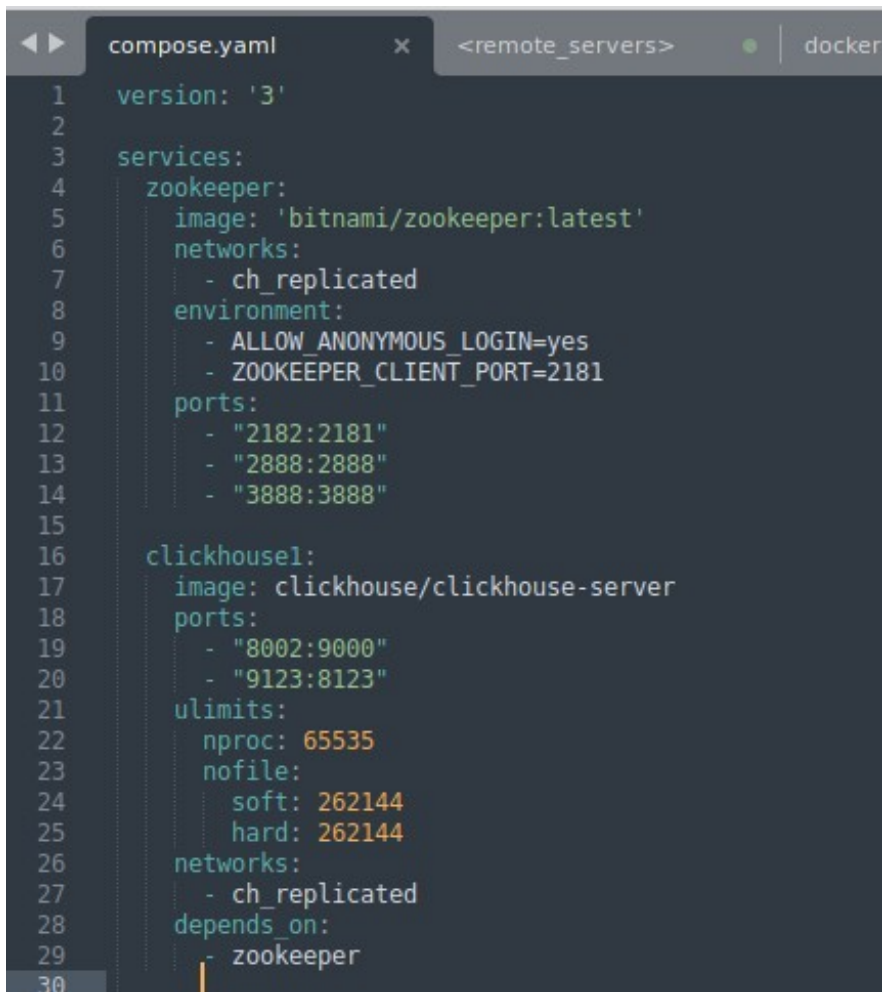


Проектная работа на тему «Построение production-ready хранилища данных Такси на базе ClickHouse»

Для выполнения работы были развернуты 3 ноды clickhouse, zookeeper и кафка с помощью docker-compose:



```
1  version: '3'
2
3  services:
4    zookeeper:
5      image: 'bitnami/zookeeper:latest'
6      networks:
7        - ch_replicated
8      environment:
9        - ALLOW_ANONYMOUS_LOGIN=yes
10       - ZOOKEEPER_CLIENT_PORT=2181
11      ports:
12        - "2182:2181"
13        - "2888:2888"
14        - "3888:3888"
15
16    clickhouse1:
17      image: clickhouse/clickhouse-server
18      ports:
19        - "8002:9000"
20        - "9123:8123"
21      ulimits:
22        nproc: 65535
23        nofile:
24          soft: 262144
25          hard: 262144
26      networks:
27        - ch_replicated
28      depends_on:
29        - zookeeper
30
```

```

31 clickhouse2:
32   image: clickhouse/clickhouse-server
33   ports:
34     - "8003:9000"
35     - "9124:8123"
36   ulimits:
37     nproc: 65535
38     nofile:
39       soft: 262144
40       hard: 262144
41   networks:
42     - ch_replicated
43   depends_on:
44     - zookeeper
45
46 clickhouse3:
47   image: clickhouse/clickhouse-server
48   ports:
49     - "8004:9000"
50     - "9125:8123"
51   ulimits:
52     nproc: 65535
53     nofile:
54       soft: 262144
55       hard: 262144
56   networks:
57     - ch_replicated
58   depends_on:
59     - zookeeper
60

