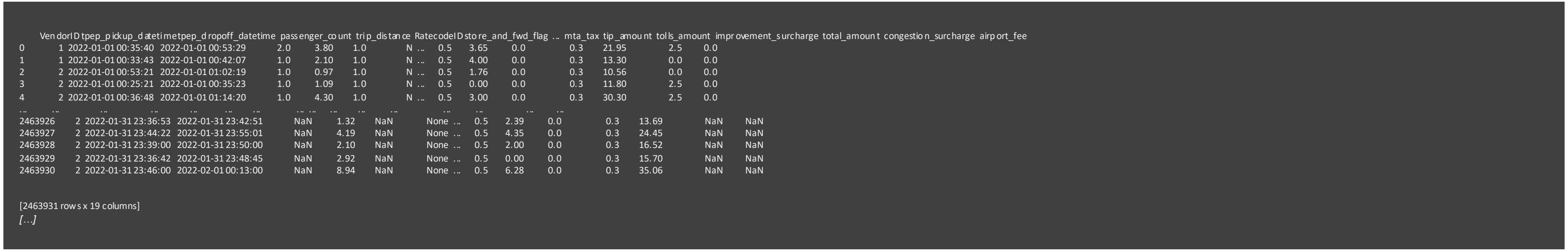
Use NYC Taxi Trip Record Data To Calculate Performance KPIs

Practical Exam

Goal

NYC.gov provides monthly exports of NYC yellow taxi trip records:

- https://www1.nyc.gov/site/tlc/about/tlc-trip-record-data.page
- Latest Full Dumps:
    - *https://d37ci6vzurychx.cloudfront.net/trip-data/yellow_tripdata_2022-01.parquet*
    - *https://d37ci6vzurychx.cloudfront.net/trip-data/yellow_tripdata_2022-02.parquet*
    - *https://d37ci6vzurychx.cloudfront.net/trip-data/yellow_tripdata_2022-03.parquet*
    - *…*



```
    VendorID tpep_pickup_datetimetpep_dropoff_datetime  passenger_count  trip_distance  RatecodeIDstore_and_fwd_flag ...  mta_tax  tip_amount  tolls_amount  improvement_surcharge  total_amount  congestion_surcharge  airport_fee
0          1 2022-01-01 00:35:40  2022-01-01 00:53:29    2.0      3.80     1.0          N ...   0.5    3.65     0.0          0.3    21.95          2.5     0.0
1          1 2022-01-01 00:33:43  2022-01-01 00:42:07    1.0      2.10     1.0          N ...   0.5    4.00     0.0          0.3    13.30          0.0     0.0
2          2 2022-01-01 00:53:21  2022-01-01 01:02:19    1.0      0.97     1.0          N ...   0.5    1.76     0.0          0.3    10.56          0.0     0.0
3          2 2022-01-01 00:25:21  2022-01-01 00:35:23    1.0      1.09     1.0          N ...   0.5    0.00     0.0          0.3    11.80          2.5     0.0
4          2 2022-01-01 00:36:48  2022-01-01 01:14:20    1.0      4.30     1.0          N ...   0.5    3.00     0.0          0.3    30.30          2.5     0.0
...      ...                 ...                  ...    ...       ...     ...        ... ...   ...     ...     ...          ...      ...
2463926    2 2022-01-31 23:36:53  2022-01-31 23:42:51    NaN      1.32     NaN       None ...   0.5    2.39     0.0          0.3    13.69          NaN     NaN
2463927    2 2022-01-31 23:44:22  2022-01-31 23:55:01    NaN      4.19     NaN       None ...   0.5    4.35     0.0          0.3    24.45          NaN     NaN
2463928    2 2022-01-31 23:39:00  2022-01-31 23:50:00    NaN      2.10     NaN       None ...   0.5    2.00     0.0          0.3    16.52          NaN     NaN
2463929    2 2022-01-31 23:36:42  2022-01-31 23:48:45    NaN      2.92     NaN       None ...   0.5    0.00     0.0          0.3    15.70          NaN     NaN
2463930    2 2022-01-31 23:46:00  2022-02-01 00:13:00    NaN      8.94     NaN       None ...   0.5    6.28     0.0          0.3    35.06          NaN     NaN


[2463931 rows x 19 columns]
[…]
```

