FROM BI TO BIG DATA

OR, THERE AND BACK AGAIN

FRANCESCO MUCIO

@mucio

linkedin.com/in/mucio

01-05-2019

ZALANDO AT A GLANCE

~ 5.4 billion EUR
revenue 2018

> 250 million
visits per month

> 15.000
employees in Europe

> 79%
of visits via mobile devices

> 26 million
active customers

> 300.000
product choices

~ 2.000
brands

17
countries

zalando

ZALANDO

2008 ZALANDO IS BORN

2009 FIRST TV AD

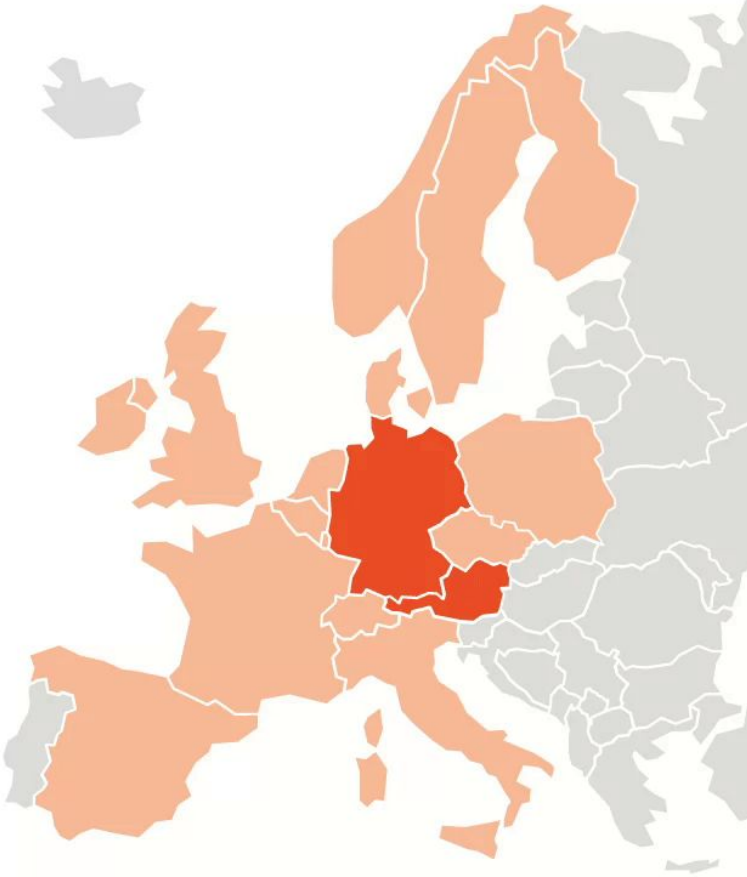
2010
- FIRST PRIVATE LABEL
- START SHOP DEVELOPMENT IN HOUSE

2011
- SELF OPERATED FULFILLMENT CENTER
- PARTNER PROGRAM

2012 BREAK EVEN IN CORE REGIONS

