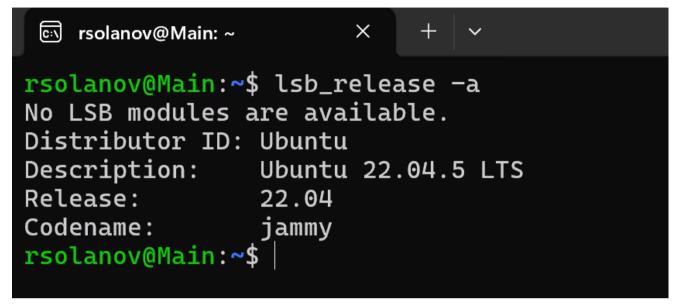
- Установить ClickHouse.
- Подгрузить датасет для примера и сделать селект из таблицы.
- Для проверки отправить скрины работающего инстанса ClickHouse, созданной виртуальной машины и результата запроса select count() from trips where payment type = 1.
 - Установка ClickHouse в WSL Ubuntu 22.04.5 LTS



```
ClickHouse client version 24.3.5.47.altinitystable (altinity build).

Connecting to database default at localhost:9000 as user default.

Connecting to database default at localhost:9000 as user default.

Connected to ClickHouse server version 24.3.5.

Warnings:

* Linux transparent hugepages are set to "always". Check /sys/kernel/mm/transparent_hugepage/enabled

* Delay accounting is not enabled, OSIOWaitMicroseconds will not be gathered. You can enable it using 'echo 1 > /proc/sys/kernel/t

ask_delayacct' or by using sysctl.

Main.:) exit

Bye.

**Solanov@Nain:~/projects/otus-ch$ sudo service clickhouse-server status

[sudo] password for rsolanov:

**Clickhouse-server.service - ClickHouse Server (analytic DBMS for big data)

Loaded: loaded (/lib/system/system/clickhouse-server.service; enabled; vendor preset: enabled)

**Active: active (running) since Sun 2024-10-20 15:47:50 MSK; 23h ago

**Main PTD: 298 (clickhouse-serv)

**Tasks: 704 (limit: 14999)

**Memory: 1.66

**Group: /system.slice/clickhouse-server.service

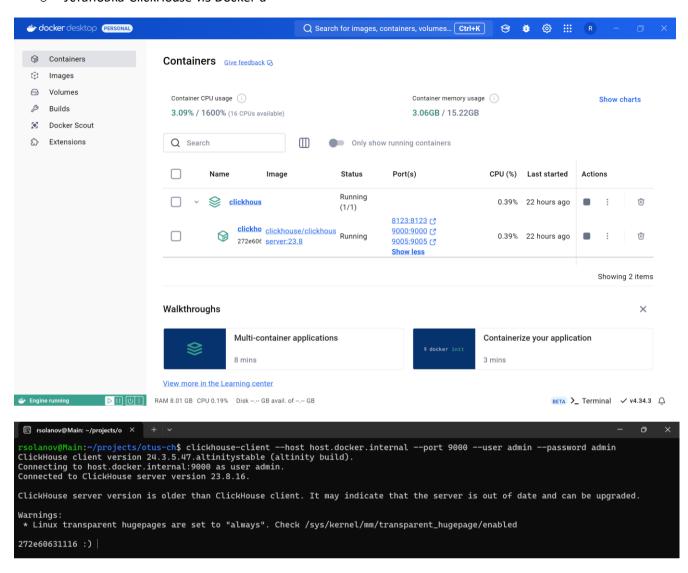
-210 clickhouse-watchdog "" "" "" "" "" "" "" "" "--config=/etc/clickhouse-server/config, xml --pid-file=/run/clickhouse-person/clickhouse-server/config.xml --pid-file=/run/clickhouse-person/clickhouse-server/config.xml --pid-file=/run/clickhouse-person/clickhouse-server/clickhouse-server/clickhouse-server/clickhouse-server/clickhouse-server/clickhouse-server/clickhouse-server/clickhouse-server/clickhouse-server/clickhouse-server/clickhouse-server/clickhouse-server/clickhouse-server/clickhouse-server/clickhouse-server/clickhouse-server/clickhouse-server/clickhouse-server/clickhouse-server/clickhouse-server/clickhouse-server/clickhouse-server/clickhouse-server/clickhouse-server-log

Oct 20 15:47:49 Main clickhouse-server[210]: Logging trace to /var/log/clickhouse-server/clickhouse-server-log

Oct 20 15:47:49 Main systemd[1]: Starting Clickhouse-server (analytic DBMS for big data).

Innes 1-16/16 (END)
```

Установка ClickHouse из Docker'a



Загрузка датасета

```
CREATE TABLE trips (
                         UInt32,
    trip_id
    pickup_datetime
                         DateTime,
    dropoff_datetime
                         DateTime,
    pickup longitude
                         Nullable(Float64),
    pickup_latitude
dropoff_longitude
                         Nullable(Float64),
                         Nullable(Float64),
    dropoff_latitude
                         Nullable(Float64),
                         UInt8,
    passenger_count
    trip_distance
                         Float32,
    fare_amount
                         Float32,
    extra
                         Float32,
    tip amount
                         Float32,
    tolls_amount
                         Float32,
    total_amount
                         Float32,
                         Enum('CSH' = 1, 'CRE' = 2, 'NOC' = 3, 'DIS' = 4, 'UNK' = 5),
    payment type
                         LowCardinality(String),
    pickup ntaname
    dropoff ntaname
                         LowCardinality(String)
ENGINE = MergeTree
PRIMARY KEY (pickup_datetime, dropoff_datetime);
```

