Kafka Monitoring & Tuning

Important Metrics

Description	JMX MBEAN NAME
Message in rate	Kafka.server:type=BrokerTopicMetrices, name=MessagesInPerSec
Byte in rate	Kafka.server:type=BrokerTopicMetrics,name=BytesInPerSec
Time request waits in request queue	Kafka.network:type=RequestMetrics,name=RequestQueueTimeMs, Request={Produce|FetchConsumer|FetchFollower}
Messages count consumer lags behind producer	Kafka.consumer:type=consumer-fetch-manager-metrics, client-id ={client-id} Attribute:records-lag-max
ISR shrink rate	Kafka.server:type=ReplicaManager, name=IsrShrinksPerSec
ISR	Kafka.server:type=ReplicaManage,name=IsrExpandsPerSec
waiting-threads	User threads blocked count waiting for buffer memory to enqueue their records. JMX MBean Name kafka.producer:type=producer- metrics,client-id=([-.\w]+)
record-queue-time-avg	Average time in ms record batches spent in record accumulator.
record-queue-time-max	The maximum time in ms record batches spent in the record accumulator.
requests-in-flight	Current number of in-flight requests - waiting for a response.
bytes-consumed-rate	Average byte count consumed per second
fetch-latency-avg	Average fetch request duration
fetch-latency-max	Max fetch request duration
records-per-request-avg	Average record count per request for specific topic
records-consumed-rate	Average record count consumed per second for specific topic

Perfomance Metrics - Producer

```
kafka-producer-perf-test.sh  --topic my-perf-test \
--num-records 100000 \
--record-size  1024 \
--throughput -1 \
--producer-props acks=1 \
bootstrap.servers=localhost:9092
```

```
[root@kafka0 code]# kafka-producer-perf-test.sh --topic my-perf-test \
> --num-records 100000 \
> --record-size 1024 \
> --throughput -1 \
> --producer-props acks=1 \
> bootstrap.servers=localhost:9092
7666 records sent, 1531.4 records/sec (1.50 MB/sec), 1013.3 ms avg latency, 1876.0 ms max latency.
12750 records sent, 2545.4 records/sec (2.49 MB/sec), 3116.2 ms avg latency, 5239.0 ms max latency.
8175 records sent, 1632.4 records/sec (1.59 MB/sec), 6957.0 ms avg latency, 9480.0 ms max latency.
8775 records sent, 1754.6 records/sec (1.71 MB/sec), 11696.2 ms avg latency, 13566.0 ms max latency.
14655 records sent, 2931.0 records/sec (2.86 MB/sec), 14802.3 ms avg latency, 15516.0 ms max latency.
14670 records sent, 2927.6 records/sec (2.86 MB/sec), 12559.2 ms avg latency, 14597.0 ms max latency.
17295 records sent, 3456.9 records/sec (3.38 MB/sec), 10034.4 ms avg latency, 10787.0 ms max latency.
12270 records sent, 2412.0 records/sec (2.36 MB/sec), 9613.4 ms avg latency, 10595.0 ms max latency.
100000 records sent, 2386.179250 records/sec (2.33 MB/sec), 9400.79 ms avg latency, 15516.00 ms max latency, 10062 ms 50th, 15252 ms
 95th, 15469 ms 99th, 15502 ms 99.9th.
[root@kafka0 code]#
```

Perfomance Metrics - Consumer

#kafka-consumer-perf-test.sh --topic my-perf-test --broker-list kafka0:9092 --messages 100000

```
--version                                Display Kafka version.
[root@kafka0 code]# kafka-consumer-perf-test.sh --topic my-perf-test --broker-list kafka0:9092 --messages 100000
start.time, end.time, data.consumed.in.MB, MB.sec, data.consumed.in.nMsg, nMsg.sec, rebalance.time.ms, fetch.time.ms, fetch.MB.sec,
fetch.nMsg.sec
2022-02-28 15:43:59:610, 2022-02-28 15:44:06:745, 98.1396, 13.7547, 100495, 14084.7933, 1933, 5202, 18.8658, 19318.5313
[root@kafka0 code]#
```