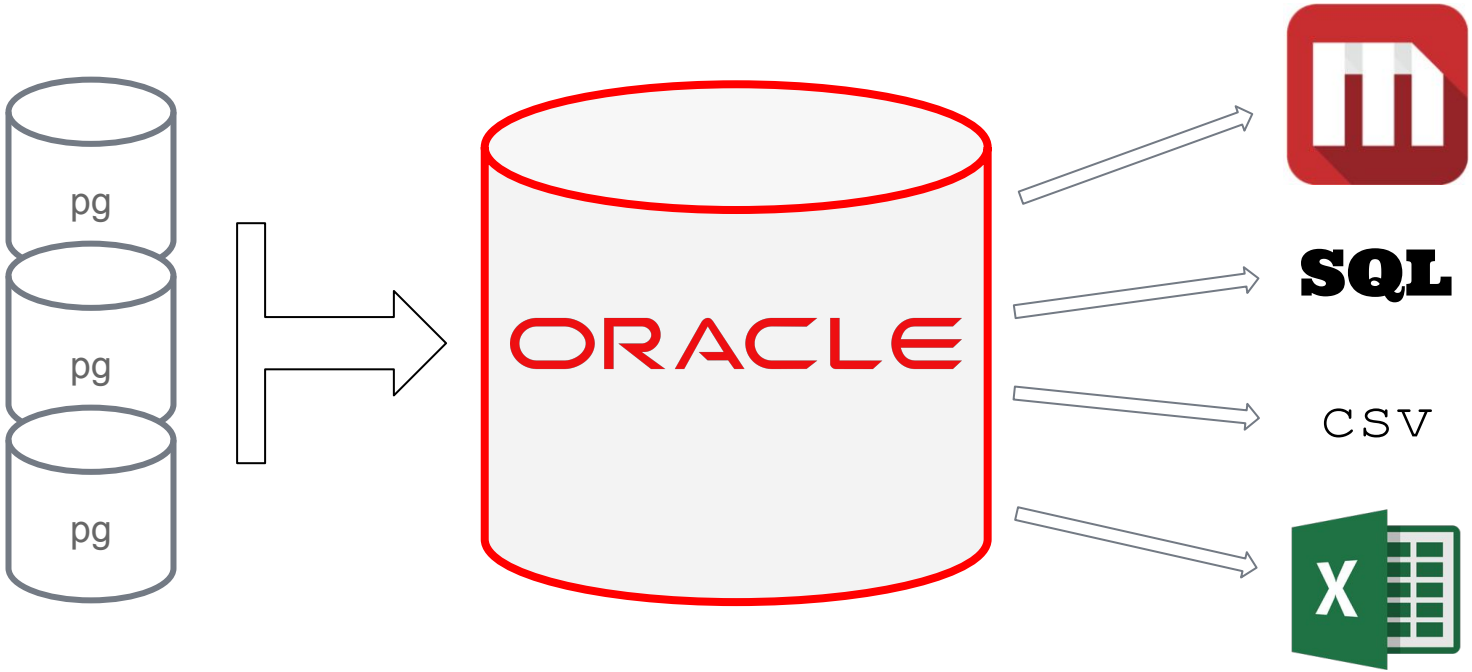
2014 STOCK MARKET

2015
- FIRST WAREHOUSE ABROAD
- TECH HUBS IN DUBLIN AND HELSINKI



SHORT BI STORY AT ZALANDO

THE OLD CLASSIC BI SETUP



OUR TARGET

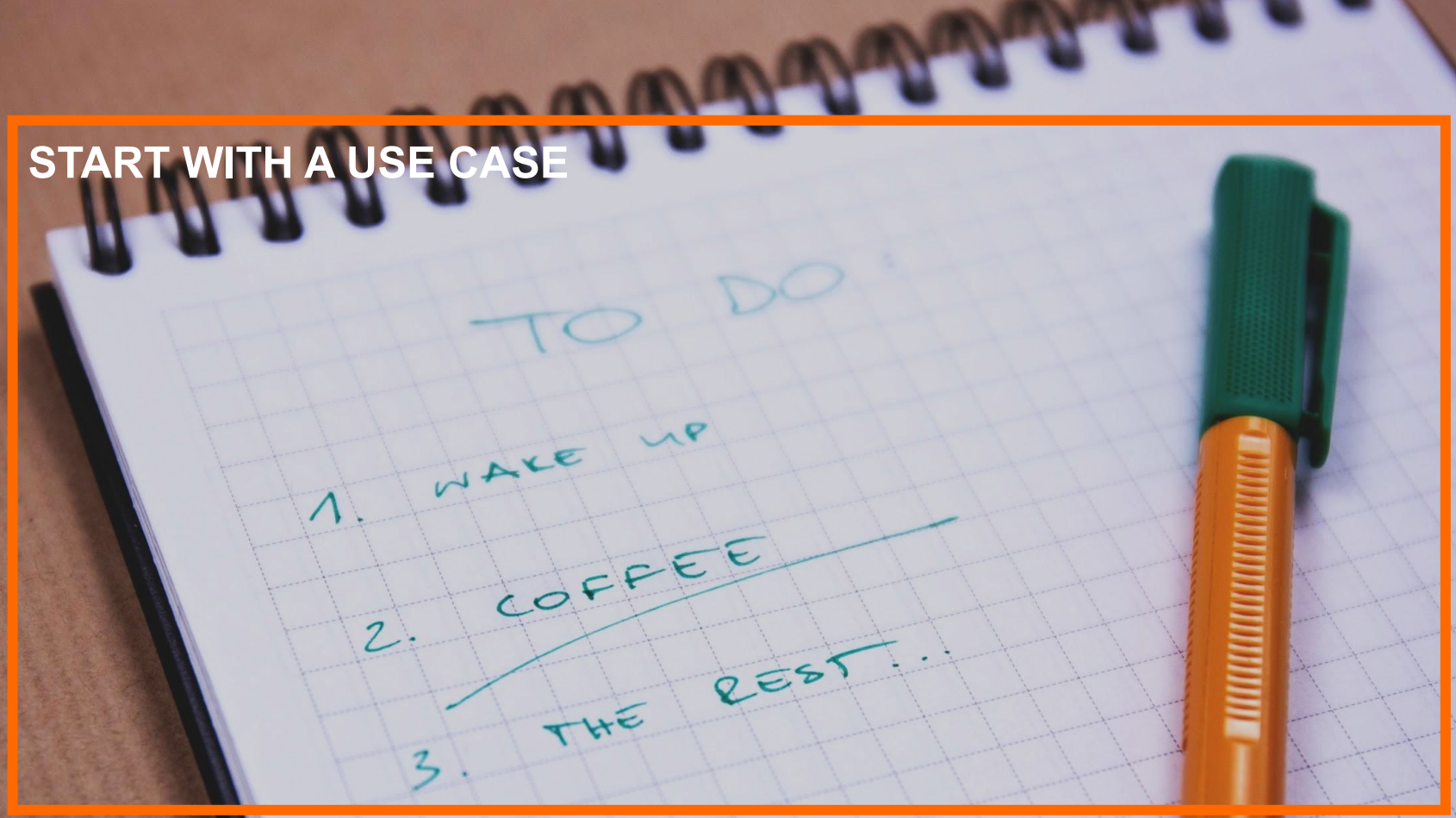
GOOD REASONS TO HAVE A DATA LAKE


DEMOCRATIZE DATA
zalando

SPLIT STORAGE FROM COMPUTE


TIPS

START WITH A USE CASE




START SIMPLE


START PROPERLY


METADATA METADATA METADATA
Café Latte
Café La
Café Latte
Café Latte
Latte
Café Latte
Café Latte


THINGS
I SHOULD HAVE LEARNED
BY NOW

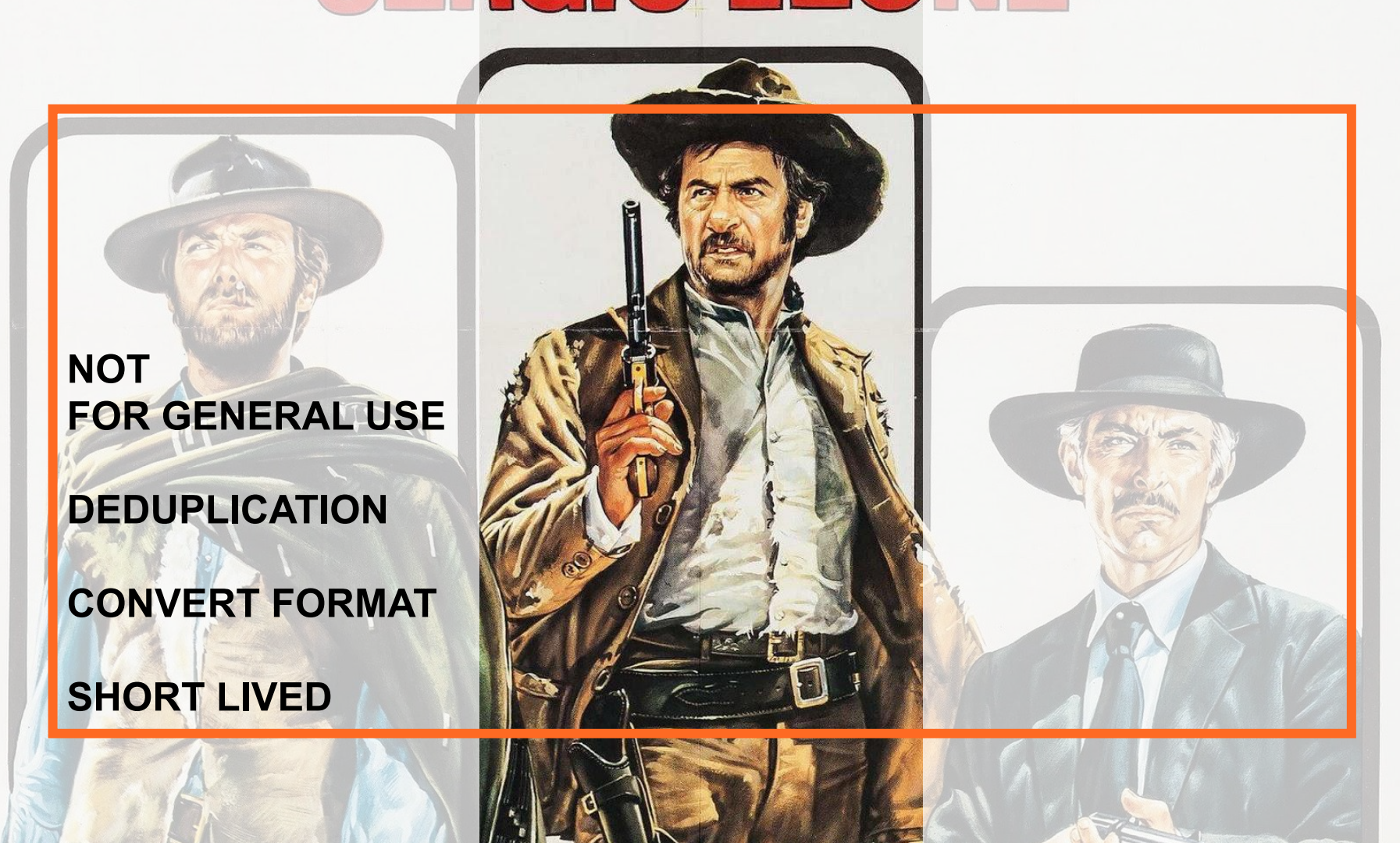
SCHEMA ON WRITE.

SCHEMA ON READ.

