

第2周 1.各种GC日志分析

笔记本： JVM进阶

创建时间： 2020/10/23 15:47

更新时间： 2020/10/24 8:55

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URL： about:blank

1. 串行GC在内存容量由大到小的GC日志

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Java HotSpot(TM) 64-Bit Server VM (25.161-b12) for windows-amd64 JRE (1.8.0_161-b12), built on Dec 19 2017 17:52:25 by "java_re" with MS VC++ 10.0 (VS2010)
Memory: 4k page, physical 12459296k(3602488k free), swap 24916692k(13850580k free)
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CommandLine flags:

-XX:InitialHeapSize=536870912 (512M)

-XX:MaxHeapSize=536870912 (512M)

-XX:+PrintGC

-XX:+PrintGCApplicationStoppedTime

-XX:+PrintGCDateStamps

-XX:+PrintGCDetails

-XX:+PrintGCTimeStamps

-XX:+UseCompressedClassPointers

-XX:+UseCompressedOops

-XX:-UseLargePagesIndividualAllocation

-XX:+UseSerialGC (串行GC)

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2020-10-23T15:39:20.669+0800: 2.284: Total time for which application threads
were stopped: 0.0192592 seconds, Stopping threads took: 0.0191455 seconds
2020-10-23T15:39:20.913+0800: 2.529: [GC (Allocation Failure) 2020-10-
23T15:39:20.913+0800: 2.529: [DefNew: 139776K->17472K(157248K), 0.0398812 secs]
139776K->46723K(506816K), 0.0401323 secs] [Times: user=0.03 sys=0.02, real=0.04
secs]
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2020-10-23T15:39:20.953+0800: 2.569: Total time for which application threads
were stopped: 0.0403353 seconds, Stopping threads took: 0.0000396 seconds
2020-10-23T15:39:21.001+0800: 2.616: [GC (Allocation Failure) 2020-10-
23T15:39:21.001+0800: 2.617: [DefNew: 157248K->17471K(157248K), 0.0460803 secs]
186499K->88632K(506816K), 0.0462145 secs] [Times: user=0.01 sys=0.03, real=0.05
secs]
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2020-10-23T15:39:21.047+0800: 2.663: Total time for which application threads
were stopped: 0.0464003 seconds, Stopping threads took: 0.0000444 seconds
2020-10-23T15:39:21.081+0800: 2.697: [GC (Allocation Failure) 2020-10-
23T15:39:21.081+0800: 2.697: [DefNew: 157247K->17465K(157248K), 0.0357039 secs]
228408K->127499K(506816K), 0.0357761 secs] [Times: user=0.00 sys=0.02, real=0.04
secs]
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2020-10-23T15:39:21.117+0800: 2.733: Total time for which application threads
were stopped: 0.0359528 seconds, Stopping threads took: 0.0000385 seconds
2020-10-23T15:39:21.157+0800: 2.773: [GC (Allocation Failure) 2020-10-
23T15:39:21.157+0800: 2.773: [DefNew: 157241K->17471K(157248K), 0.0390491 secs]
267275K->169936K(506816K), 0.0391525 secs] [Times: user=0.03 sys=0.00, real=0.04
secs]
```

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2020-10-23T15:39:21.197+0800: 2.813: Total time for which application threads
were stopped: 0.0393845 seconds, Stopping threads took: 0.0000726 seconds
2020-10-23T15:39:21.236+0800: 2.852: [GC (Allocation Failure) 2020-10-
23T15:39:21.236+0800: 2.852: [DefNew: 157247K->17469K(157248K), 0.0457270 secs]