yellow_tripdata_2022-01.parquet

Goal

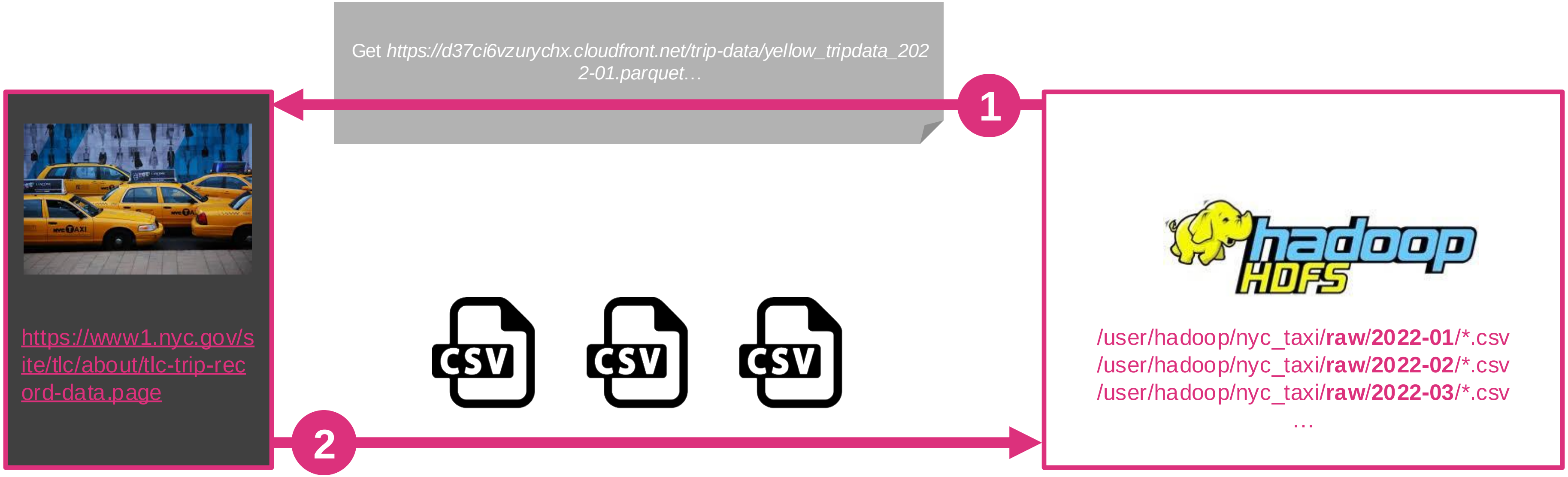
We want to make use of this data to calculate some KPIs

Workflow:

- **Gather data** from https://www1.nyc.gov/site/tlc/about/tlc-trip-record-data.page
- **Save raw data** (*CSV files*) to HDFS (partitioned by *YYYY-MM*)
- **Optimize**, **reduce** and **clean raw data** and save it to **final** directory on HDFS
- **Calculate KPIs** and **Export** them to an **Excel File**

- The whole data workflow **must be implemented** within an ETL **workflow tool** (e.g. Pentaho Data Integration or Airflow) and **run automatically**

