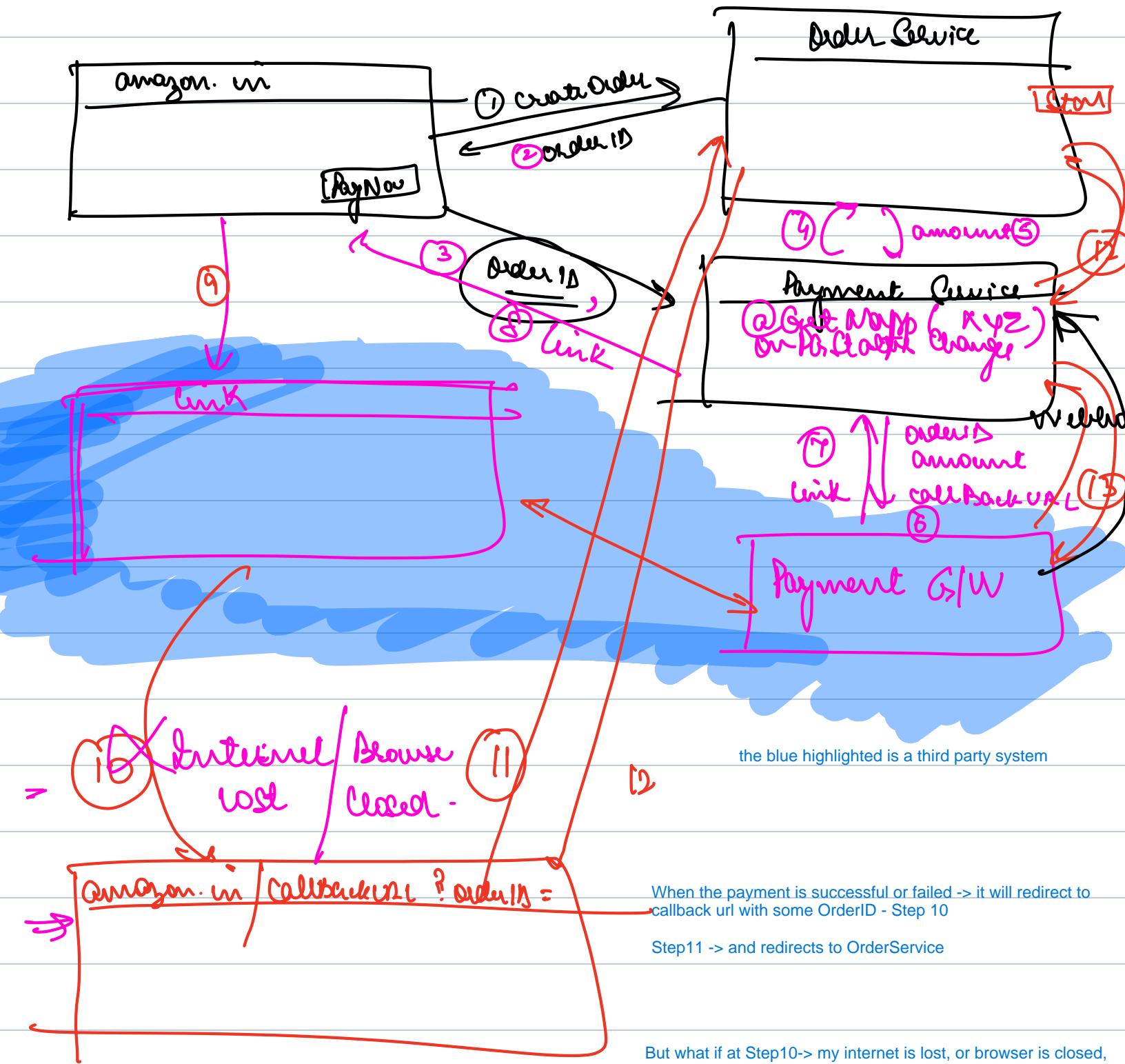
will the Payment related UI managed by me? No, orderService talk to the payment gateway service -> it asks the payment gateway to create a payment page gw link -> where there would be orderId, etc)

Now Stripe will give a particular link to OrderService. OrderService will pass this link to the UI. UI will either open this link in a new tab or redirect to this particular link