309712K->213021K(506816K), 0.0457963 secs] [Times: user=0.03 sys=0.01, real=0.05
secs]
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2020-10-23T15:39:21.282+0800: 2.898: Total time for which application threads
were stopped: 0.0460034 seconds, Stopping threads took: 0.0000590 seconds
2020-10-23T15:39:21.372+0800: 2.988: [GC (Allocation Failure) 2020-10-
23T15:39:21.372+0800: 2.988: [DefNew: 157245K->17470K(157248K), 0.0420281 secs]
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352797K->251370K(506816K), 0.0421831 secs] [Times: user=0.03 sys=0.00, real=0.04
secs]
2020-10-23T15:39:21.414+0800: 3.030: Total time for which application threads
were stopped: 0.0425640 seconds, Stopping threads took: 0.0001437 seconds
2020-10-23T15:39:21.467+0800: 3.083: [GC (Allocation Failure) 2020-10-
23T15:39:21.467+0800: 3.083: [DefNew: 157246K->17471K(157248K), 0.0479710 secs]
391146K->295297K(506816K), 0.0480425 secs] [Times: user=0.02 sys=0.03, real=0.05
secs]
2020-10-23T15:39:21.515+0800: 3.131: Total time for which application threads
were stopped: 0.0482232 seconds, Stopping threads took: 0.0000422 seconds
2020-10-23T15:39:21.568+0800: 3.184: [GC (Allocation Failure) 2020-10-
23T15:39:21.568+0800: 3.184: [DefNew: 157194K->17469K(157248K), 0.0502371 secs]
435021K->337137K(506816K), 0.0503082 secs] [Times: user=0.05 sys=0.02, real=0.05
secs]
2020-10-23T15:39:21.619+0800: 3.235: Total time for which application threads
were stopped: 0.0504827 seconds, Stopping threads took: 0.0000400 seconds
2020-10-23T15:39:21.666+0800: 3.282: [GC (Allocation Failure) 2020-10-
23T15:39:21.666+0800: 3.282: [DefNew: 157245K->157245K(157248K), 0.0000231
secs]2020-10-23T15:39:21.666+0800: 3.282: [Tenured: 319668K->269919K(349568K),
0.0678881 secs] 476913K->269919K(506816K), [Metaspace: 3596K->3596K(1056768K)],
0.0680399 secs] [Times: user=0.06 sys=0.00, real=0.07 secs] (FULL GC)
2020-10-23T15:39:21.734+0800: 3.350: Total time for which application threads
were stopped: 0.0683016 seconds, Stopping threads took: 0.0000370 seconds

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Heap

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def new generation total 157248K, used 6070K [0x00000000e0000000,
0x00000000eaaaa0000, 0x00000000eaaa0000)
  eden space 139776K, 4% used [0x00000000e0000000, 0x00000000e05ed950,
0x00000000e8880000)
    from space 17472K, 0% used [0x00000000e8880000, 0x00000000e8880000,
0x00000000e9990000)
      to space 17472K, 0% used [0x00000000e9990000, 0x00000000e9990000,
0x00000000eaaa0000)
  tenured generation total 349568K, used 269919K [0x00000000eaaa0000,
0x00000000100000000, 0x00000000100000000)
    the space 349568K, 77% used [0x00000000eaaa0000, 0x00000000fb237f70,
0x00000000fb238000, 0x00000000100000000)
    Metaspace used 3606K, capacity 4502K, committed 4864K, reserved 1056768K
      class space used 387K, capacity 390K, committed 512K, reserved 1048576K