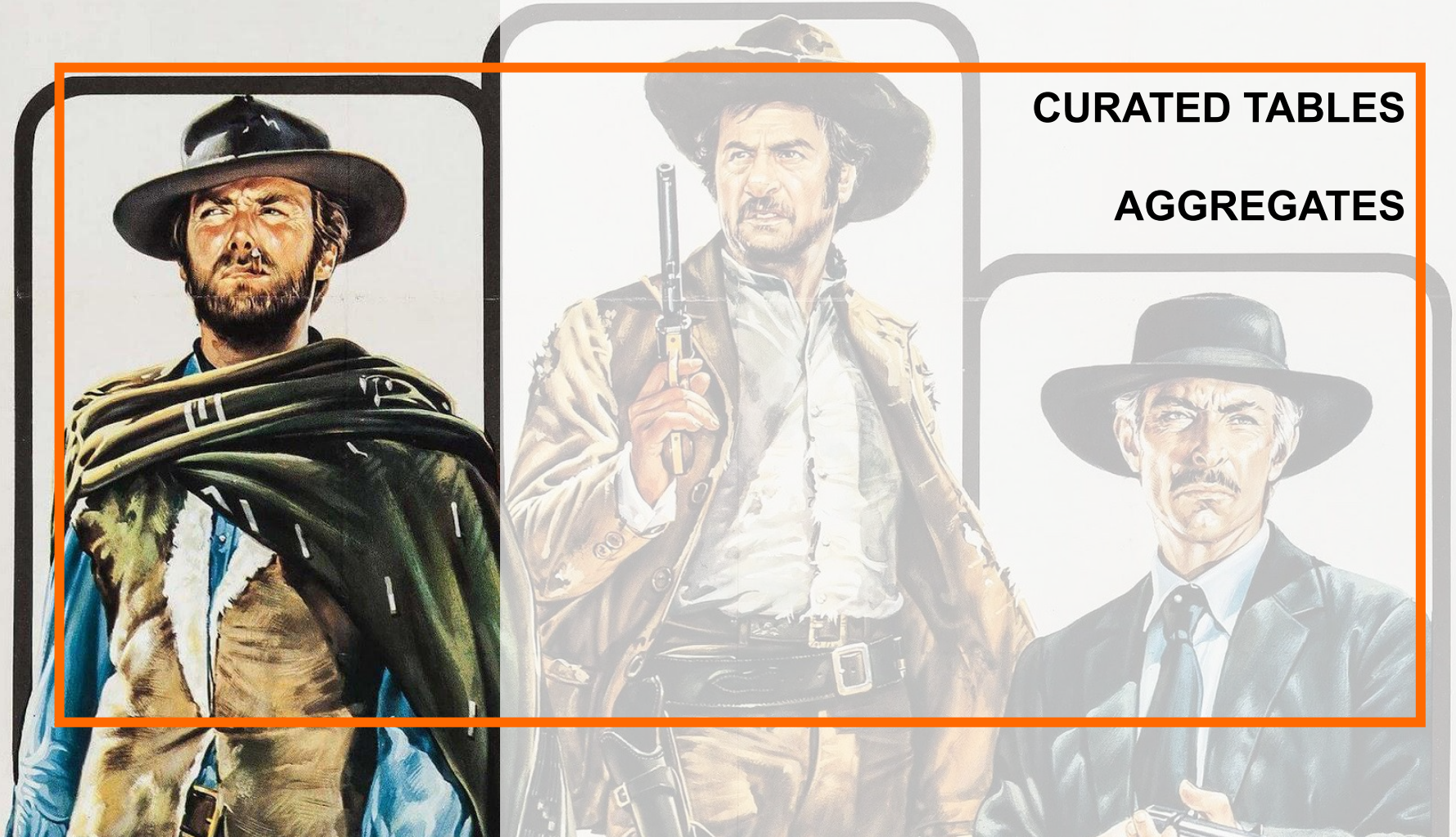

INSERT INTO <TABLE-NAME>
zalando


SCHEMA
ON WRITE


THE BRONZE
THE SILVER
THE GOLD


NOT
FOR GENERAL USE
DEDUPLICATION
CONVERT FORMAT
SHORT LIVED


QUERYABLE TABLES
PII/MASKING



CURATED TABLES

AGGREGATES

BRONZE

- NOT FOR GENERAL USE
- DEDUPLICATION
- CONVERT FORMAT
- SHORT LIVED

SILVER

- QUERYABLE TABLES
- PII/MASKING

GOLD

- CURATED TABLES
- AGGREGATES

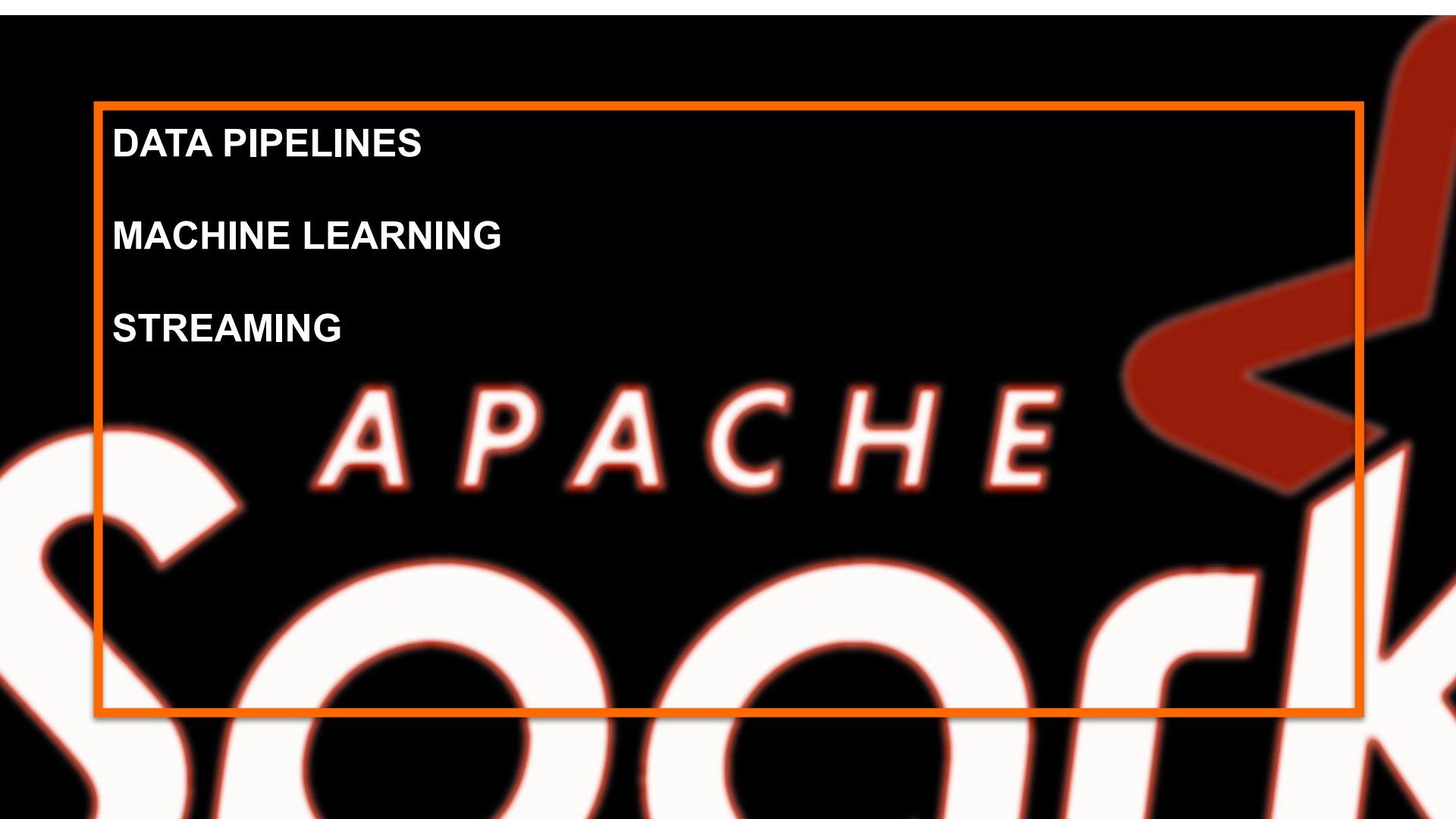
BRONZE
SOURCE DATA

SILVER
DATA WAREHOUSE

GOLD
DATA MART

PRESTO AND SPARK


SQL
FAST SQL
SQL ON EVERYTHING
presto

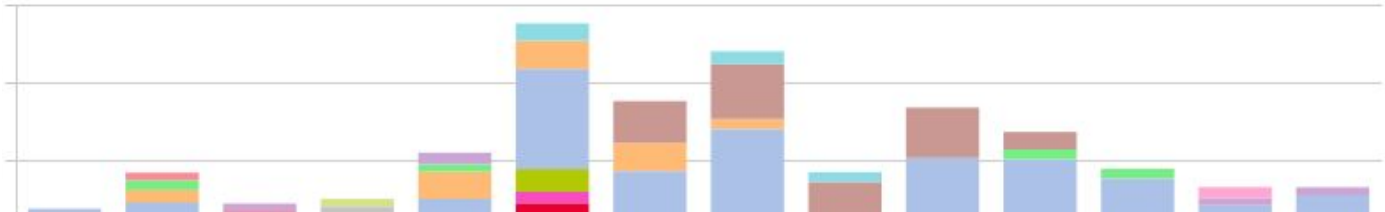

DATA PIPELINES
MACHINE LEARNING
STREAMING
APACHE
Spark

SPARK: HOW DOES IT LOOK LIKE?

Cmd 12

```
%sql
with t1 as ( select date_trunc('WEEK', timestamp) dt,
                    case when substr(clustername, 1, 4) = 'job-' then 'job-XXXX' else clustername end cn,
                    sum(machinehours) machinehours
               from delta.`/user/hive/warehouse/billing.db/databricks_usage`
              group by date_trunc('WEEK', timestamp),
                       case when substr(clustername, 1, 4) = 'job-' then 'job-XXXX' else clustername end
  ),
      t2 as ( select *,
                    rank() over (partition by dt order by machinehours desc) rnk
               from t1 )
select to_date(dt),
       case when rnk <= 10 then cn else 'other' end clustername,
       sum(machinehours) * 0.05 cost
  from t2
 where dt > date_add(current_date, -105)
 group by dt,