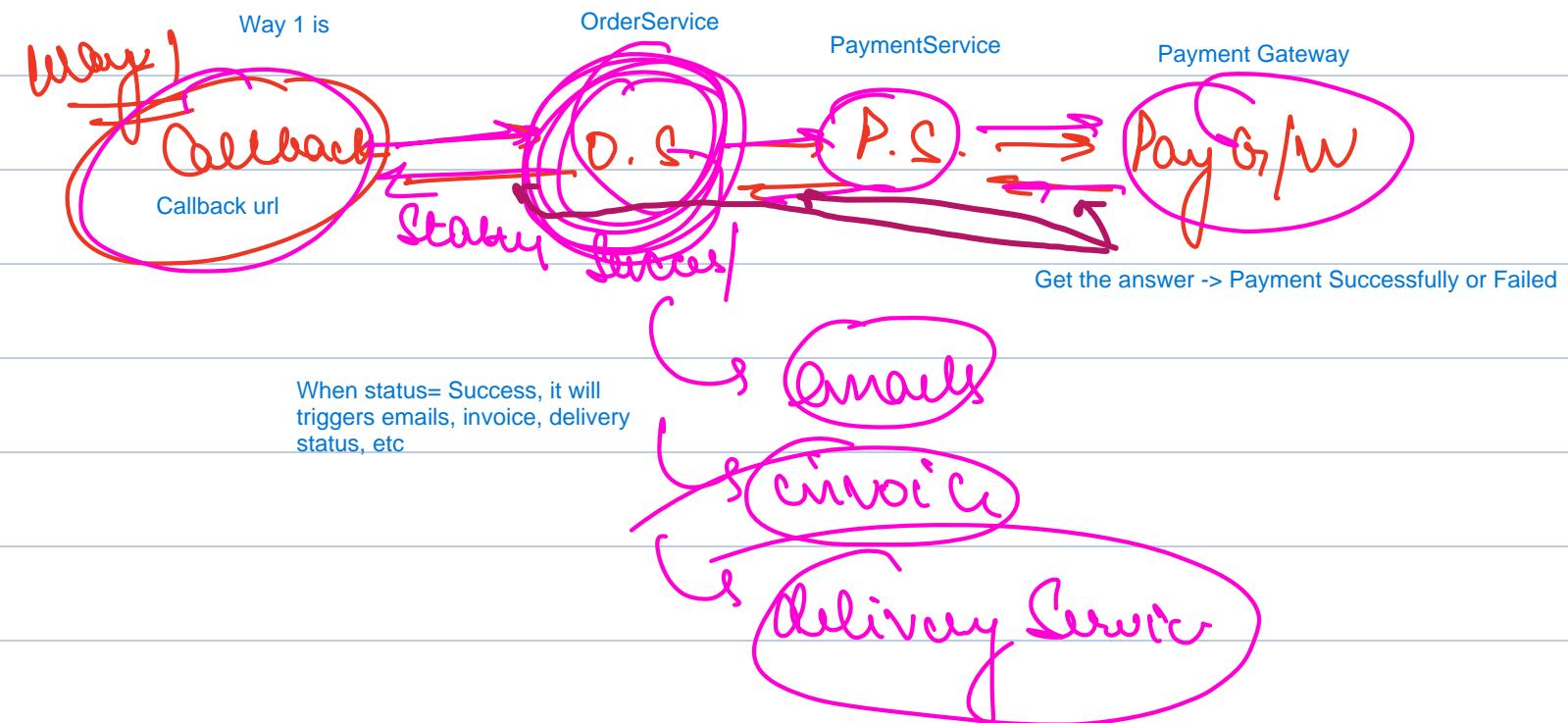




Break till 10:20



How will order service get to know
status of payment



But what if at Step 10-> my internet is lost, or browser is closed, how the OrderService will know the payment success or failure. This is solved by the use of Webhooks