```

```

46 clickhouse3:
47   image: clickhouse/clickhouse-server
48   ports:
49     - "8004:9000"
50     - "9125:8123"
51   ulimits:
52     nproc: 65535
53     nofile:
54       soft: 262144
55       hard: 262144
56   networks:
57     - ch_replicated
58   depends_on:
59     - zookeeper
60
61 kafka:
62   image: confluentinc/cp-kafka:7.4.4
63   depends_on:
64     - zookeeper
65   ports:
66     - 29092:29092
67   environment:
68     KAFKA_BROKER_ID: 1
69     KAFKA_ZOOKEEPER_CONNECT: zookeeper:2181
70     KAFKA_ADVERTISED_LISTENERS: PLAINTEXT://kafka:9092,PLAINTEXT_HOST://localhost:29092
71     KAFKA_LISTENER_SECURITY_PROTOCOL_MAP: PLAINTEXT:PLAINTEXT,PLAINTEXT_HOST:PLAINTEXT
72     KAFKA_INTER_BROKER_LISTENER_NAME: PLAINTEXT
73     KAFKA_OFFSETS_TOPIC_REPLICATION_FACTOR: 1
74   networks:
75     - ch_replicated
76
77 networks:
78   ch_replicated:
79     driver: bridge
80

```

```
oem@envy ~/Desktop/proj2: docker ps
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS
86fd2b6950af	confluentinc/cp-kafka:7.4.4	"/etc/confluent/dock..."	26 hours ago	Up 13 minutes	9092/tcp, 0.0.0.0:29092->29092/tcp, :::29092->29092/tcp
c3cfeea76e31	clickhouse/clickhouse-server	"/entrypoint.sh"	26 hours ago	Up 13 minutes	9009/tcp, 0.0.0.0:9125->8123/tcp, [::]:9125->8123/tcp, 0.0.0.0:8004->9000/tcp, [::]:8004->9000/tcp
25cb3cd41e43	clickhouse/clickhouse-server	"/entrypoint.sh"	26 hours ago	Up 13 minutes	9009/tcp, 0.0.0.0:9123->8123/tcp, [::]:9123->8123/tcp, 0.0.0.0:8002->9000/tcp, [::]:8002->9000/tcp
f659f33d7b3b	clickhouse/clickhouse-server	"/entrypoint.sh"	26 hours ago	Up 13 minutes	9009/tcp, 0.0.0.0:9124->8123/tcp, [::]:9124->8123/tcp, 0.0.0.0:8003->9000/tcp, [::]:8003->9000/tcp
5b59a77c641f	bitnami/zookeeper:latest	"/opt/bitnami/script..."	26 hours ago	Up 13 minutes	0.0.0.0:2888->2888/tcp, [::]:2888->2888/tcp, 0.0.0.0:3888->3888/tcp, [::]:3888->3888/tcp, 8080/tcp, 0.0.0.0:2182->2181/tcp, [::]:2182->2181/tcp

```
oem@envy ~/Desktop/proj2: 
```

В конфигурации каждой ноды внесены изменения в секции remote_servers, zookeeper, macros:

```
<remote_servers>
<replicated_cluster>
<shard>
<internal_replication>true</internal_replication>
<replica>
<host>clickhouse1</host>
<port>9000</port>
</replica>
<replica>
<host>clickhouse2</host>
<port>9000</port>
</replica>
<replica>
<host>clickhouse3</host>
<port>9000</port>
</replica>
</shard>
</replicated_cluster>
</remote_servers>

<zookeeper>
<node index="1">
  <host>zookeeper</host>
<port>2181</port>
</node>
</zookeeper>