```

Java HotSpot(TM) 64-Bit Server VM (25.161-b12) for windows-amd64 JRE (1.8.0_161-b12), built on Dec 19 2017 17:52:25 by "java_re" with MS VC++ 10.0 (VS2010)
Memory: 4k page, physical 12459296k(3936072k free), swap 24916692k(14135012k free)

CommandLine flags:

```

-XX:InitialHeapSize=1073741824(1G)
-XX:MaxHeapSize=1073741824(1G)
-XX:+PrintGC
-XX:+PrintGCApplicationStoppedTime
-XX:+PrintGCDateStamps
-XX:+PrintGCDetails
-XX:+PrintGCTimeStamps
-XX:+UseCompressedClassPointers
-XX:+UseCompressedOops
-XX:-UseLargePagesIndividualAllocation
-XX:+UseSerialGC

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2020-10-23T15:53:38.897+0800: 1.366: Total time for which application threads
were stopped: 0.0010333 seconds, Stopping threads took: 0.0009494 seconds
2020-10-23T15:53:39.144+0800: 1.613: [GC (Allocation Failure) 2020-10-
23T15:53:39.145+0800: 1.613: [DefNew: 279616K->34943K(314560K), 0.0529774 secs]
279616K->90798K(1013632K), 0.0531486 secs] [Times: user=0.00 sys=0.05, real=0.05
secs]
2020-10-23T15:53:39.198+0800: 1.666: Total time for which application threads
were stopped: 0.0532842 seconds, Stopping threads took: 0.0000253 seconds
2020-10-23T15:53:39.282+0800: 1.751: [GC (Allocation Failure) 2020-10-
23T15:53:39.282+0800: 1.751: [DefNew: 314559K->34943K(314560K), 0.0699134 secs]

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370414K->165437K(1013632K), 0.0700010 secs] [Times: user=0.05 sys=0.02, real=0.07
secs]
2020-10-23T15:53:39.352+0800: 1.821: Total time for which application threads
were stopped: 0.0701692 seconds, Stopping threads took: 0.0000396 seconds
2020-10-23T15:53:39.412+0800: 1.881: [GC (Allocation Failure) 2020-10-
23T15:53:39.412+0800: 1.881: [DefNew: 314554K->34941K(314560K), 0.0528257 secs]
445047K->243117K(1013632K), 0.0529474 secs] [Times: user=0.01 sys=0.03, real=0.05
secs]
2020-10-23T15:53:39.465+0800: 1.934: Total time for which application threads
were stopped: 0.0531123 seconds, Stopping threads took: 0.0000323 seconds
2020-10-23T15:53:39.514+0800: 1.982: [GC (Allocation Failure) 2020-10-
23T15:53:39.514+0800: 1.983: [DefNew: 314557K->34943K(314560K), 0.0678618 secs]
522733K->319137K(1013632K), 0.0679468 secs] [Times: user=0.03 sys=0.05, real=0.07
secs]
2020-10-23T15:53:39.582+0800: 2.050: Total time for which application threads
were stopped: 0.0680982 seconds, Stopping threads took: 0.0000414 seconds
2020-10-23T15:53:39.637+0800: 2.106: [GC (Allocation Failure) 2020-10-
23T15:53:39.637+0800: 2.106: [DefNew: 314559K->34942K(314560K), 0.0847790 secs]
598753K->402197K(1013632K), 0.0848857 secs] [Times: user=0.05 sys=0.05, real=0.08
secs]
2020-10-23T15:53:39.722+0800: 2.191: Total time for which application threads
were stopped: 0.0850502 seconds, Stopping threads took: 0.0000334 seconds
2020-10-23T15:53:39.779+0800: 2.248: [GC (Allocation Failure) 2020-10-
23T15:53:39.779+0800: 2.248: [DefNew: 314558K->34943K(314560K), 0.0803433 secs]
681813K->480359K(1013632K), 0.0804500 secs] [Times: user=0.05 sys=0.05, real=0.08
secs]
2020-10-23T15:53:39.860+0800: 2.328: Total time for which application threads
were stopped: 0.0806505 seconds, Stopping threads took: 0.0000433 seconds

```

Heap

```

def new generation    total 314560K, used 244780K [0x00000000c0000000,
0x00000000d5550000, 0x00000000d5550000)
  eden space 279616K,  75% used [0x00000000c0000000, 0x00000000ccceb3e0,
0x00000000d1110000)
    from space 34944K,  99% used [0x00000000d1110000, 0x00000000d332fd00,
0x00000000d3330000)
      to   space 34944K,   0% used [0x00000000d3330000, 0x00000000d3330000,
0x00000000d5550000)
tenured generation    total 699072K, used 445416K [0x00000000d5550000,
0x0000000010000000, 0x0000000010000000)
  the space 699072K,  63% used [0x00000000d5550000, 0x00000000f084a008,
0x00000000f084a200, 0x0000000010000000)
Metaspace              used 3603K, capacity 4502K, committed 4864K, reserved 1056768K
  class space          used 387K, capacity 390K, committed 512K, reserved 1048576K

```

Java HotSpot(TM) 64-Bit Server VM (25.161-b12) for windows-amd64 JRE (1.8.0_161-b12), built on Dec 19 2017 17:52:25 by "java_re" with MS VC++ 10.0 (VS2010)
Memory: 4k page, physical 12459296k(3966508k free), swap 24916692k(14136632k free)

CommandLine flags:

```

-XX:InitialHeapSize=2147483648(2G)
-XX:MaxHeapSize=2147483648(2G)
-XX:+PrintGC
-XX:+PrintGCApplicationStoppedTime
-XX:+PrintGCDateStamps
-XX:+PrintGCDetails
-XX:+PrintGCTimeStamps
-XX:+UseCompressedClassPointers
-XX:+UseCompressedOops
-XX:-UseLargePagesIndividualAllocation
-XX:+UseSerialGC