          case when rnk <= 10 then cn else 'other' end
 order by dt asc
```

▸ (1) Spark Jobs

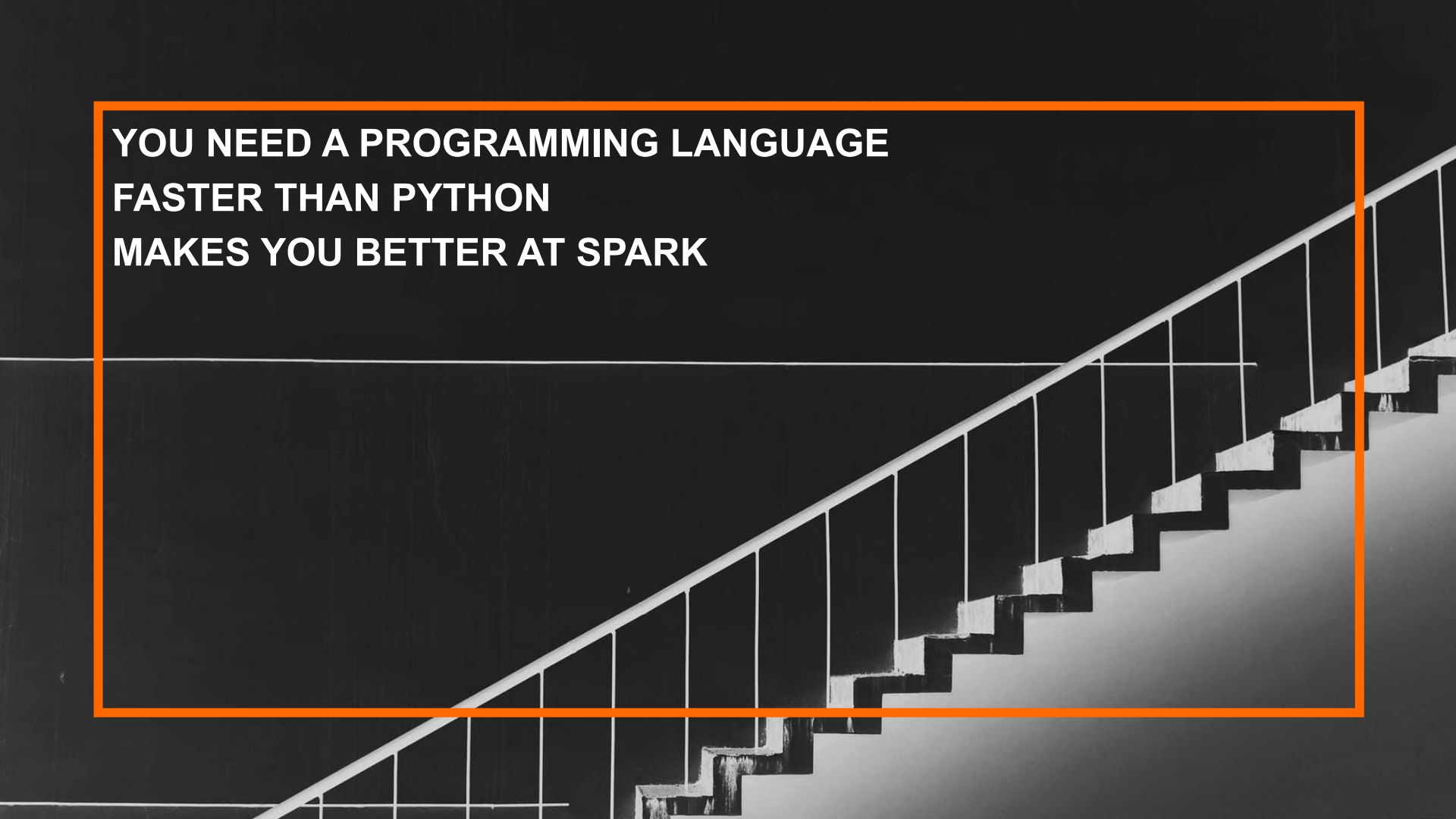


```
result_purchase = spark.sql("""SELECT DISTINCT
customer.name AS name FROM purchase JOIN book ON
purchase.isbn = book.isbn JOIN customer ON customer.cid
= purchase.cid WHERE customer.name != 'Harry Smith' AND
purchase.isbn IN (SELECT purchase.isbn FROM customer
JOIN purchase ON customer.cid = purchase.cid WHERE
customer.name = 'Harry Smith')""")
```

```
select distinct customer.name name
  from purchase
  join book
       on purchase.isbn = book.isbn
  join customer
       on customer.cid = purchase.cid
 where customer.name != 'Harry Smith'
   and purchase.isbn in ( select purchase.isbn
                            from customer
                            join purchase
                                 on customer.cid = purchase.cid
                           where customer.name = 'Harry Smith' )
```

```
val temp = customer.join(purchase, customer("cid")===purchase("cid") )
                   .where(customer("name")==="Harry Smith")
                   .select(purchase("isbn").as("purchase_isbn"))

val result = purchase.join(book, purchase("isbn")===book("isbn"))
                     .join(customer, customer("cid")===purchase("cid"))
                     .where(customer("name") !== "Harry Smith")
                     .join(temp, purchase("isbn")===temp("purchase_isbn"))
                     .select(customer("name").as("NAME")).distinct()
```