<macros>
<shard>01</shard>
<replica>ch1</replica>
</macros>
```

Создана таблица trips с движком ReplicatedMergeTree:

```

CREATE TABLE trips on cluster "replicated_cluster"
(
    `trip_id` UInt32,
    `vendor_id` Enum8('1' = 1, '2' = 2, '3' = 3, '4' = 4, 'CMT' = 5, 'VTS' = 6, 'DDS' = 7, 'B02512' = 10, 'B02598' = 11, 'B02617' = 12, 'B02682' = 13, 'B02764' = 14, '' = 15),
    `pickup_date` Date,
    `pickup_datetime` DateTime,
    `dropoff_date` Date,
    `dropoff_datetime` DateTime,
    `store_and_fwd_flag` UInt8,
    `rate_code_id` UInt8,
    `pickup_longitude` Float64,
    `pickup_latitude` Float64,
    `dropoff_longitude` Float64,
    `dropoff_latitude` Float64,
    `passenger_count` UInt8,
    `trip_distance` Float64,
    `fare_amount` Float32,
    `extra` Float32,
    `mta_tax` Float32,
    `tip_amount` Float32,
    `tolls_amount` Float32,
    `ehail_fee` Float32,
    `improvement_surcharge` Float32,
    `total_amount` Float32,
    `payment_type` Enum8('UNK' = 0, 'CSH' = 1, 'CRE' = 2, 'NOC' = 3, 'DIS' = 4),
    `trip_type` UInt8,
    `pickup` FixedString(25),
    `dropoff` FixedString(25),
    `cab_type` Enum8('yellow' = 1, 'green' = 2, 'uber' = 3),
    `pickup_nyct2010_gid` Int8,
    `pickup_ctlabel` Float32,
    `pickup_borocode` Int8,
    `pickup_ct2010` String,
    `pickup_boroc2010` String,
    `pickup_cdeligibil` String,
    `pickup_ntacode` FixedString(4),
    `pickup_ntaname` String,
    `pickup_puma` UInt16,
    `dropoff_nyct2010_gid` UInt8,
    `dropoff_ctlabel` Float32,
    `dropoff_borocode` UInt8,
    `dropoff_ct2010` String,
    `dropoff_boroc2010` String,
    `dropoff_cdeligibil` String,
    `dropoff_ntacode` FixedString(4),
    `dropoff_ntaname` String,
    `dropoff_puma` UInt16
)
ENGINE = ReplicatedMergeTree('/clickhouse/tables/s3_trips', '{replica}')
PARTITION BY toYYYYMM(pickup_date)
ORDER BY pickup_datetime
SETTINGS index_granularity = 8192

```

Загружены тестовые данные из s3:

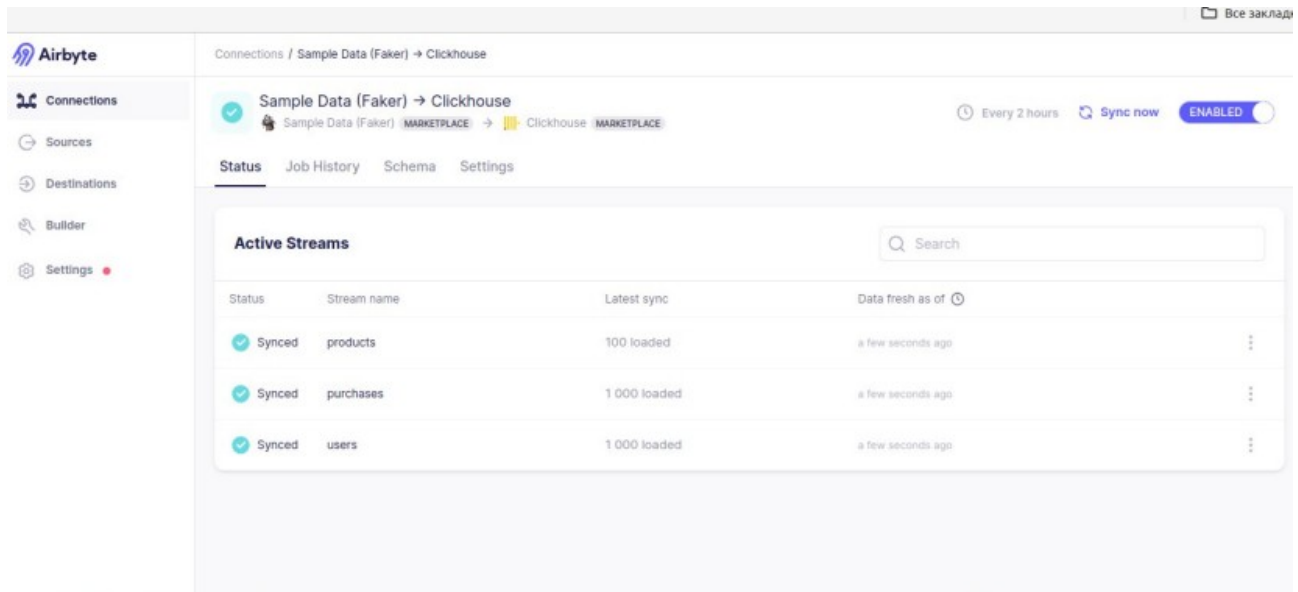
```