Perfomance Tuning - Producer & Consumer

Increase the no of partitions

Acks – Recommended 2 or 3

Buffer setting – Set as per the batch size

ISR – Set the minimum as per the requirement – 2 or 3 is the optimal

Two parameters are particularly important for latency and throughput:

batch size and linger time

```
[root@kafka0 code]# kafka-producer-perf-test.sh --topic my-perf-test4 --num-records 100000 --record-size 1024 --throughput -1 --prod
ucer-props acks=1 bootstrap.servers=kafka0:9092
11946 records sent, 2373.1 records/sec (2.32 MB/sec), 521.9 ms avg latency, 1748.0 ms max latency.
19260 records sent, 3843.5 records/sec (3.75 MB/sec), 2231.3 ms avg latency, 4188.0 ms max latency.
20556 records sent, 4111.2 records/sec (4.01 MB/sec), 5283.8 ms avg latency, 6877.0 ms max latency.
24264 records sent, 4848.9 records/sec (4.74 MB/sec), 6761.5 ms avg latency, 8210.0 ms max latency.
100000 records sent, 4004.324671 records/sec (3.91 MB/sec), 4737.75 ms avg latency, 8210.00 ms max latency, 5609 ms 50th, 7438 ms 95
th, 7888 ms 99th, 8152 ms 99.9th.
[root@kafka0 code]#
```

```
[root@kafka0 code]# kafka-producer-perf-test.sh --topic my-perf-test4 --num-records 100000 --record-size 1024 --throughput -1 --prod
ucer-props acks=1 batch.size=96384  bootstrap.servers=kafka0:9092
38240 records sent, 7648.0 records/sec (7.47 MB/sec), 69.3 ms avg latency, 1565.0 ms max latency.
100000 records sent, 10260.619741 records/sec (10.02 MB/sec), 74.23 ms avg latency, 1565.00 ms max latency, 68 ms 50th, 140 ms 95th,
 175 ms 99th, 204 ms 99.9th.
[root@kafka0 code]#
```

Perfomance Tuning – Producer & Consumer

The maximum number of consumers in a consumer group for a topic is equal to the number of partitions

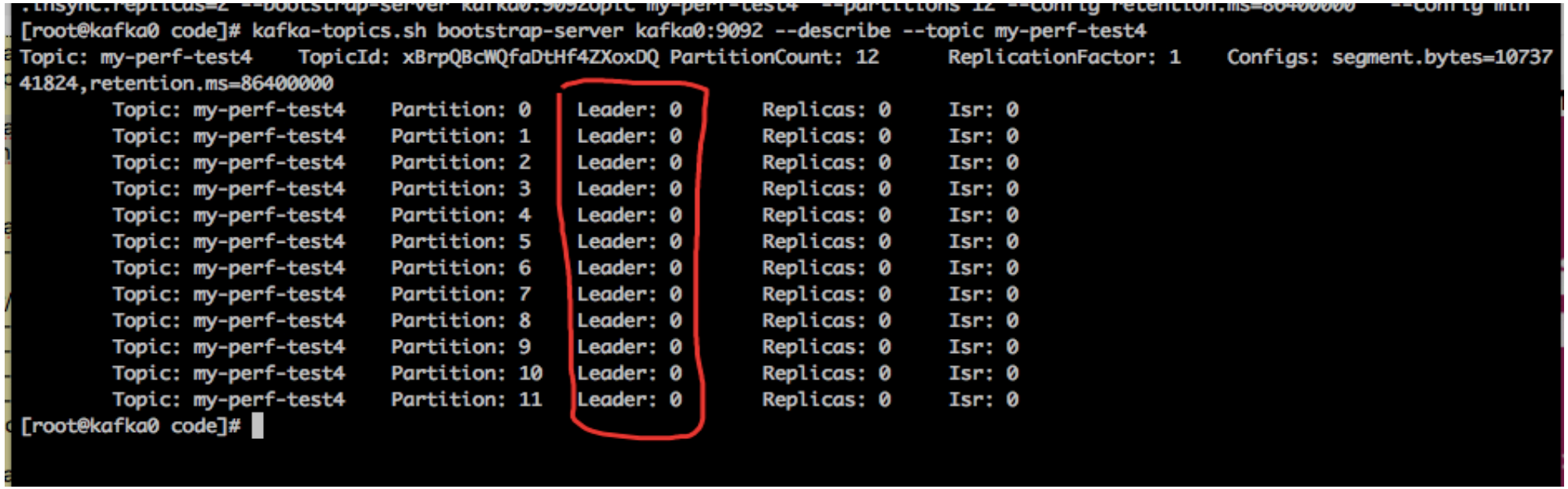
```
--version                                Display Kafka version.
[root@kafka0 code]# kafka-consumer-perf-test.sh --topic my-perf-test --broker-list kafka0:9092 --messages 100000
start.time, end.time, data.consumed.in.MB, MB.sec, data.consumed.in.nMsg, nMsg.sec, rebalance.time.ms, fetch.time.ms, fetch.MB.sec,
fetch.nMsg.sec
2022-02-28 15:43:59:610, 2022-02-28 15:44:06:745, 98.1396, 13.7547, 100495, 14084.7933, 1933, 5202, 18.8658, 19318.5313
[root@kafka0 code]#
```

