SKaMP. Tests

The goal of this report is to provide information on the performed testing of data acquisition and data pre-processing.

GitHub repository: https://github.com/salveendutt/Big-Data-Analytics.

1 Data acquisition

Test objective	Steps	Expected Result	Actual Result
Verify data incoming from stream API	1. Start the server using start_containers.bat; 2. Navigate to http://localhost:5000	Incoming data is available on /data/0	Passed. The screenshot is provided in Fig.1 and Fig.2
Verify correct setup of the stream	Run 'pytest' from the root folder	Data stream is configured as expected; Incoming data is not null; Returned status code - 200	PASSED. The screenshot is provided in Fig. 3

Table 1: Data acquisition tests

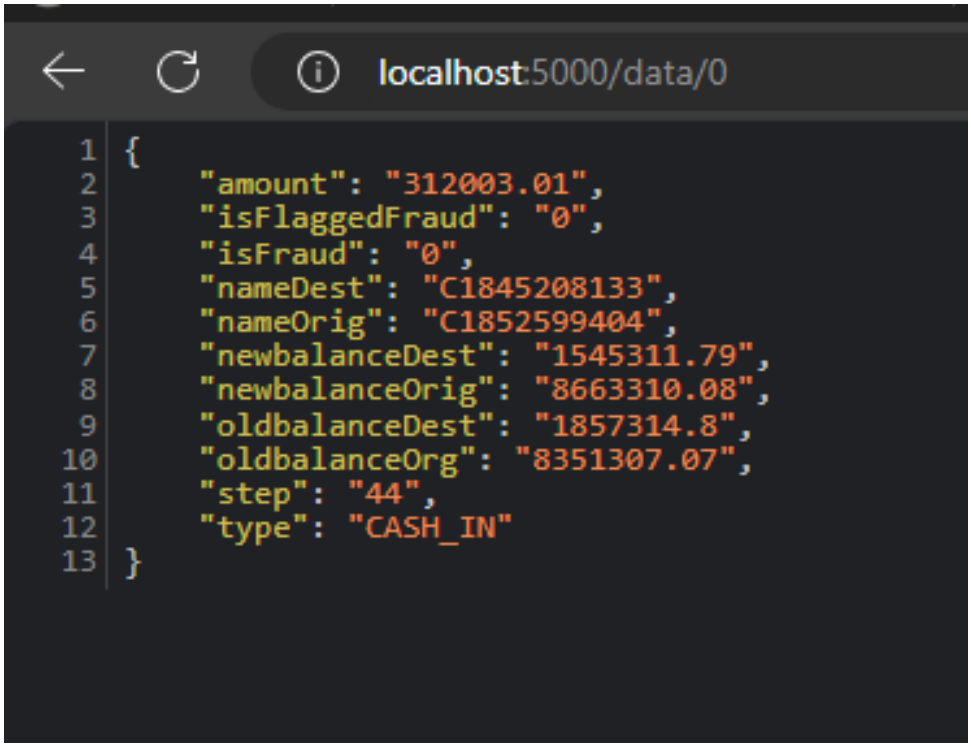


Figure 1: Data incoming via the stream

Figure 2: Kafka Dataset1

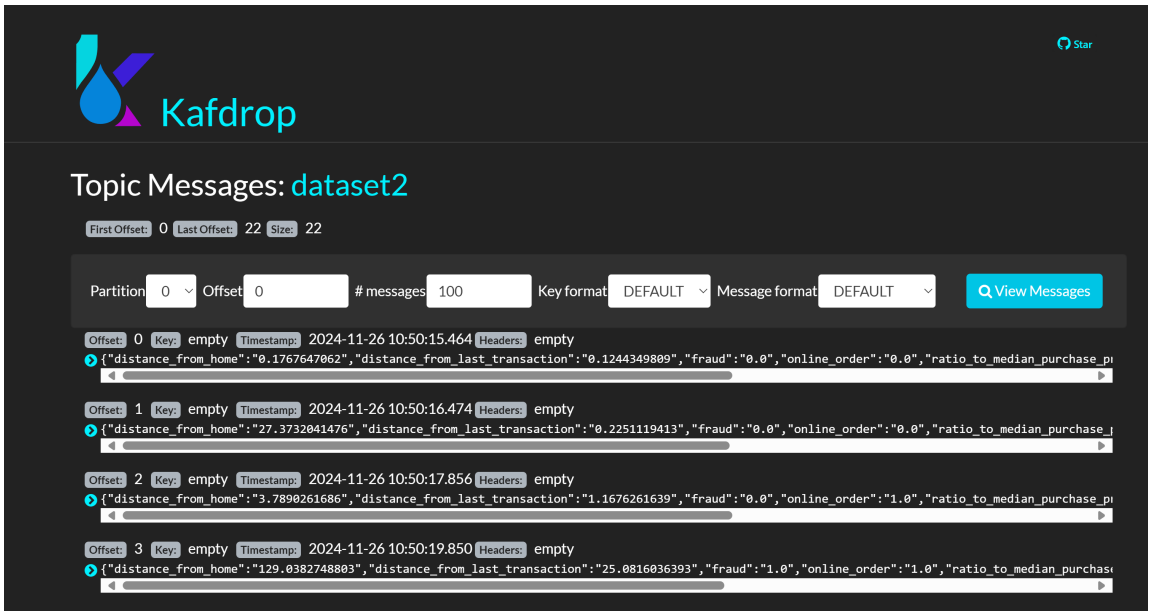


Figure 3: Kafka Dataset2

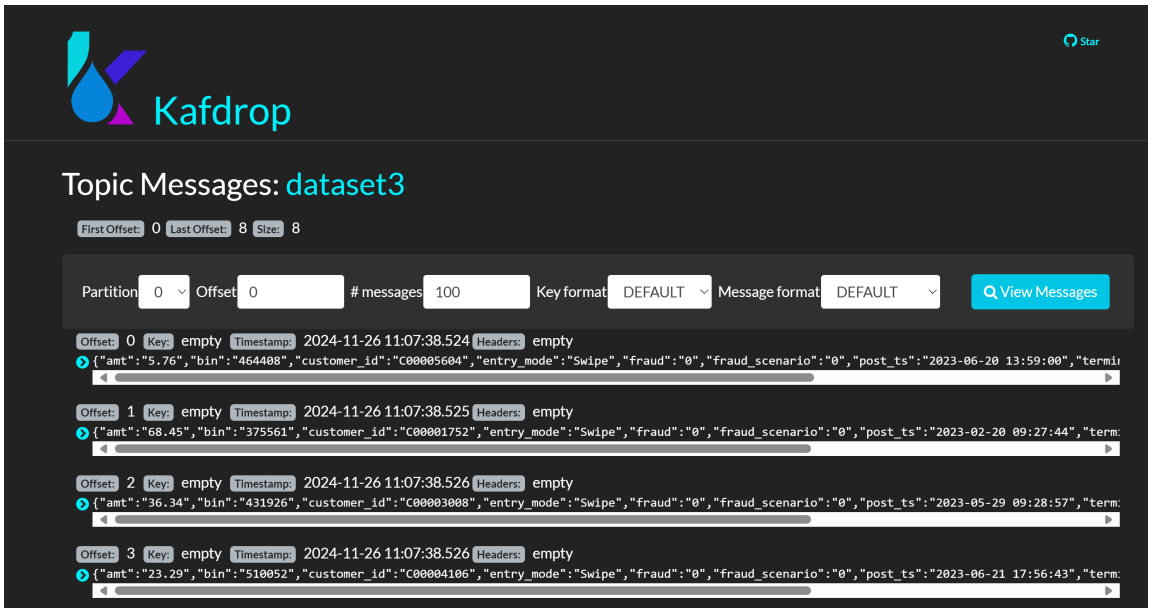
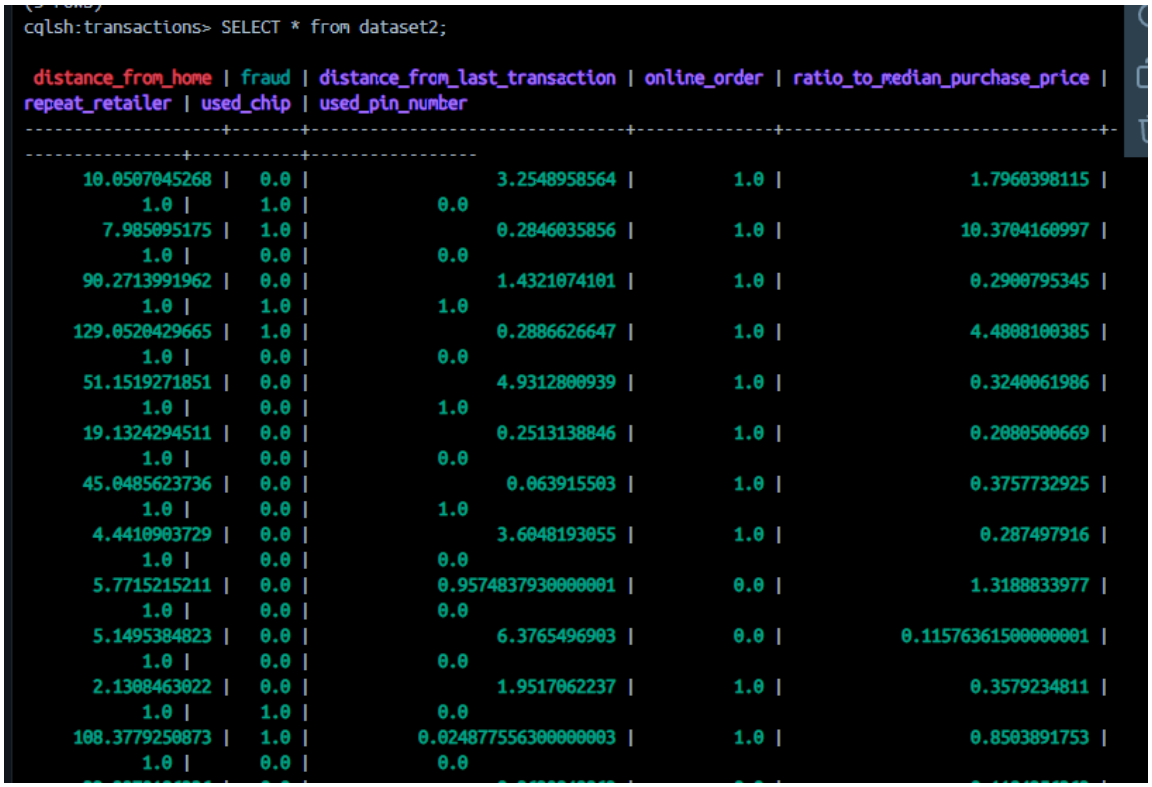