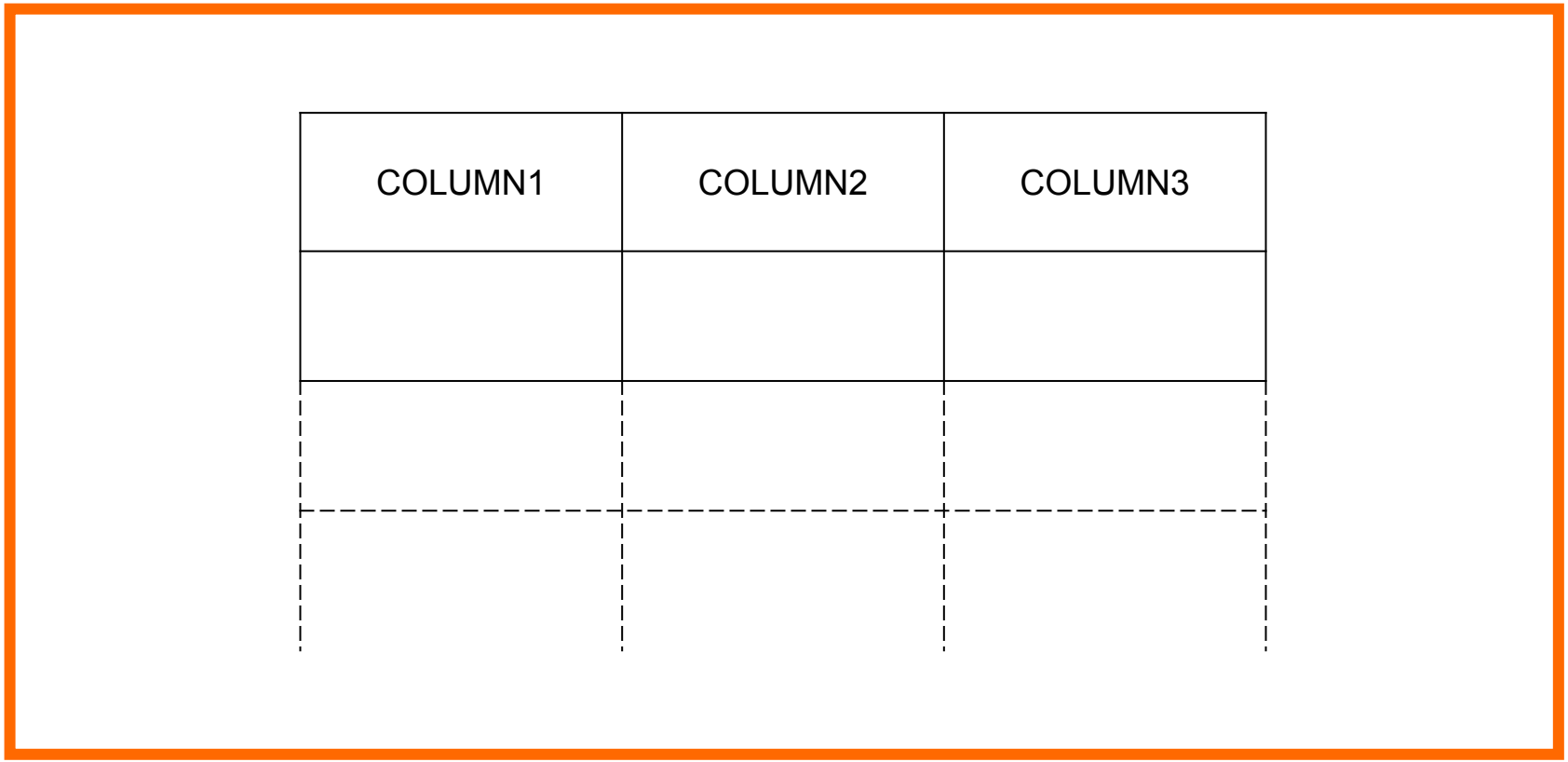
SPARK SQL, BUT LEARN USING SCALA


YOU NEED A PROGRAMMING LANGUAGE
FASTER THAN PYTHON
MAKES YOU BETTER AT SPARK

STRUCTURED STREAMING AND CONTINUOUS APPLICATIONS


STRUCTURED STREAMING

COLUMN1	COLUMN2	COLUMN3



ID	COL1	TS
1	ABC	12:00

ID	COL2	TS
1	XYZ	12:00

```
val joinedStream = stream1
                   .join(stream2, $"id" === $"id")
```

ID	COL1	TS
1	ABC	12:00

ID	COL2	TS
1	XYZ	12:00

ID	COL1	TS
1	ABC	12:00

ID	COL2	TS
...	...	...
1	XYZ	13:00

```
val stream1W = stream1.withWatermark("TS", "2 hours")
val stream2W = stream2.withWatermark("TS", "2 hours")

val joinedStreamW = stream1W
                    .join(stream2W, $"id" === $"id")
```