2 consumer group

```
[root@kafka0 my-kafka-0]# kafka-consumer-perf-test.sh --topic my-perf-test4 --broker-list kafka0:9092  --messages 100000 --group cg
start.time, end.time, data.consumed.in.MB, MB.sec, data.consumed.in.nMsg, nMsg.sec, rebalance.time.ms, fetch.time.ms, fetch.MB.sec,
fetch.nMsg.sec
2022-02-28 16:51:53:378, 2022-02-28 16:52:06:294, 97.6973, 7.5640, 100042, 7745.5869, 3336, 9580, 10.1980, 10442.7975
[root@kafka0 my-kafka-0]#
```

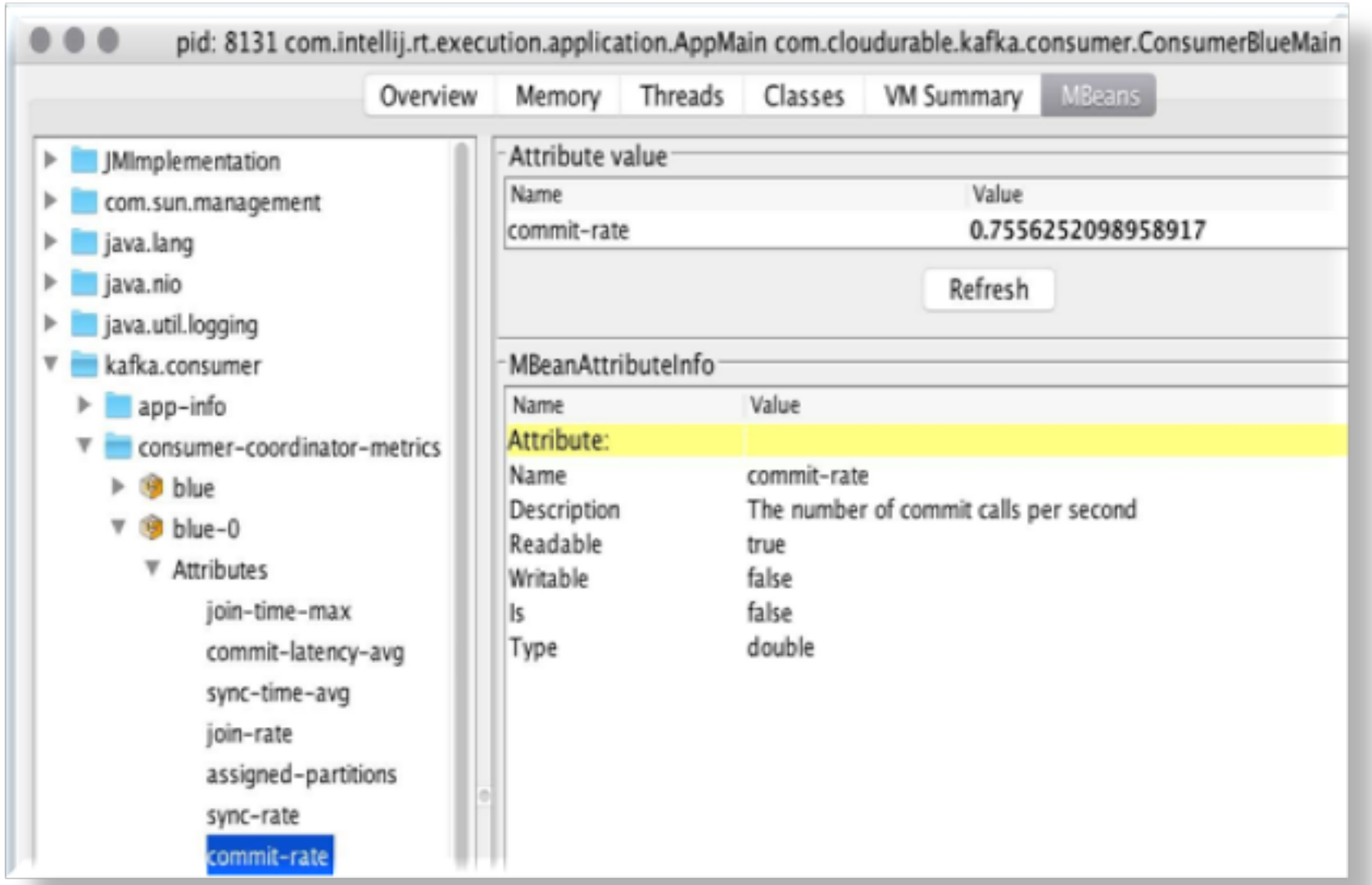
Perfomance Tuning - Broker

- Leader balanced properly
- It is recommends starting with one partition per physical storage disk and one consumer per partition



Kafka Consumer JConsole Metrics

Tos



Kafka Performance Broker Configuration

Tos

JVM and Garbage Collection

```
-server -XX:+UseG1GC -XX:MaxGCPauseMillis=20
-XX:InitiatingHeapOccupancyPercent=35 -XX:+DisableExplicitGC