```

```

2020-10-23T15:57:42.378+0800: 0.985: Total time for which application threads
were stopped: 0.0001228 seconds, Stopping threads took: 0.0000532 seconds
2020-10-23T15:57:42.799+0800: 1.407: [GC (Allocation Failure) 2020-10-
23T15:57:42.799+0800: 1.407: [DefNew: 559232K->69887K(629120K), 0.1198385 secs]
559232K->148955K(2027264K), 0.1200155 secs] [Times: user=0.03 sys=0.08, real=0.12
secs]

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2020-10-23T15:57:42.919+0800: 1.527: Total time for which application threads
were stopped: 0.1201853 seconds, Stopping threads took: 0.0000268 seconds
2020-10-23T15:57:43.056+0800: 1.664: [GC (Allocation Failure) 2020-10-
23T15:57:43.056+0800: 1.664: [DefNew: 629119K->69887K(629120K), 0.1450333 secs]
708187K->265898K(2027264K), 0.1451157 secs] [Times: user=0.05 sys=0.08, real=0.14
secs]
2020-10-23T15:57:43.201+0800: 1.809: Total time for which application threads
were stopped: 0.1452869 seconds, Stopping threads took: 0.0000381 seconds
2020-10-23T15:57:43.312+0800: 1.920: [GC (Allocation Failure) 2020-10-
23T15:57:43.312+0800: 1.920: [DefNew: 629119K->69888K(629120K), 0.1242775 secs]
825130K->393026K(2027264K), 0.1243951 secs] [Times: user=0.09 sys=0.03, real=0.12
secs]
2020-10-23T15:57:43.436+0800: 2.044: Total time for which application threads
were stopped: 0.1245806 seconds, Stopping threads took: 0.0000447 seconds

```

Heap

```

def new generation    total 629120K, used 92832K [0x0000000080000000,
0x00000000aaaa0000, 0x00000000aaaa0000)
  eden space 559232K,    4% used [0x0000000080000000, 0x0000000081668160,
0x00000000a2220000)
    from space 69888K, 100% used [0x00000000a6660000, 0x00000000aaaa0000,
0x00000000aaaa0000)
    to   space 69888K,    0% used [0x00000000a2220000, 0x00000000a2220000,
0x00000000a6660000)
tenured generation    total 1398144K, used 323138K [0x00000000aaaa0000,
0x0000000010000000, 0x0000000010000000)
  the space 1398144K,   23% used [0x00000000aaaa0000, 0x00000000be630b70,
0x00000000be630c00, 0x0000000010000000)
Metaspace              used 3602K, capacity 4502K, committed 4864K, reserved 1056768K
class space            used 387K, capacity 390K, committed 512K, reserved 1048576K

```

Java HotSpot(TM) 64-Bit Server VM (25.161-b12) for windows-amd64 JRE (1.8.0_161-b12), built on Dec 19 2017 17:52:25 by "java_re" with MS VC++ 10.0 (VS2010)
Memory: 4k page, physical 12459296k(3961612k free), swap 24916692k(14142532k free)

CommandLine flags:

```

-XX:InitialHeapSize=4294967296(4G)
-XX:MaxHeapSize=4294967296(4G)
-XX:+PrintGC
-XX:+PrintGCApplicationStoppedTime
-XX:+PrintGCDateStamps
-XX:+PrintGCDetails
-XX:+PrintGCTimeStamps
-XX:+UseCompressedClassPointers
-XX:+UseCompressedOops
-XX:-UseLargePagesIndividualAllocation
-XX:+UseSerialGC

```

```

2020-10-23T15:59:11.570+0800: 0.958: Total time for which application threads
were stopped: 0.0012287 seconds, Stopping threads took: 0.0011484 seconds
2020-10-23T15:59:12.412+0800: 1.800: [GC (Allocation Failure) 2020-10-
23T15:59:12.412+0800: 1.800: [DefNew: 1118528K->139775K(1258304K), 0.2230361
secs] 1118528K->241903K(4054528K), 0.2232029 secs] [Times: user=0.01 sys=0.19,
real=0.22 secs]
2020-10-23T15:59:12.635+0800: 2.023: Total time for which application threads
were stopped: 0.2233660 seconds, Stopping threads took: 0.0000286 seconds