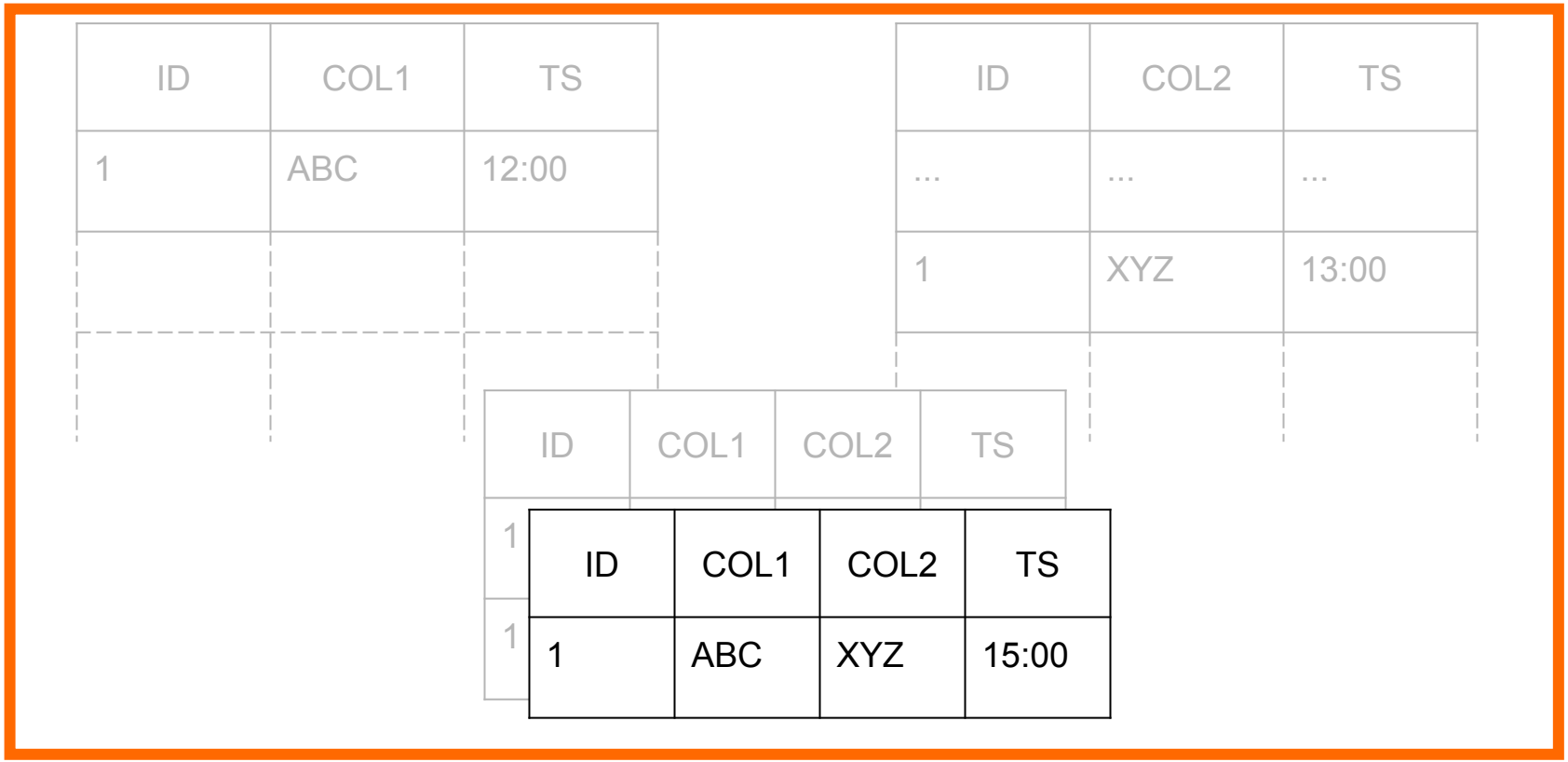
ID	COL1	TS
1	ABC	12:00

ID	COL2	TS
...	...	...
1	XYZ	15:00

ID	COL1	TS
1	ABC	12:00

ID	COL2	TS
...	...	...
1	XYZ	13:00

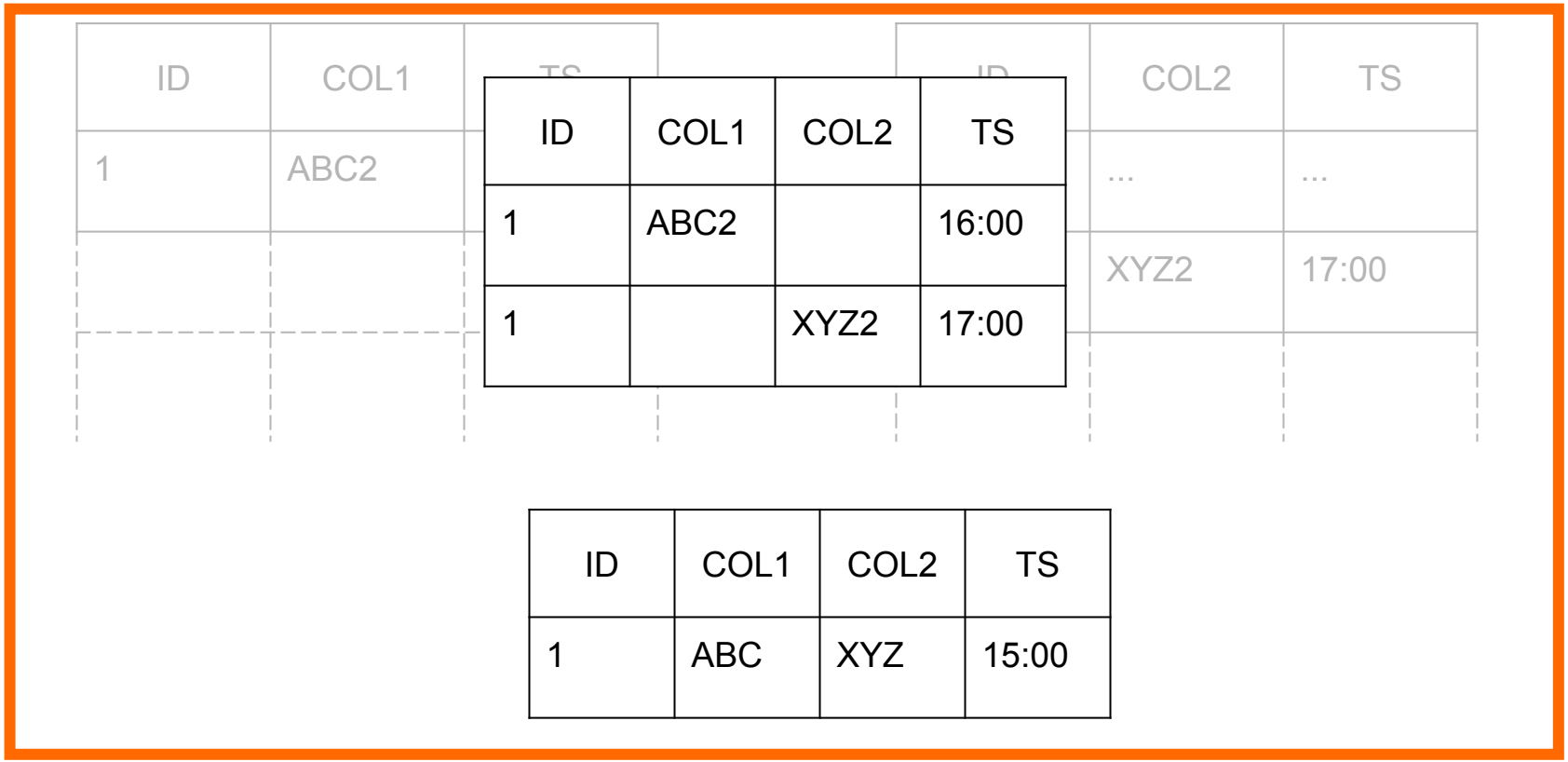
ID	COL1	COL2	TS
1	ABC		12:00
1		XYZ	15:00