Figure 4: Kafka Dataset3

```
cassandra@cqlsh:transactions> select * from dataset1;

 step | nameorig    | amount     | isflaggedfraud | isfraud | namedest    | newbalancedest | newbalanceorig | o
ldbalancedest | oldbalanceorg | type
------+-------------+------------+----------------+---------+-------------+----------------+----------------+--
--------------+---------------+----------
  308 | C1271426277 |    8790.47 |              0 |       0 |  M894155590 |            0.0 |       90308.53 |
          0.0 |       99099.0 |  PAYMENT
  255 |  C811207725 |  467230.23 |              0 |       0 |   C44881505 |      2595549.49 |            0.0 |
    2128319.26 |       49268.0 | CASH_OUT
  476 | C1941387835 |  6764872.7 |              0 |       0 | C1776296807 |     14253058.83 |            0.0 |
    7488186.13 |           0.0 |  TRANSFER
  373 | C1252613171 |      567.6 |              0 |       0 | M1731181881 |            0.0 |        20247.4 |
          0.0 |       20815.0 |  PAYMENT
  619 |  C846225384 |     5842.46 |              0 |       0 | C1125659327 |       55710.28 |     2487896.16 |
     61552.74 |     2482053.7 |  CASH_IN
  178 |  C957709052 |  471495.44 |              0 |       0 | C1597145256 |     2694271.24 |      7736623.8 |
    3165766.68 |    7265128.36 |  CASH_IN
  374 |  C360354097 |  141001.55 |              0 |       0 |  C658412810 |     9680246.55 |            0.0 |
    9539245.0 |           0.0 |  TRANSFER
  237 | C1471684960 |  388343.92 |              0 |       0 |  C330275006 |      269101.34 |     5501251.43 |
     657445.26 |    5112907.51 |  CASH_IN
```

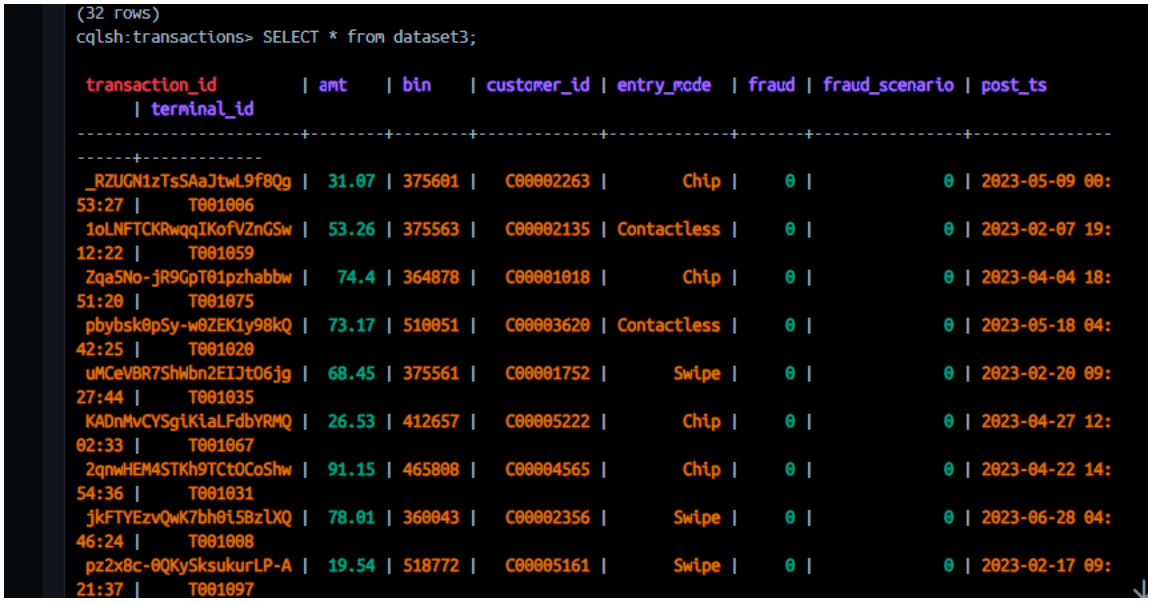
Figure 5: Cassandra Dataset1



```
cqlsh:transactions> SELECT * from dataset2;

 distance_from_home | fraud | distance_from_last_transaction | online_order | ratio_to_median_purchase_price |
repeat_retailer | used_chip | used_pin_number
--------------------+-------+--------------------------------+--------------+--------------------------------+-
----------------+-----------+-----------------
      10.0507045268 |   0.0 |                 3.2548958564 |          1.0 |                  1.7960398115 |
            1.0 |       1.0 |            0.0
       7.985095175 |   1.0 |                 0.2846035856 |          1.0 |                 10.3704160997 |
            1.0 |       0.0 |            0.0
      90.2713991962 |   0.0 |                 1.4321074101 |          1.0 |                  0.2900795345 |
            1.0 |       1.0 |            1.0
     129.0520429665 |   1.0 |                 0.2886626647 |          1.0 |                  4.4888100385 |
            1.0 |       0.0 |            0.0
      51.1519271851 |   0.0 |                 4.9312800939 |          1.0 |                  0.3240061986 |
            1.0 |       0.0 |            1.0
      19.1324294511 |   0.0 |                 0.2513138846 |          1.0 |                  0.2080500669 |
            1.0 |       0.0 |            0.0
      45.0485623736 |   0.0 |                  0.063915503 |          1.0 |                  0.3757732925 |
            1.0 |       0.0 |            1.0
       4.4410903729 |   0.0 |                 3.6048193055 |          1.0 |                   0.287497916 |
            1.0 |       0.0 |            0.0
       5.7715215211 |   0.0 |          0.9574837930000001 |          0.0 |                  1.3188833977 |
            1.0 |       0.0 |            0.0
       5.1495384823 |   0.0 |                 6.3765496903 |          0.0 |          0.11576361500000001 |
            1.0 |       0.0 |            0.0
       2.1308463022 |   0.0 |                 1.9517062237 |          1.0 |                  0.3579234811 |
            1.0 |       1.0 |            0.0
     108.3779250873 |   1.0 |          0.024877556300000003 |          1.0 |                  0.8503891753 |
            1.0 |       0.0 |            0.0
```