INSERT INTO trips
SELECT *
FROM s3('https://datasets-documentation.s3.eu-west-3.amazonaws.com/nyc-taxi/trips_*.gz',
'TabSeparatedWithNames')
LIMIT 1000000;

```

Записи реплицируются на все ноды clickhouse.

Развернут airbyte, загружены тестовые данные.



```
SHOW DATABASES
Query id: 8d5bd0d8-e7c6-42eb-94e3-b1dad373ab3
+----+
| name |
+----+
| INFORMATION_SCHEMA |
| airbyte_internal   |
| default             |
| information_schema  |
| system              |
+----+
6 rows in set. Elapsed: 0.075 sec.

015ab337f247 :) use airbyte_internal
USE airbyte_internal
Query id: 9c7dd8ef-c103-47bf-9723-de3bfacea0ce
Ok.
0 rows in set. Elapsed: 0.002 sec.

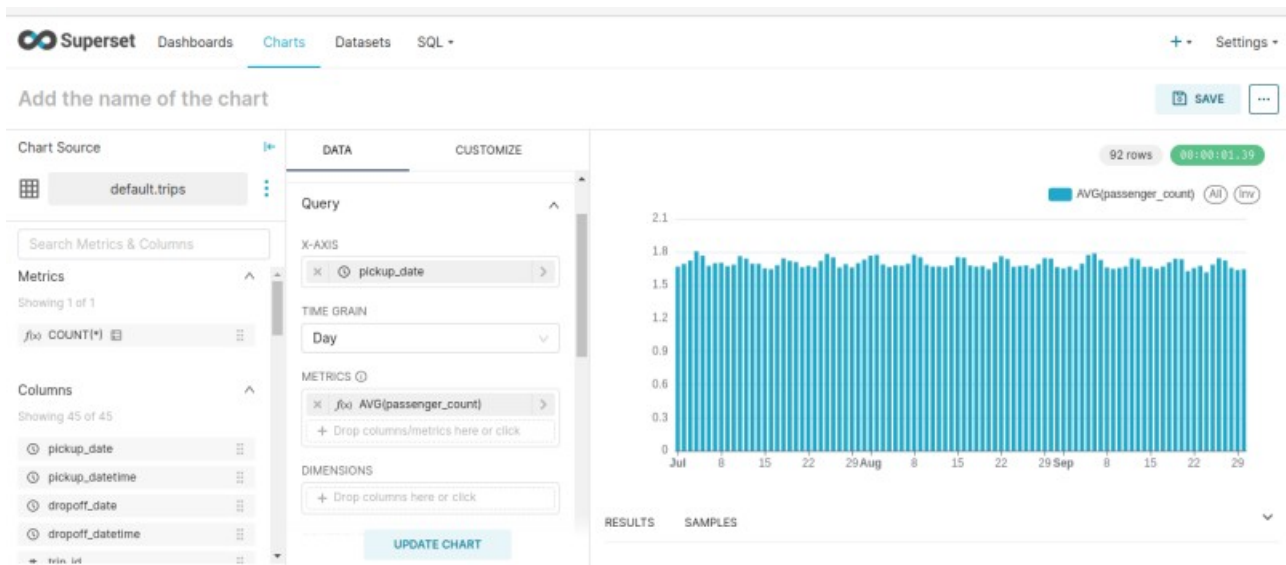
015ab337f247 :) show tables
SHOW TABLES
Query id: ff3b7ae8-204b-4672-a7ea-530826534d68
+----+
| name |
+----+
| default_raw_stream_airbyte_products |
| default_raw_stream_airbyte_purchases |
| default_raw_stream_airbyte_users    |
+----+
3 rows in set. Elapsed: 0.128 sec.
```

Для отправки тестовых данных в kafka создана таблица `faker_push` и материализованное представление `faker_push_mv`. При записи данных в таблицу будет выполняться отправка в кафку.