-Djava.awt.headless=true -Djava.net.preferIPv4Stack=true
```

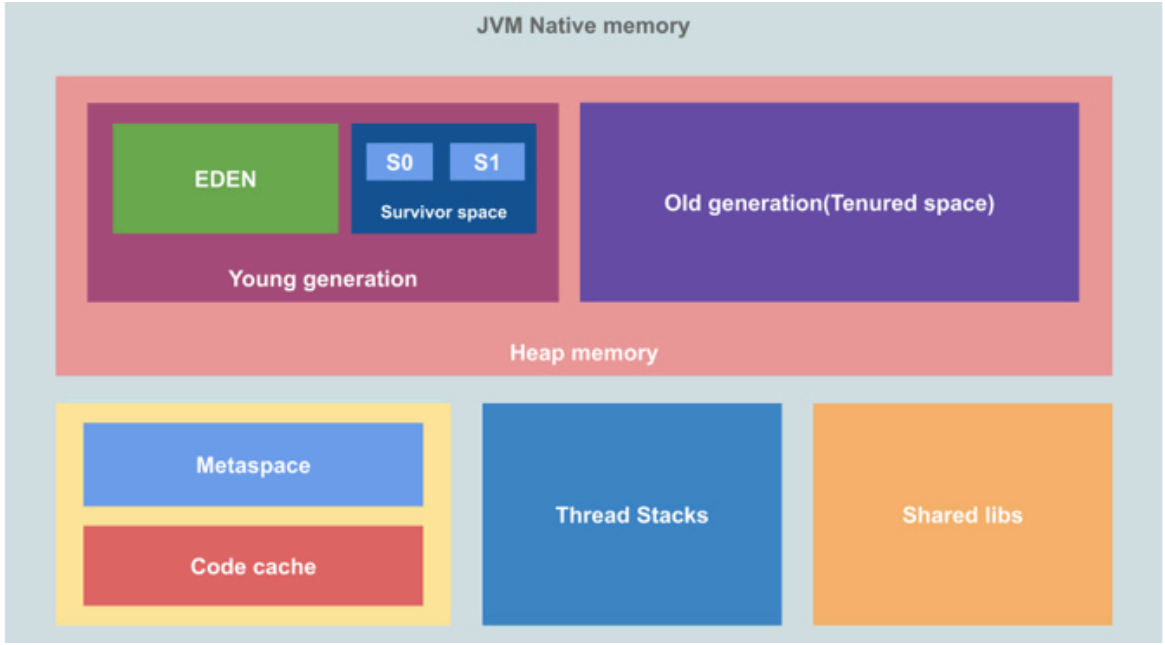
Network and I/O Threads

num.network.threads : Set this value mainly based on number of producers, consumers and replica fetchers.
queued.max.requests: controls how many requests are allowed in the request queue before blocking network threads.
num.io.threads: specifies the number of threads that a broker uses for processing requests from the request queue (might include disk I/O).

Java GC config

Tos

```
Xms6g   Xmx6g
-XX:MetaspaceSize=96m
-XX:+UseG1GC
-XX:MaxGCPauseMillis=20
-XX:InitiatingHeapOccupancyPercent=35
-XX:G1HeapRegionSize=16M
```



- Heap Space should be 25% to 35% of available space for server
- Leave 50% for OS, Remember Kafka uses OS page cache
- Other tweaks for GC to limit overhead

Lab : Monitoring, Performance & Tuning