Figure 6: Cassandra Dataset2



```
(32 rows)
cqlsh:transactions> SELECT * from dataset3;

 transaction_id         | amt    | bin    | customer_id | entry_mode  | fraud | fraud_scenario | post_ts
      | terminal_id
------------------------+--------+--------+-------------+-------------+-------+----------------+---------
------+-------------
 _RZUGN1zTsSAaJtwL9f8Qg |  31.07 | 375601 |   C00002263 |        Chip |     0 |              0 | 2023-05-09 00:
53:27 |     T001006
 1oLNFTCKRwqqIKofVZnGSw |  53.26 | 375563 |   C00002135 | Contactless |     0 |              0 | 2023-02-07 19:
12:22 |     T001059
 Zqa5No-jR9GpT01pzhabbw |   74.4 | 364878 |   C00001018 |        Chip |     0 |              0 | 2023-04-04 18:
51:20 |     T001075
 pbybsk0pSy-w0ZEK1y98kQ |  73.17 | 510051 |   C00003620 | Contactless |     0 |              0 | 2023-05-18 04:
42:25 |     T001020
 uMCeVBR7ShWbn2EIJtO6jg |  68.45 | 375561 |   C00001752 |       Swipe |     0 |              0 | 2023-02-20 09:
27:44 |     T001035
 KADnMvCYSgiKlaLFdbYRMQ |  26.53 | 412657 |   C00005222 |        Chip |     0 |              0 | 2023-04-27 12:
02:33 |     T001067
 2qnwHEM4STKh9TCtOCoShw |  91.15 | 465808 |   C00004565 |        Chip |     0 |              0 | 2023-04-22 14:
54:36 |     T001031
 jkFTYEzvQwK7bh0i5BzlXQ |  78.01 | 360043 |   C00002356 |       Swipe |     0 |              0 | 2023-06-28 04:
46:24 |     T001008
 pz2x8c-0QKySksukurLP-A |  19.54 | 518772 |   C00005161 |       Swipe |     0 |              0 | 2023-02-17 09:
21:37 |     T001097
```