```

Heap

```

def new generation    total 1258304K, used 172918K [0x00000006c0000000,
0x00000000715550000, 0x00000000715550000)
  eden space 1118528K,    2% used [0x00000006c0000000, 0x00000006c205d9c8,
0x00000000704450000)
    from space 139776K,  99% used [0x0000000070ccd0000, 0x0000000071554fff8,
0x00000000715550000)
    to   space 139776K,    0% used [0x00000000704450000, 0x00000000704450000,
0x0000000070ccd0000)
tenured generation    total 2796224K, used 102127K [0x00000000715550000,
0x000000007c0000000, 0x000000007c0000000)

```

```
the space 2796224K, 3% used [0x0000000715550000, 0x000000071b90bfe8,
0x000000071b90c000, 0x00000007c0000000)
Metaspace      used 3603K, capacity 4502K, committed 4864K, reserved 1056768K
class space    used 387K, capacity 390K, committed 512K, reserved 1048576K
```

结论：串行GC在堆空间越来越大的情况下，可以明显减少GC的次数，但是堆越大每次GC耗时越长

2. 并行GC在内存容量由大到小的GC日志

```
Java HotSpot(TM) 64-Bit Server VM (25.161-b12) for windows-amd64 JRE (1.8.0_161-b12), built on Dec 19 2017 17:52:25 by "java_re" with MS VC++ 10.0 (VS2010)
Memory: 4k page, physical 12459296k(3996112k free), swap 24916692k(14440612k free)
```

CommandLine flags:

```
-XX:InitialHeapSize=536870912(512M)
-XX:MaxHeapSize=536870912(512M)
-XX:+PrintGC
-XX:+PrintGCApplicationStoppedTime
-XX:+PrintGCDateStamps
-XX:+PrintGCDetails
-XX:+PrintGCTimeStamps
-XX:+UseCompressedClassPointers
-XX:+UseCompressedOops
-XX:-UseLargePagesIndividualAllocation
-XX:+UseParallelGC
```

```
2020-10-23T16:02:19.804+0800: 0.825: Total time for which application threads
were stopped: 0.0001158 seconds, Stopping threads took: 0.0000315 seconds
2020-10-23T16:02:19.921+0800: 0.942: [GC (Allocation Failure) [PSYoungGen:
131584K->21503K(153088K)] 131584K->42585K(502784K), 0.0165514 secs] [Times:
user=0.00 sys=0.05, real=0.02 secs]
2020-10-23T16:02:19.938+0800: 0.959: Total time for which application threads
were stopped: 0.0167831 seconds, Stopping threads took: 0.0000293 seconds
2020-10-23T16:02:19.965+0800: 0.986: [GC (Allocation Failure) [PSYoungGen:
152886K->21497K(153088K)] 173967K->83306K(502784K), 0.0212704 secs] [Times:
user=0.00 sys=0.06, real=0.02 secs]
2020-10-23T16:02:19.986+0800: 1.007: Total time for which application threads
were stopped: 0.0214860 seconds, Stopping threads took: 0.0000370 seconds
2020-10-23T16:02:20.011+0800: 1.032: [GC (Allocation Failure) [PSYoungGen:
153081K->21489K(153088K)] 214890K->126259K(502784K), 0.0224489 secs] [Times:
user=0.05 sys=0.03, real=0.02 secs]
2020-10-23T16:02:20.034+0800: 1.055: Total time for which application threads
were stopped: 0.0227007 seconds, Stopping threads took: 0.0000345 seconds
2020-10-23T16:02:20.059+0800: 1.080: [GC (Allocation Failure) [PSYoungGen:
153073K->21485K(153088K)] 257843K->166098K(502784K), 0.0191430 secs] [Times:
user=0.02 sys=0.05, real=0.02 secs]
2020-10-23T16:02:20.078+0800: 1.100: Total time for which application threads
were stopped: 0.0193317 seconds, Stopping threads took: 0.0000301 seconds
2020-10-23T16:02:20.105+0800: 1.126: [GC (Allocation Failure) [PSYoungGen:
153069K->21501K(153088K)] 297682K->210698K(502784K), 0.0252138 secs] [Times:
user=0.05 sys=0.00, real=0.03 secs]
2020-10-23T16:02:20.130+0800: 1.152: Total time for which application threads
were stopped: 0.0254294 seconds, Stopping threads took: 0.0000370 seconds
2020-10-23T16:02:20.153+0800: 1.174: [GC (Allocation Failure) [PSYoungGen:
153085K->21496K(80384K)] 342282K->253165K(430080K), 0.0237132 secs] [Times:
user=0.02 sys=0.02, real=0.02 secs]
2020-10-23T16:02:20.177+0800: 1.198: Total time for which application threads
were stopped: 0.0238792 seconds, Stopping threads took: 0.0000301 seconds
2020-10-23T16:02:20.189+0800: 1.210: [GC (Allocation Failure) [PSYoungGen:
80376K->32918K(116736K)] 312045K->271027K(466432K), 0.0092900 secs] [Times:
user=0.00 sys=0.00, real=0.01 secs]
2020-10-23T16:02:20.198+0800: 1.219: Total time for which application threads
were stopped: 0.0095279 seconds, Stopping threads took: 0.0000466 seconds
2020-10-23T16:02:20.210+0800: 1.231: [GC (Allocation Failure) [PSYoungGen:
91798K->49132K(116736K)] 329907K->291412K(466432K), 0.0099758 secs] [Times:
user=0.06 sys=0.00, real=0.01 secs]
```


