02 ДЗ - Развертывание и базовая конфигурация, интерфейсы и инструменты.

Собираем Dockerfile для clickhouse.

Dockerfile:

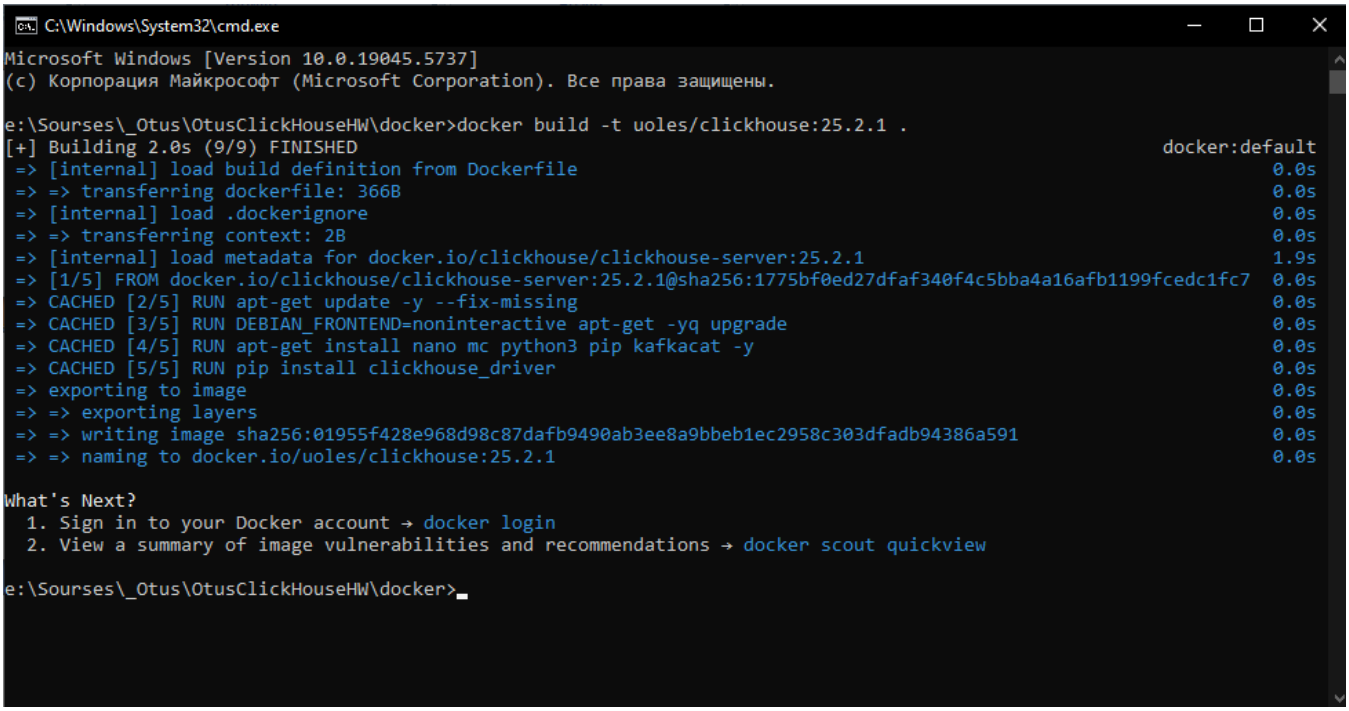
FROM clickhouse/clickhouse-server:25.2.1
MAINTAINER Maksim Kulikov max.uoles@rambler.ru

RUN apt-get update -y --fix-missing
RUN DEBIAN_FRONTEND=noninteractive apt-get -yq upgrade
RUN apt-get install nano mc python3 pip kafkacat –y
RUN pip install clickhouse_driver

EXPOSE 8123 9000
ENTRYPOINT ["/entrypoint.sh"]

Собираем образ командой:

docker build -t uoles/clickhouse:25.2.1 .



Запускаем контейнер командой:

docker run -d
-p 18123:8123
-p 19000:9000
-e CLICKHOUSE_DB=my_database
-e CLICKHOUSE_USER=username
-e CLICKHOUSE_DEFAULT_ACCESS_MANAGEMENT=1
-e CLICKHOUSE_PASSWORD=password
--name clickhouse-server-02
--ulimit nofile=262144:262144
uoles/clickhouse:25.2.1

Создаем таблицу и заливаем данные.