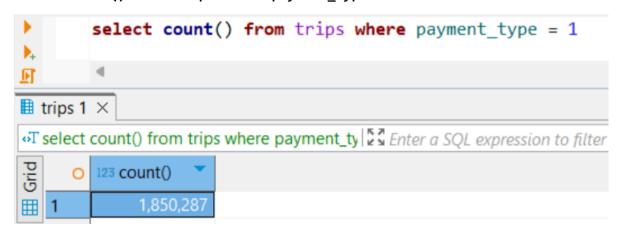
```
⊕ CREATE TABLE trips (
1
           trip_id
                                UInt32,
Ð
                                DateTime,
           pickup_datetime
dropoff datetime
                                DateTime,
                                Nullable(FLoat64),
           pickup_longitude
           pickup_latitude
  Δ
                                Nullable(FLoat64),
           dropoff_longitude
dropoff_latitude
  Δ
                                Nullable(Float64),
                                Nullable(Float64),
  A
           passenger_count
                                UInt8,
           trip_distance
                                Float32,
                                Float32,
           fare_amount
           extra
                                Float32,
           tip_amount
                                Float32,
           tolls_amount
                                Float32,
           total amount
                                Float32,
                                Enum('CSH' = 1, 'CRE' = 2, 'NOC' = 3, 'DIS' = 4, 'UNK' = 5),
           payment_type
LowCardinality(String),
           pickup_ntaname
           dropoff_ntaname
                                LowCardinality(String)
B
       ENGINE = MergeTree
PRIMARY KEY (pickup_datetime, dropoff_datetime);
3.
■ Statistics 1 ×
            Value
Name
Updated Rows 0
            CREATE TABLE trips (
Query
                         UInt32,
              trip_id
```

```
INSERT INTO trips
SELECT
    trip_id,
    pickup_datetime,
    dropoff datetime,
    pickup_longitude,
    pickup latitude,
    dropoff longitude,
    dropoff latitude,
    passenger_count,
    trip_distance,
    fare_amount,
    extra,
    tip amount,
    tolls_amount,
    total_amount,
    payment_type,
    pickup_ntaname,
    dropoff ntaname
FROM gcs(
    'https://storage.googleapis.com/clickhouse-public-datasets/nyc-
taxi/trips_{0..2}.gz',
    'TabSeparatedWithNames'
);
```

```
    ■ INSERT INTO trips

1
       SELECT
H
            trip_id,
            pickup_datetime,
I
            dropoff_datetime,
>_
            pickup_longitude,
            pickup latitude,
            dropoff_longitude,
            dropoff latitude,
            passenger_count,
            trip_distance,
            fare_amount,
            extra,
            tip_amount,
            tolls_amount,
            total_amount,
            payment_type,
            pickup_ntaname,
            dropoff_ntaname
       FROM gcs(
B
            'https://storage.googleapis.com/clickhouse-public-datasets/nyc-taxi/trips_{0..2}.gz',
'TabSeparatedWithNames'
(m)
       );
3
■ Statistics 1 ×
Name
             Value
Updated Rows 3000317
             INSERT INTO trips
Query
             SELECT
```

select count() from trips where payment_type = 1



Провести тестирование производительности и сохранить результаты

Queries executed: 10.

localhost:9000, queries: 10, QPS: 61.616, RPS: 0.000, MiB/s: 0.000, result RPS: 0.000, result MiB/s: 0.000.

```
0.000%
                0.001 sec.
10.000%
                0.001 sec.
20.000%
                0.001 sec.
30.000%
                0.001 sec.
40.000%
                0.001 sec.
                0.001 sec.
50.000%
60.000%
                0.001 sec.
70.000%
                0.001 sec.
80.000%
                0.001 sec.
90.000%
                0.001 sec.
95.000%
                0.007 sec.
99.000%
                0.007 sec.
99.900%
                0.007 sec.
99.990%
                0.007 sec.
```

Внесенные изменения:

- Увеличение количества открытых файловых дескрипторов: увеличение значения параметра "ulimit -n" не менее чем до 100000;
- Увеличение объема разделяемой памяти: увеличение значения параметра "kernel.shmmax" не менее чем до 1 Гб

```
max_memory_usage = 8000000000;
max_execution_time = 1800;
force_primary_key = 1;
max_threads = 16;
max_insert_threads = 16;
max_final_threads = 16;
max_insert_block_size = 268435456; --from 1MB to 256MB
max_compress_block_size = 104857600; -- from 1MB to 100MB
min_insert_block_size_rows = 1048449;
min_insert_block_size_bytes = 268435456; -- 256MB
```

```
localhost:9000, queries: 10, QPS: 68.638, RPS: 0.000, MiB/s: 0.000, result RPS: 0.000, result MiB/s: 0.000.
                 0.001 sec.
0.000%
10.000%
20.000%
                 0.001 sec.
                 0.001 sec.
30.000%
                 0.001 sec.
40.000%
                 0.001 sec.
50.000%
60.000%
                 0.001 sec.
                 0.001 sec.
70.000%
                 0.001 sec.
80.000%
                 0.001 sec.
90.000%
                 0.001 sec.
95.000%
                 0.001 sec.
99.000%
                 0.001 sec.
99.900%
                 0.001 sec.
99.990%
                 0.001 sec.
rsolanov@Main:~$
```

```
0.000%
                0.001 sec.
10.000%
                0.001 sec.
20.000%
                0.001 sec.
30.000%
                0.001 sec.
40.000%
                0.001 sec.
50.000%
                0.001 sec.
60.000%
                0.001 sec.
70.000%
                0.001 sec.
80.000%
                0.001 sec.
90.000%
                0.001 sec.
95.000%
                0.001 sec.
99.000%
                0.001 sec.
99.900%
                0.001 sec.
99.990%
                0.001 sec.
```

После применения изменения настроек видно, что увеличился параметр QPS с 61616 до 68638