```
CREATE TABLE faker_push
(ID UInt64,
Name String,
Object String
)
ENGINE = Kafka
SETTINGS kafka_broker_list = 'kafka:9092',
kafka_topic_list = 'otus_faker',
kafka_group_name = 'otus_faker_push',
kafka_format = 'JSONEachRow';
```

```
CREATE MATERIALIZED VIEW faker_push_mv TO faker_push AS SELECT ID, Name, Object
FROM default_raw_stream_airbyte_purchases
```

Развернут Superset. Для демонстрации работы построен график.



Superset Databases

NAME	EXPOSE IN SQL LAB	AQE	MODIFIED BY
ClickHouse Connect (Superset)	clickhousedb	x	x
examples	sqlite	x	x

1-2 of 2

Для демонстрации работы мониторинга были добавлены следующие метрики и отображены на графиках.

```
SELECT *
FROM otus.custom_dashboards

Query id: ee245d00-a5eb-4a48-8a23-216daled6836

| dashboard | title | query |
|-----|-----|-----|
| overview | core1temp | SELECT toStartOfInterval(event_time, INTERVAL {rounding:UInt32} SECOND)::INT AS t, avg(value)
FROM system.asynchronous_metric_log
WHERE event_date >= toDate(now() - {seconds:UInt32}) AND event_time >= now() - {seconds:UInt32} AND metric = 'Temperature_coretemp_Core_1'
GROUP BY t
ORDER BY t WITH FILL STEP {rounding:UInt32} |
|-----|-----|-----|
| dashboard | title | query |
|-----|-----|-----|
| overview | merges | SELECT toStartOfInterval(event_time, INTERVAL {rounding:UInt32} SECOND)::INT AS t, avg(CurrentMetric_Merge)
FROM system.metric_log
WHERE event_date >= toDate(now() - {seconds:UInt32}) AND event_time >= now() - {seconds:UInt32}
GROUP BY t
ORDER BY t WITH FILL STEP {rounding:UInt32} |
|-----|-----|-----|

2 rows in set. Elapsed: 0.005 sec.

Bd6ecf44e6d8 :)
```



Создан пользователя с паролем:

```
1967d5be96dc :) CREATE USER jhon IDENTIFIED BY 'qwerty';

CREATE USER jhon IDENTIFIED BY 'qwerty'

Query id: ee5add69-f411-49c4-a317-6d57c931cdd6

Ok.

0 rows in set. Elapsed: 0.002 sec.
```


Создана роль и выданы права на запросы select

```
1967d5be96dc :) CREATE ROLE devs;  
  
CREATE ROLE devs  
Query id: 5e005be4-dbdb-4eae-93bd-cf90d42c47e8  
Ok.  
0 rows in set. Elapsed: 0.002 sec.  
  
1967d5be96dc :) GRANT SELECT ON db.* TO devs;  
  
GRANT SELECT ON db.* TO devs  
Query id: e60f11f1-bc72-418e-a87b-c4ada0e65d1e  
Ok.  
0 rows in set. Elapsed: 0.003 sec.
```