Набор тестовых данных брал этот:
https://clickhouse.com/docs/ru/getting-started/example-datasets/uk-price-paid

Создаем таблицу:

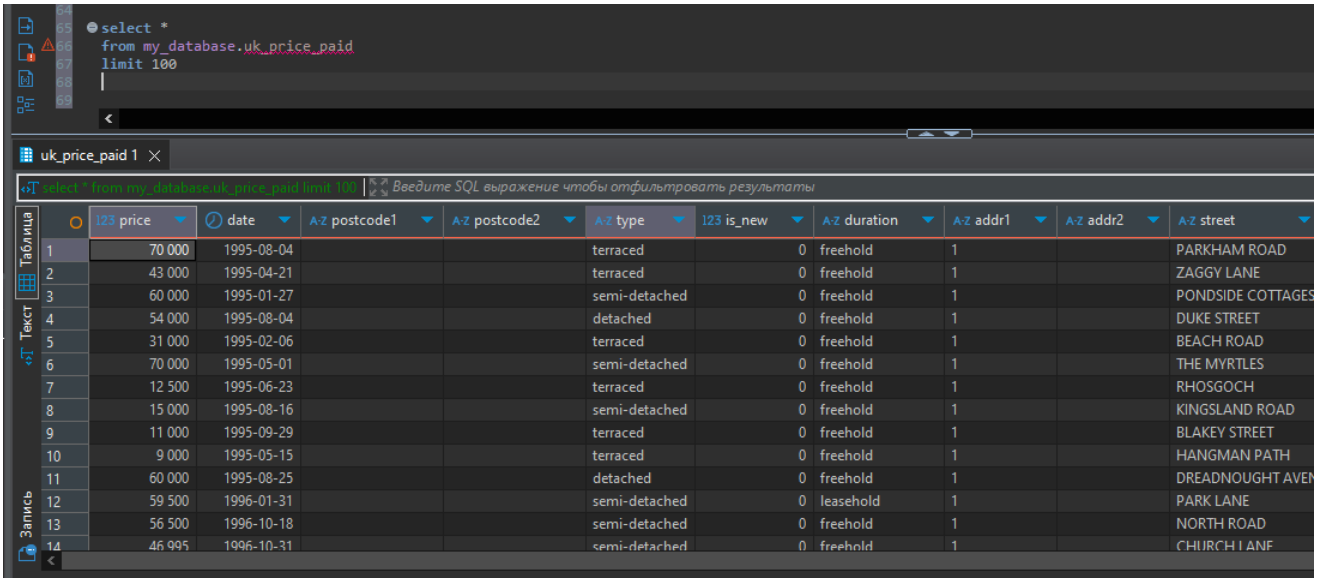
```
CREATE TABLE my_database.uk_price_paid  (
        price UInt32,
        date Date,
        postcode1 LowCardinality(String),
        postcode2 LowCardinality(String),
        type Enum8('terraced' = 1, 'semi-detached' = 2, 'detached' = 3, 'flat' = 4, 'other' = 0),
        is_new UInt8,
        duration Enum8('freehold' = 1, 'leasehold' = 2, 'unknown' = 0),
        addr1 String,
        addr2 String,
        street LowCardinality(String),
        locality LowCardinality(String),
        town LowCardinality(String),
        district LowCardinality(String),
        county LowCardinality(String)
)
ENGINE = MergeTree
ORDER BY (postcode1, postcode2, addr1, addr2);
```

Вставка данных:

```
INSERT INTO my_database.uk_price_paid
WITH
        splitByChar(' ', postcode) AS p
SELECT
        toUInt32(price_string) AS price,
        parseDateTimeBestEffortUS(time) AS date,
        p[1] AS postcode1,
        p[2] AS postcode2,
        transform(a, ['T', 'S', 'D', 'F', 'O'], ['terraced', 'semi-detached', 'detached', 'flat', 'other']) AS type,
        b = 'Y' AS is_new,
        transform(c, ['F', 'L', 'U'], ['freehold', 'leasehold', 'unknown']) AS duration,
        addr1,
        addr2,
        street,
        locality,
        town,
        district,
        county
FROM url(
        'http://prod.publicdata.landregistry.gov.uk.s3-website-eu-west-1.amazonaws.com/pp-complete.csv',
        'CSV',
        'uuid_string String,
        price_string String,
        time String,
        postcode String,
        a String,
        b String,
        c String,
        addr1 String,
        addr2 String,
        street String,
        locality String,
```

```
        town String,
        district String,
        county String,
        d String,
        e String'
) SETTINGS max_http_get_redirects=10;
```