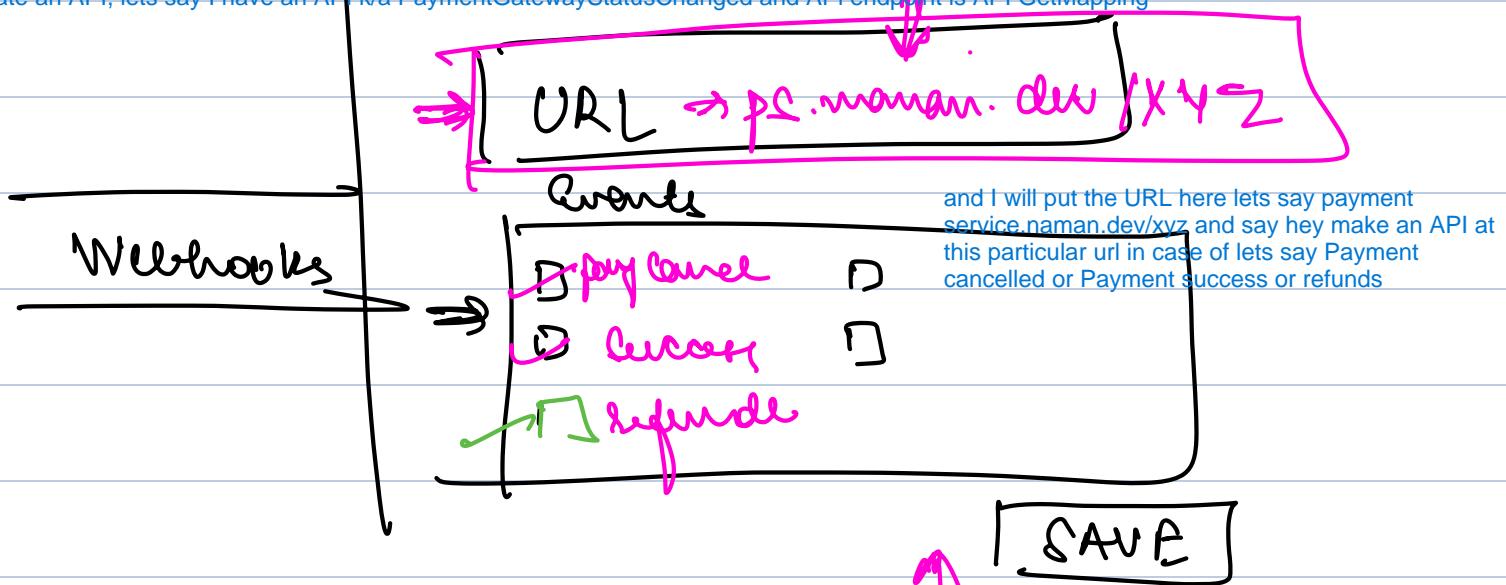
② Webhooks

APIs that I create on my system
that are called by external systems

3rd party APIs or external systems

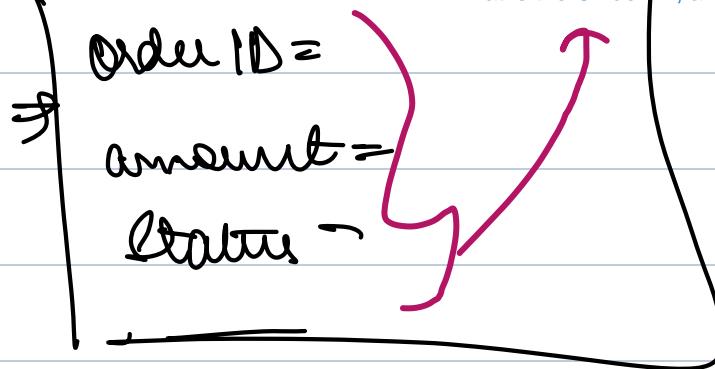
Stripe Dashboard / RPay Dashboard

For eg:- In Stripe Dashboard or Razorpay Dashboard, there is a tab called Webhooks tab. In this Webhooks tab, you can give an url as well as you can give events. Now what happens is at the time of the Saving, this save button this stripe in the dashboard should put up an URL. I will create an API, lets say I have an API k/a PaymentGatewayStatusChanged and API endpoint is API GetMapping