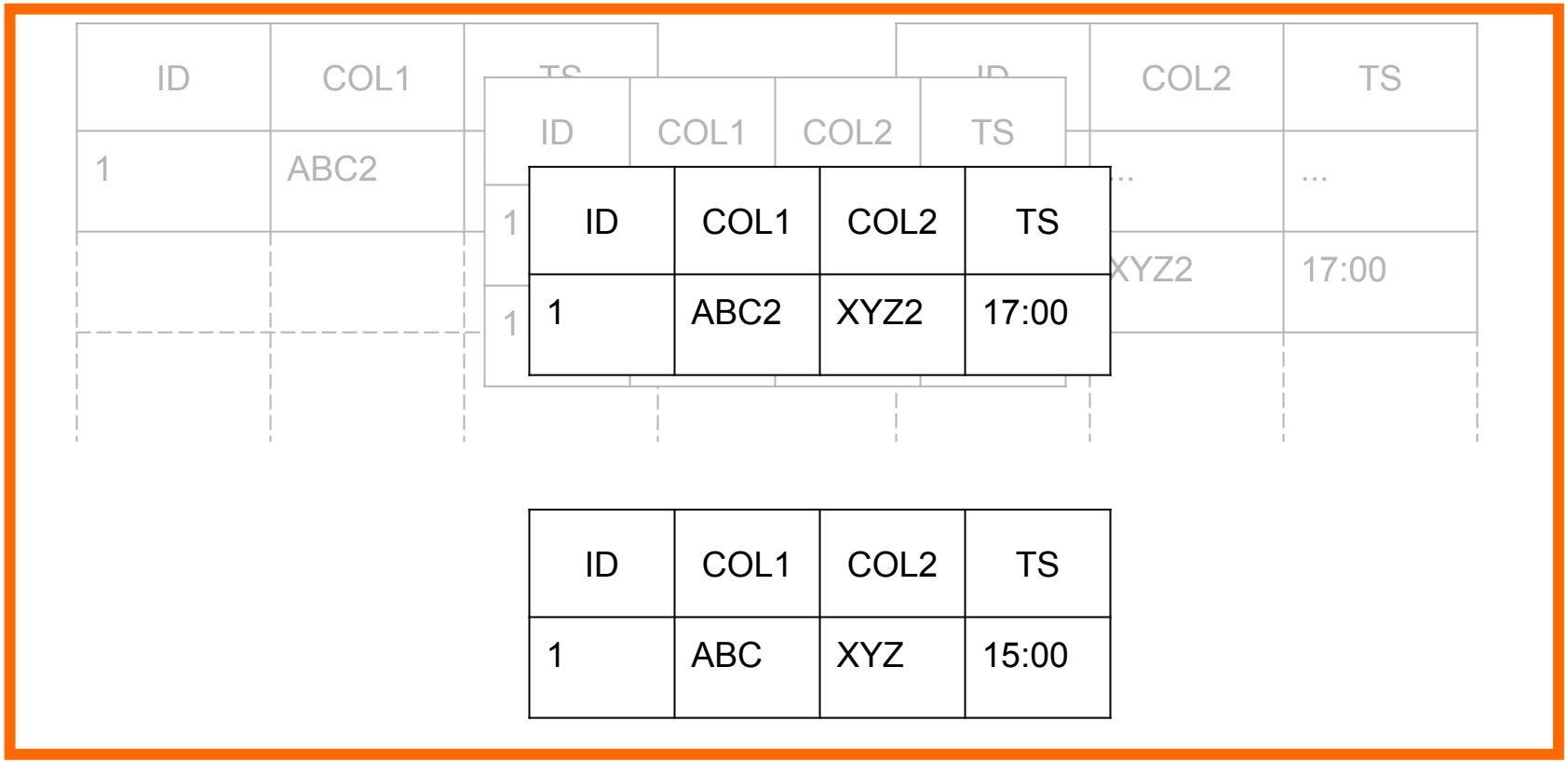

ID
COL1
TS
1
ABC
12:00
ID
COL2
TS
...
...
...
1
XYZ
13:00
ID
COL1
COL2
TS
1
1
ID
COL1
COL2
TS
1
ABC
XYZ
15:00

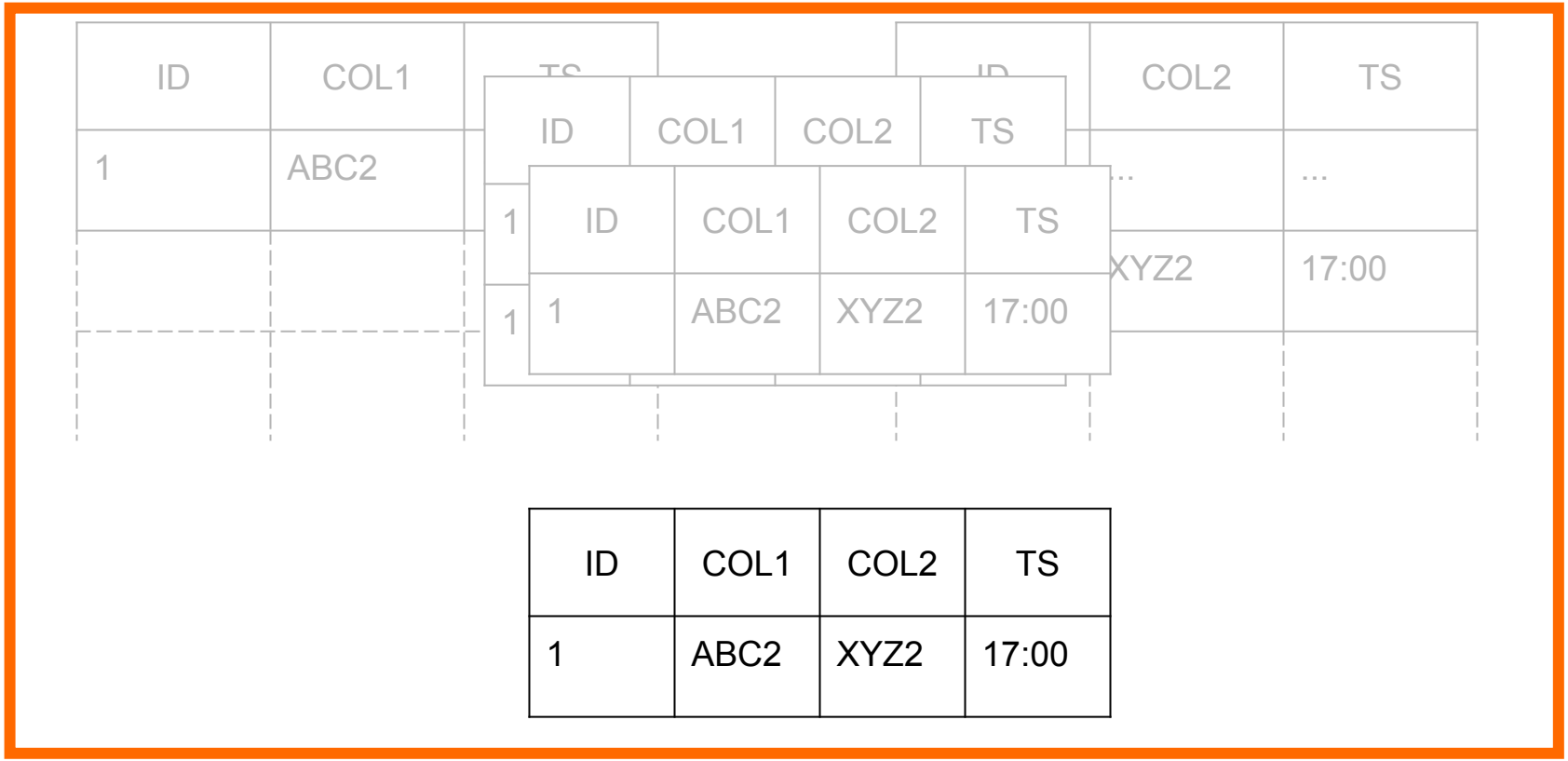
ID	COL1	TS
1	ABC2	16:00

ID	COL2	TS
...	...	...
1	XYZ2	17:00

ID	COL1	COL2	TS
1	ABC	XYZ	15:00


ID
COL1
TS
1
ABC2
ID
COL2
TS
...
...
XYZ2
17:00
ID
COL1
COL2
TS
1
ABC2
16:00
1
XYZ2
17:00
ID
COL1
COL2
TS
1
ABC
XYZ
15:00