Проверяем данные:



	price	date	postcode1	postcode2	type	is_new	duration	addr1	addr2	street
1	70 000	1995-08-04			terraced	0	freehold	1		PARKHAM ROAD
2	43 000	1995-04-21			terraced	0	freehold	1		ZAGGY LANE
3	60 000	1995-01-27			semi-detached	0	freehold	1		PONDSIDE COTTAGES
4	54 000	1995-08-04			detached	0	freehold	1		DUKE STREET
5	31 000	1995-02-06			terraced	0	freehold	1		BEACH ROAD
6	70 000	1995-05-01			semi-detached	0	freehold	1		THE MYRTLES
7	12 500	1995-06-23			terraced	0	freehold	1		RHOSGOCH
8	15 000	1995-08-16			semi-detached	0	freehold	1		KINGSLAND ROAD
9	11 000	1995-09-29			terraced	0	freehold	1		BLAKEY STREET
10	9 000	1995-05-15			terraced	0	freehold	1		HANGMAN PATH
11	60 000	1995-08-25			detached	0	freehold	1		DREADNOUGHT AVEN
12	59 500	1996-01-31			semi-detached	0	leasehold	1		PARK LANE
13	56 500	1996-10-18			semi-detached	0	freehold	1		NORTH ROAD
14	46 995	1996-10-31			semi-detached	0	freehold	1		CHURCH LANE

Запускаем бенчмарк и тестируем производительность.

Заходим в контейнер:
docker exec -it clickhouse-server-02 bash

Тестируем командой:
clickhouse-benchmark --user username --password password -i 10 --query "SELECT * FROM my_database.uk_price_paid LIMIT 6000000 OFFSET 6000000"

Результат без настроек (дефолтные):

Loaded 1 queries.

Queries executed: 2.

localhost:9000, queries: 2, QPS: 1.025, RPS: 12308389.099, MiB/s: 533.694, result RPS: 6149858.387, result MiB/s: 252.186.

0% 0.913 sec.
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Queries executed: 4.

localhost:9000, queries: 2, QPS: 1.104, RPS: 13272159.292, MiB/s: 575.535, result RPS: 6622368.584, result MiB/s: 271.410.

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Queries executed: 6.

localhost:9000, queries: 2, QPS: 1.016, RPS: 12195265.547, MiB/s: 528.824, result RPS: 6093336.464, result MiB/s: 249.612.

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Queries executed: 8.

localhost:9000, queries: 2, QPS: 1.063, RPS: 12763686.736, MiB/s: 553.471, result RPS: 6377346.807, result MiB/s: 261.314.

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Queries executed: 10.

localhost:9000, queries: 10, QPS: 1.004, RPS: 12057105.729, MiB/s: 522.838, result RPS: 6022661.798, result MiB/s: 246.800.

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90% 1.033 sec.
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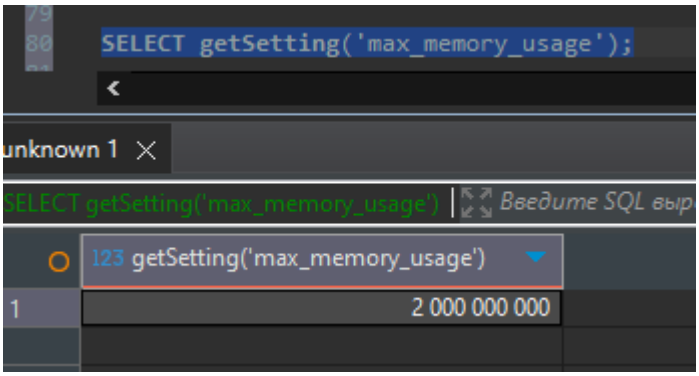
Выставил ограничение памяти - 2GB



Loaded 1 queries.

Queries executed: 1.

localhost:9000, queries: 1, QPS: 0.975, RPS: 11705636.625, MiB/s: 506.221, result RPS: 5848560.560, result MiB/s: 238.694.

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Queries executed: 3.

localhost:9000, queries: 2, QPS: 1.068, RPS: 12832874.362, MiB/s: 555.397, result RPS: 6407398.478, result MiB/s: 262.341.

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Queries executed: 4.

localhost:9000, queries: 1, QPS: 0.943, RPS: 11321593.368, MiB/s: 490.254, result RPS: 5656678.622, result MiB/s: 231.115.

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Queries executed: 5.

localhost:9000, queries: 1, QPS: 0.980, RPS: 11774290.634, MiB/s: 509.185, result RPS: 5882862.593, result MiB/s: 240.653.

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Queries executed: 7.

localhost:9000, queries: 2, QPS: 1.001, RPS: 12025063.788, MiB/s: 520.823, result RPS: 6008157.955, result MiB/s: 245.952.