Webhook

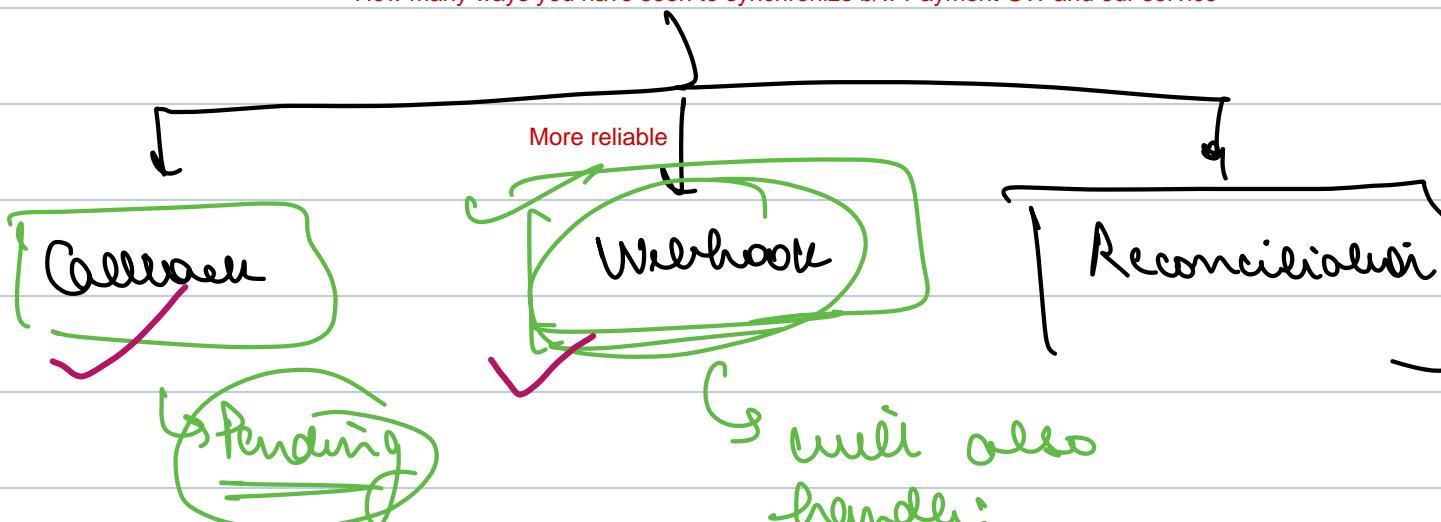
So stripe is making an API call to this URL so the payment gateway(Stripe) is making an API call to this particular url in case of any events triggered -> this is called Webhooks and in those API calls it is sending what is the Order ID, amount, Status.



Coz of this Webhook request which Stripe itself send to me (on my API). So as soon as the status change in the Payment GW, it will tell me or make an API call to me and I will also change the status at my end

A webhook is a way for applications to communicate with each other by automatically sending data when a specific event occurs. Webhooks are often used to integrate applications and perform automated tasks.

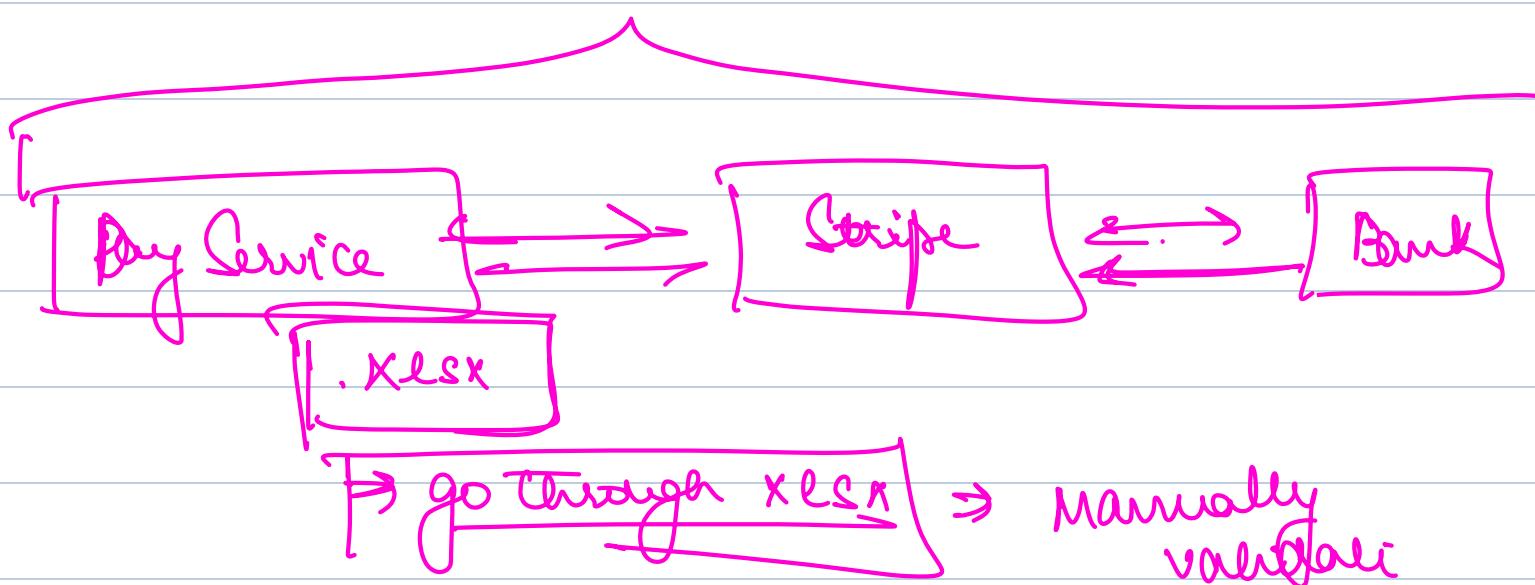
How many ways you have seen to synchronize b/w Payment GW and our service