Figure 7: Cassandra Dataset3

2 Data pre-processing

Test objective	Steps	Expected Result	Actual Result
Verify correct data preprocessing of dataset 1	Run 'pytest' from the root folder	Feature 'type' is correctly transformed into numeric value (5 cases); Feature 'isMerchant' is correctly prepared (2 cases)	PASSED. The screenshot is provided in Fig. 3
Verify correct data preprocessing of dataset 2	Run 'pytest' from the root folder	Numeric boolean values are transformed to int from float (4 cases)	PASSED. The screenshot is provided in Fig. 3
Verify correct data preprocessing of dataset 3	Run 'pytest' from the root folder	Feature 'entry_mode' is correctly transformed into numeric value (4 cases); Unnecessary features are omitted.	PASSED. The screenshot is provided in Fig. 3
Verify correct data preprocessing of dataset 4	Run 'pytest' from the root folder	Features 'Amount', 'Class' are renamed to 'amount' and 'isFraud'; Extra features are removed	PASSED. The screenshot is provided in Fig. 3

Table 2: Data pre-processing tests

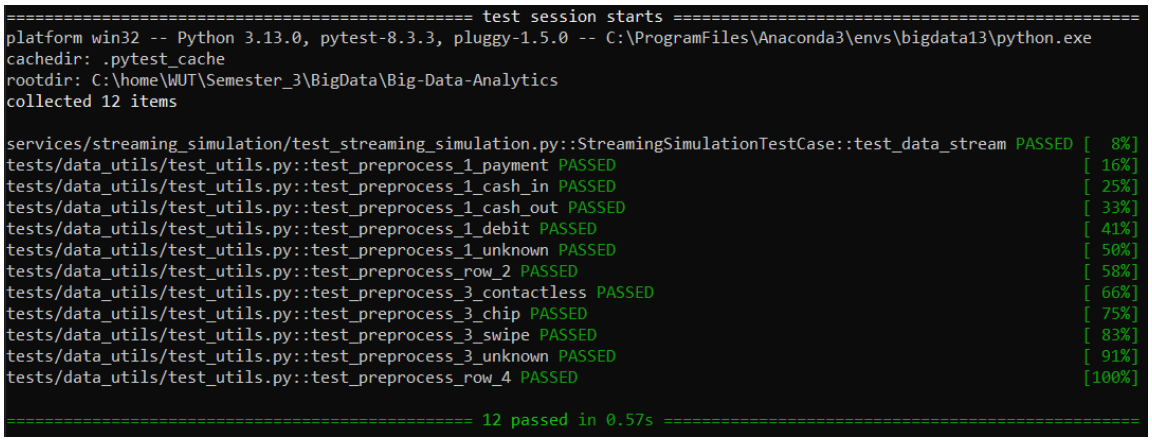


Figure 8: Unit testing result

Unit testing is included in the CI/CD pipeline on GitHub and must be successful before any merge into the main branch.

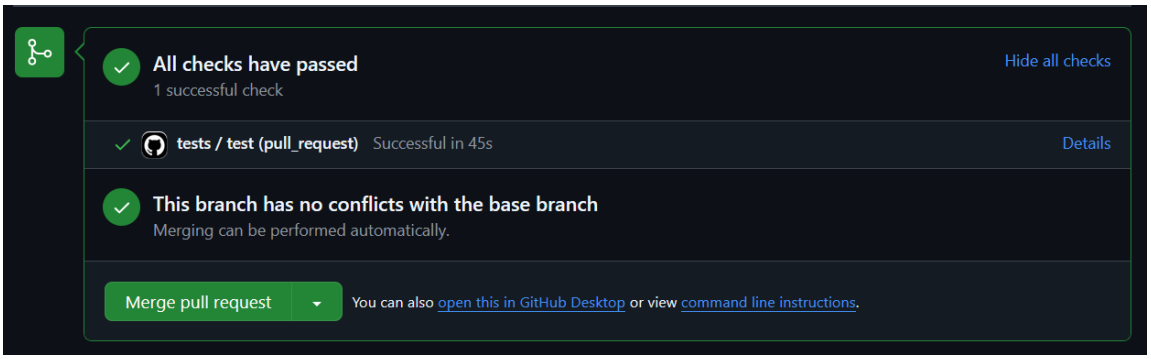


Figure 9: GitHub checks before merge