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Queries executed: 10.

localhost:9000, queries: 10, QPS: 0.995, RPS: 11952292.630, MiB/s: 517.266, result RPS: 5971354.900, result MiB/s: 244.277.

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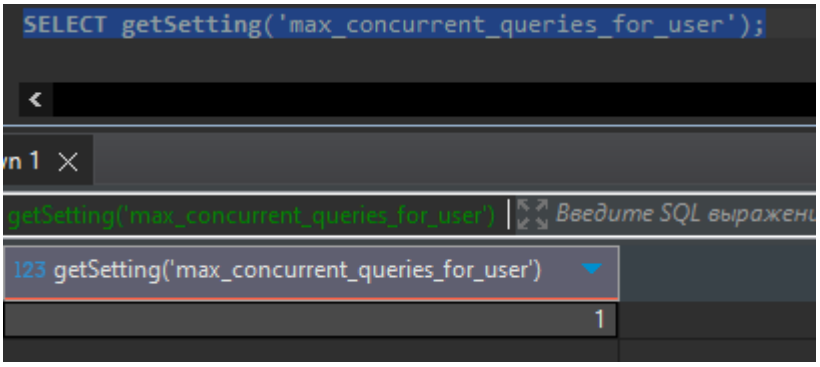
Ограничение параллельных запросов на пользователя – 1.



Loaded 1 queries.

Queries executed: 3.

localhost:9000, queries: 3, QPS: 2.072, RPS: 24875050.007, MiB/s: 1052.473, result RPS: 12430541.801, result MiB/s: 490.208.

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Queries executed: 6.

localhost:9000, queries: 3, QPS: 2.089, RPS: 25074199.545, MiB/s: 1060.204, result RPS: 12535762.624, result MiB/s: 493.973.

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Queries executed: 10.

localhost:9000, queries: 10, QPS: 2.044, RPS: 24530290.320, MiB/s: 1037.558, result RPS: 12262163.002, result MiB/s: 483.430.

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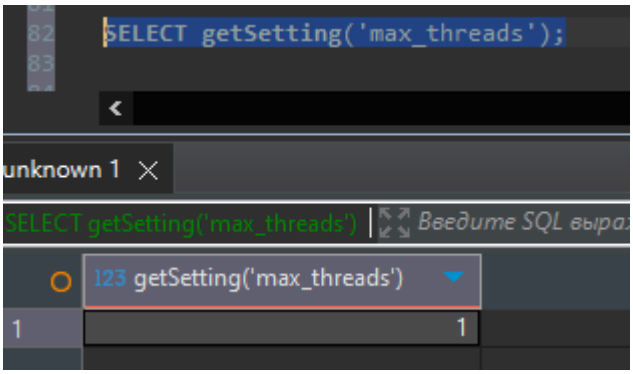
Ограничение потоков – 1



Loaded 1 queries.

Queries executed: 2.

localhost:9000, queries: 2, QPS: 1.528, RPS: 18372823.725, MiB/s: 766.739, result RPS: 9166660.764, result MiB/s: 357.256.

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99.99% 0.661 sec.

Queries executed: 4.

localhost:9000, queries: 2, QPS: 1.549, RPS: 18632808.278, MiB/s: 777.589, result RPS: 9296373.553, result MiB/s: 362.311.

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Queries executed: 6.

localhost:9000, queries: 2, QPS: 1.566, RPS: 18837082.072, MiB/s: 786.114, result RPS: 9398290.852, result MiB/s: 366.283.

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Queries executed: 8.

localhost:9000, queries: 2, QPS: 1.570, RPS: 18876721.507, MiB/s: 787.768, result RPS: 9418067.957, result MiB/s: 367.054.

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Queries executed: 10.

localhost:9000, queries: 10, QPS: 1.531, RPS: 18416615.965, MiB/s: 768.567, result RPS: 9188509.807, result MiB/s: 358.107.

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Изменение памяти в целом не повлияло на результаты, что 2GB, что 20MB. При значении памяти ниже 20 метров уже бенчмарк не запускался. На результаты повлияло только ограничение кол-ва параллельных запросов и потоков, но очень странно - дало лучшие показатели.

/etc/clickhouse-server/users.d/user.xml

```
<clickhouse>
    <profiles>
        <default>
            <max_memory_usage>20000000</max_memory_usage>
            <max_memory_usage_for_user>20000000</max_memory_usage_for_user>
            <max_concurrent_queries_for_user>1</max_concurrent_queries_for_user>
            <max_threads>1</max_threads>
        </default>
    </profiles>
</clickhouse>

```