Dataflow: **1. Get TLC NYC Taxi Data**

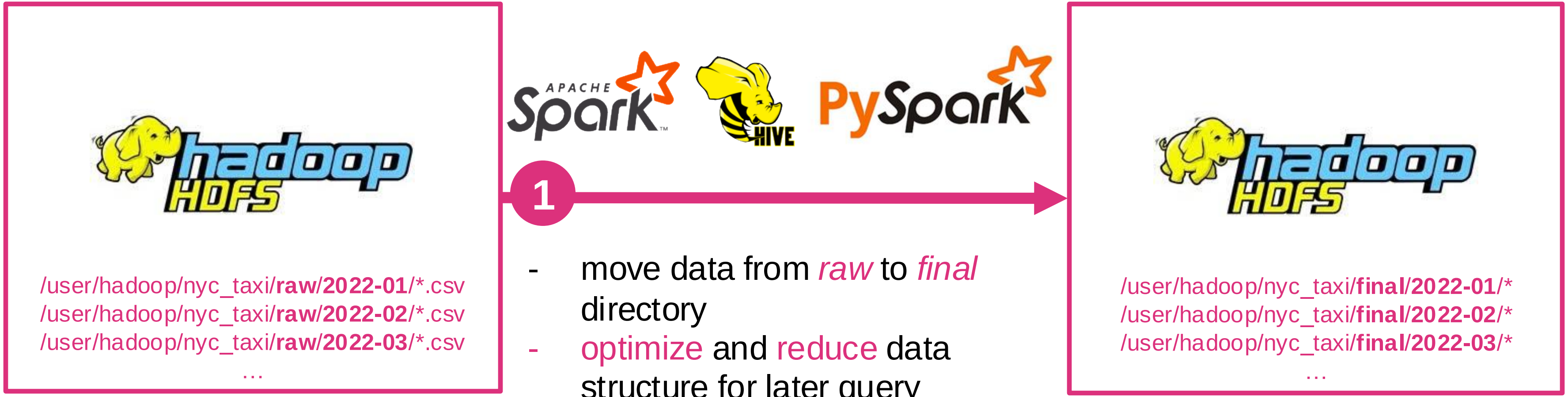


Get *https://d37ci6vzurychx.cloudfront.net/trip-data/yellow_tripdata_2022-01.parquet…*

https://www1.nyc.gov/site/tlc/about/tlc-trip-record-data.page

/user/hadoop/nyc_taxi/**raw/2022-01**/*.csv
/user/hadoop/nyc_taxi/**raw/2022-02**/*.csv
/user/hadoop/nyc_taxi/**raw/2022-03**/*.csv
…

Dataflow: **2. Raw To Final Transfer**

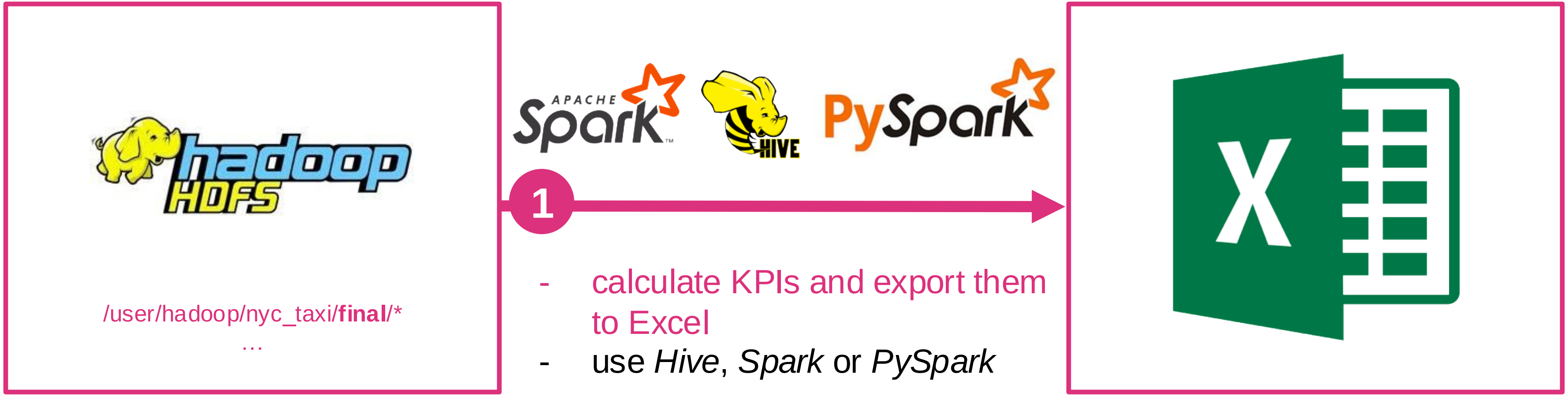


/user/hadoop/nyc_taxi/**raw/2022-01**/*.csv
/user/hadoop/nyc_taxi/**raw/2022-02**/*.csv
/user/hadoop/nyc_taxi/**raw/2022-03**/*.csv
…

/user/hadoop/nyc_taxi/**final/2022-01**/*
/user/hadoop/nyc_taxi/**final/2022-02**/*
/user/hadoop/nyc_taxi/**final/2022-03**/*
…

- move data from *raw* to *final* directory
- optimize and reduce data structure for later query purposes if necessary
- remove duplicates if necessary
- …

Dataflow: **3. Calculate And Export KPIs**



/user/hadoop/nyc_taxi/**final**/*
…

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- calculate KPIs and export them to Excel
- use *Hive*, *Spark* or *PySpark*

Dataflow: **4. KPIs To Calculate**

Calculate per Month:

- Average Trip Duration (in minutes)
- Average Trip Distance (in miles)
- Average total amount (in USD)
- Average tip amount (in USD)
- Average passenger count (as Number)
- Usage Share by payment type (credit card, cash… in percent)
- Usage share per timeslot (in percent):
    - 00:00-06:00
    - 06:00-12:00
    - 12:00-18:00
    - 18:00-24:00