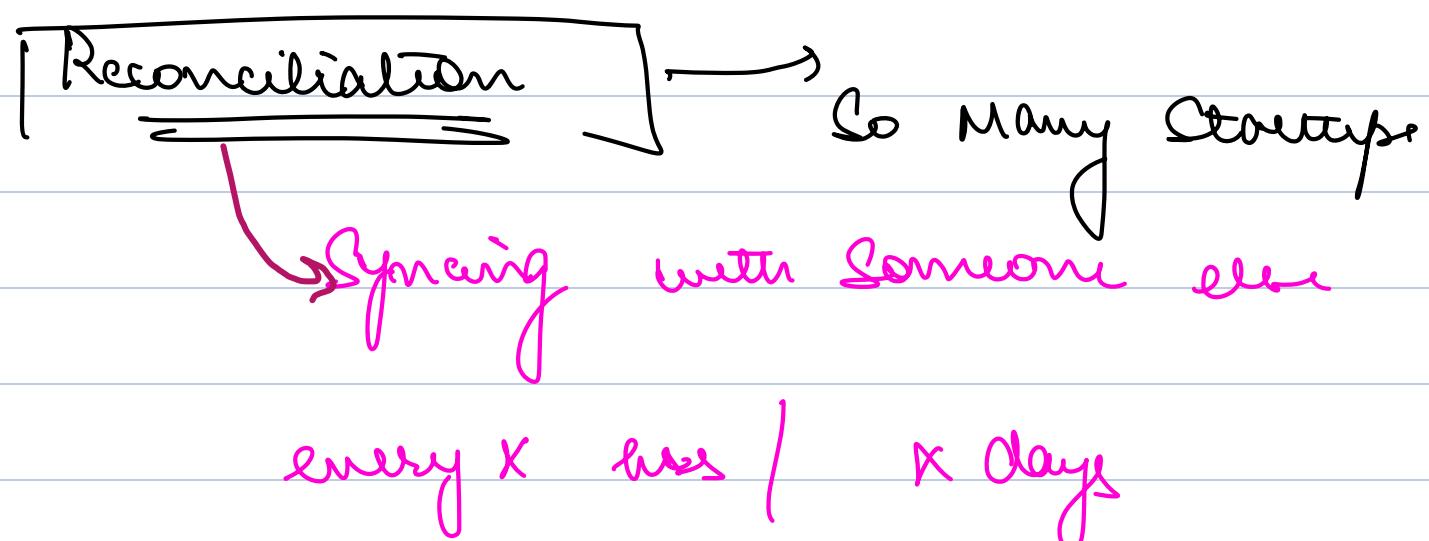


In Credit card charge backs can happen. Charge backs are when you pay something through website, and if you say to the credit card company, not to pay certain amount -> charge backs can happen. Now if you haven't made check on refund or not enabled charge back request then you have a problem, the money got deducted but you didn't cancel the service and kept on giving the service for free.

It is a problem for stripe what if bank donot tell stripe the payment status and stripe will not be update neither our API will get a call

So all of these Payment Service, Stripe and banks need to be kept in sync. So the 3rd way is Reconciliation



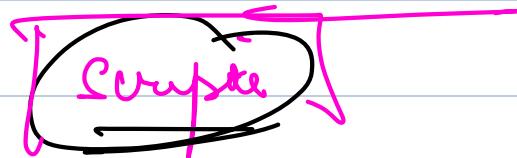


So lets say every X days, a complete tradebook of last Y days will be sent by that system to you

→ a complete tradebook of last Y days will be sent by that system to you

So what happens is Stripe gets a tradebook, an excel file with all of the transactions/ payments that happened in last suppose 90 days. Similarly stripe also give you an excel statement

`.xlsx` you get an excel file and there is a script that runs on this file.