ID
COL1
COL2
TS
1
ABC2
XYZ2
17:00
ID
COL1
COL2
TS
1
ABC
XYZ
15:00


ID
COL1
TS
1
ABC2
ID
COL2
TS
...
XYZ2
17:00
ID
COL1
COL2
TS
1
ABC2
XYZ2
17:00
ID
COL1
COL2
TS
1
ABC2
XYZ2
17:00

SURROGATE KEYS IN A DISTRIBUTED WORLD

CUSTOMER_ID	CUST_NUMBER	FIRST_NAME	LAST_NAME
	1234	MICKEY	MOUSE

CUSTOMER_ID	CUST_NUMBER	FIRST_NAME	LAST_NAME
1	1234	MICKEY	MOUSE

CUSTOMER_ID	CUST_NUMBER	FIRST_NAME	LAST_NAME
1	1234	Mickey	Mouse
2	2345	Minnie	Mouse
3	666	George G.	Goof

CUSTOMER_ID	CUST_NUMBER	FIRST_NAME	LAST_NAME
1	1234	Mickey	Mouse
2	2345	Minnie	Mouse
3	666	George G.	Goof

Amazon Lambda

DynamoDB

DynamoDB

RELIABLE PERFORMANCE

HIGHLY AVAILABLE

FULLY MANAGED

SERVERLESS

Amazon Lambda

SERVERLESS COMPUTE

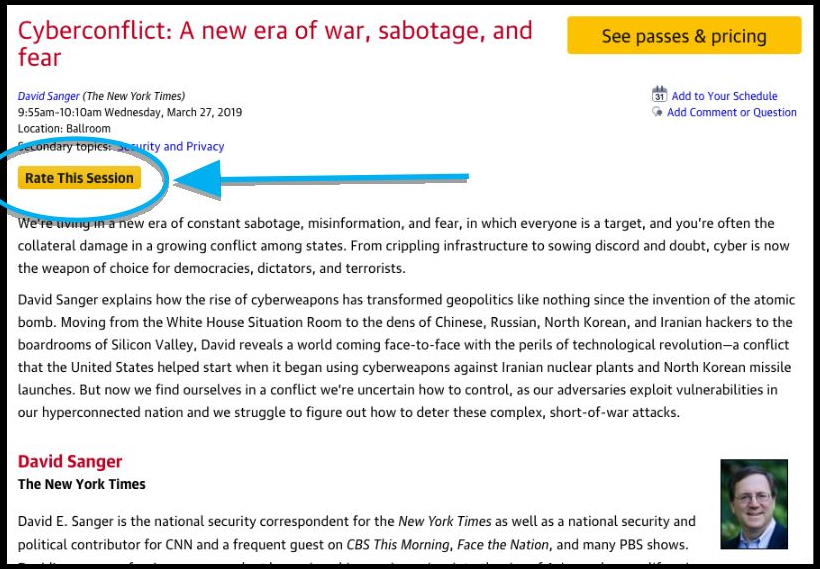
CONTINUOUS SCALING

Amazon Lambda

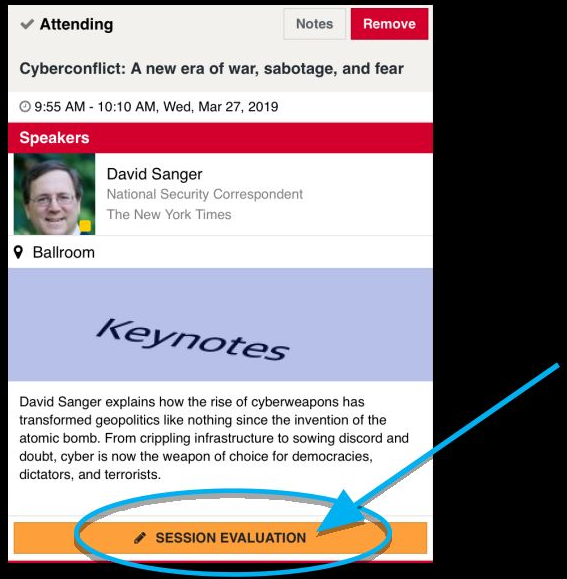
```python
client = boto3.client('dynamodb')
dynamodb = boto3.resource('dynamodb')
table = dynamodb.Table('customer')

try:
    sk = get_sk(event['cust_number'])
except KeyError:
    sk = new_sk(event['cust_number'])

return {
    'statusCode': 200,
    'body': json.dumps({'customer_id': str(sk)})
}
```

???

Rate today's session



Session page on conference website



O'Reilly Events App

bit.ly/bi2bigdata

APPENDIX

Amazon Lambda

```python
import json
import boto3

sk_name = 'customer_id'
nk_name = 'cust_number'
table_name = 'customer'

sk_name_max = sk_name + '_max'

def lambda_handler(event, context):

    def get_sk(nk):
        return table.get_item(Key={nk_name: nk})['Item'][sk_name]

    def get_max_sk(sk_name_max):
        return get_sk(sk_name_max)
```

Amazon Lambda

```
def new_sk(nk):
    sk_max = get_max_sk(sk_name_max)

    sk_nextval = -1

    # Getting the next available customer_id value
    while sk_nextval == -1:
        sk_max = sk_max + 1
        try:
            table.put_item(
                Item = {
                    nk_config: sk_name_max,
                    sk_name: sk_max
                },
                ConditionExpression = sk_name + " < :new_max",
                ExpressionAttributeValues = {
                                    ':new_max': sk_max
                }
            )
            sk_nextval = sk_max
        except ClientError as e:
            if e.response['Error']['Code'] == 'ConditionalCheckFailedException':
                pass
            else:
                raise
```

Amazon Lambda

```
    # Writing the new couple (natural key, surrogate key)
    #
    # There will be an exception in case another process already stored
    # the same natural key value
    try:
        table.put_item(
            Item = {
                nk_name: nk,
                sk_name: sk_nextval
            },
            ConditionExpression = 'attribute_not_exists(' + nk_name + ')',
        )
    except ClientError as e:
        if e.response['Error']['Code'] == 'ConditionalCheckFailedException':
            pass
        else:
            raise

    return  get_sk(nk)

client = boto3.client('dynamodb')
dynamodb = boto3.resource('dynamodb')
table = dynamodb.Table(table_name)

try:
    sk = get_sk(event[nk_name])
except KeyError:
    sk = new_sk(event[nk_name])

return {
    'statusCode': 200,
    'body': json.dumps({sk_name: str(sk)})
}
```

DISCLAIMER

This presentation and its contents are strictly confidential. It may not, in whole or in part, be reproduced, redistributed, published or passed on to any other person by the recipient.

The information in this presentation has not been independently verified. No representation or warranty, express or implied, is made as to the accuracy or completeness of the presentation and the information contained herein and no reliance should be placed on such information. No responsibility is accepted for any liability for any loss howsoever arising, directly or indirectly, from this presentation or its contents.

zalando

zalando

FRANCESCO MUCIO

@mucio

linkedin.com/in/mucio

francesco.mucio@zalando.com

28-03-2019