`trans`

Validates the payment status on your system vs Payment GW

```

graph TD
    A[Your Sys Success] --- B[Pay GW Success]
    A --- C[Pay GW Fail]

```

cancel the service, can be automated or manually

```

graph TD
    A[Cancel] --- B[Auto]

```

account
(Manual)

fail

success

```

graph TD
    A[Pay GW Success] --- B[Pay GW Fail]

```

```

graph TD
    A[Pay GW Success] --- B[Cancel]
    A --- C[Auto]
    B --- D[success]
    C --- E[fail]
    D --- F[success]
    E --- G[fail]
    F --- H[success]
    G --- I[fail]
    H --- J[success]
    I --- K[fail]
    J --- L[success]
    K --- M[fail]
    L --- N[success]
    M --- O[fail]
    N --- P[success]

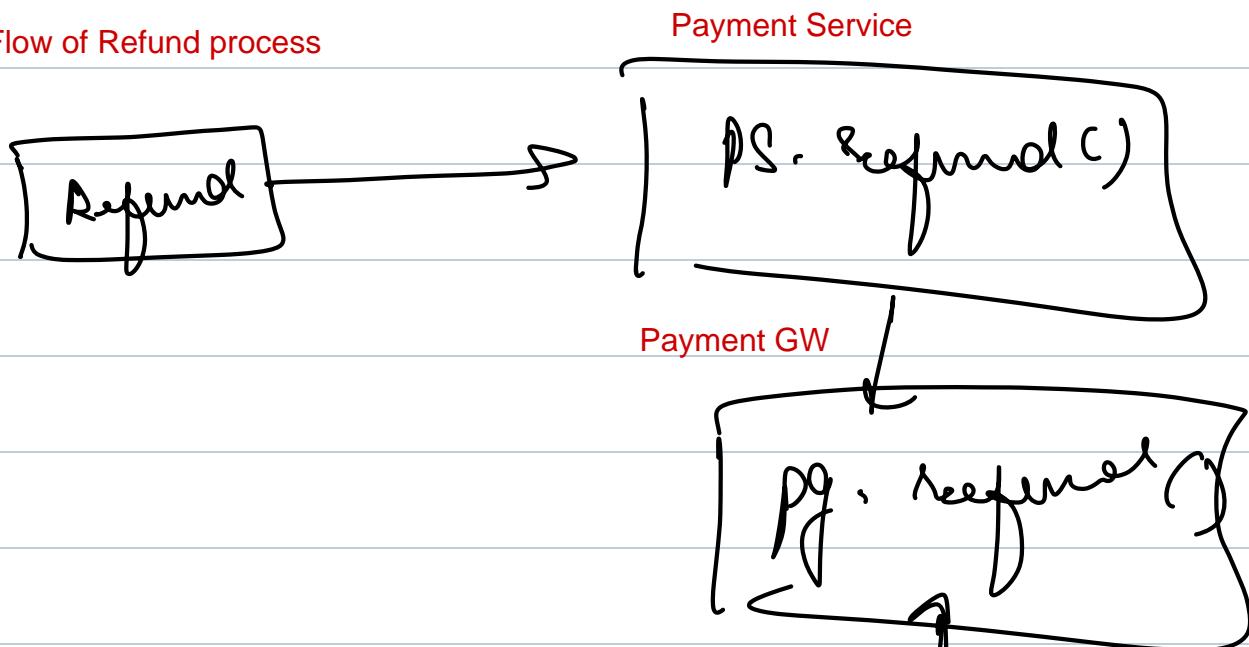
```

refund

Welcoming

At the end there are
Some manual intervention

Flow of Refund process



Here controller is calling the service, service is calling the adapter. Most imp business logic is going to happen in the adapter. Stripe & RazorPay has good developer experience, others are complicated to implement them.

If you want to integrate for 3rd party API(Stripe or RazorPay) there are 2 ways to implement them ->
 1. see if that 3rd party have sdk available for your programming language. For most programming language, sdk's are available. SDK are Source Development Kit. If you don't have sdk or library available for 3rd party -> then you need to send http request. have to get the json response, parse the json response and maybe handle a lot of exceptions, etc. whereas 3rd party use ready to use library of that in your programming language. So you have to import the library and start doing the work, you just need to call the methods.
 Those methods behind the scenes might be calling HTTP APIs n all.

SDK is made by the 3rd party themselves, they know the best practices. Always try to see if they is a Stripe java sdk
[stripe java sdk payment link](#)

Your stripe client need a API key this is like a password ->stripe needs to know what is the url or whose account I need to create the payment or they do via API key. This API key is present in my stripe's account but I should give the key via environment variable. \${STRIPE_API_KEY}

When a new product is created, you have to make a call to the Payment Service (PS) as well, so that the PS can make the price and product object of that particular product

```

public class StripeProductOrder extends BaseModel {
    private Long productId;
    private String stripePriceId;
    private String stripeProductId;
}
  
```