2020-10-23T16:02:20.220+0800: 1.241: Total time for which application threads were stopped: 0.0101737 seconds, Stopping threads took: 0.0000301 seconds
2020-10-23T16:02:20.234+0800: 1.255: [GC (Allocation Failure) [PSYoungGen: 108012K->57251K(116736K)] 350292K->306385K(466432K), 0.0115630 secs] [Times: user=0.00 sys=0.00, real=0.01 secs]
2020-10-23T16:02:20.246+0800: 1.267: Total time for which application threads were stopped: 0.0117723 seconds, Stopping threads took: 0.0000334 seconds
2020-10-23T16:02:20.255+0800: 1.276: [GC (Allocation Failure) [PSYoungGen: 116003K->35982K(116736K)] 365137K->323896K(466432K), 0.0179058 secs] [Times: user=0.00 sys=0.05, real=0.02 secs]
2020-10-23T16:02:20.273+0800: 1.294: [Full GC (Ergonomics) [PSYoungGen: 35982K->0K(116736K)] [ParOldGen: 287913K->227936K(349696K)] 323896K->227936K(466432K), [Metaspace: 3606K->3606K(1056768K)], 0.0485135 secs] [Times: user=0.14 sys=0.02, real=0.05 secs]
2020-10-23T16:02:20.322+0800: 1.343: Total time for which application threads were stopped: 0.0667947 seconds, Stopping threads took: 0.0000293 seconds
2020-10-23T16:02:20.333+0800: 1.354: [GC (Allocation Failure) [PSYoungGen: 58844K->22755K(116736K)] 286780K->250691K(466432K), 0.0047256 secs] [Times: user=0.00 sys=0.00, real=0.01 secs]
2020-10-23T16:02:20.338+0800: 1.359: Total time for which application threads were stopped: 0.0048924 seconds, Stopping threads took: 0.0000286 seconds
2020-10-23T16:02:20.349+0800: 1.370: [GC (Allocation Failure) [PSYoungGen: 81635K->19861K(116736K)] 309571K->269328K(466432K), 0.0079238 secs] [Times: user=0.05 sys=0.00, real=0.01 secs]
2020-10-23T16:02:20.357+0800: 1.378: Total time for which application threads were stopped: 0.0081430 seconds, Stopping threads took: 0.0000341 seconds
2020-10-23T16:02:20.369+0800: 1.390: [GC (Allocation Failure) [PSYoungGen: 78578K->20317K(116736K)] 328046K->288203K(466432K), 0.0078457 secs] [Times: user=0.05 sys=0.00, real=0.01 secs]
2020-10-23T16:02:20.377+0800: 1.398: Total time for which application threads were stopped: 0.0080437 seconds, Stopping threads took: 0.0000293 seconds
2020-10-23T16:02:20.387+0800: 1.409: [GC (Allocation Failure) [PSYoungGen: 79007K->21104K(116736K)] 346892K->308111K(466432K), 0.0071746 secs] [Times: user=0.00 sys=0.00, real=0.01 secs]
2020-10-23T16:02:20.395+0800: 1.416: Total time for which application threads were stopped: 0.0073864 seconds, Stopping threads took: 0.0000433 seconds
2020-10-23T16:02:20.407+0800: 1.429: [GC (Allocation Failure) [PSYoungGen: 79984K->17577K(116736K)] 366991K->323492K(466432K), 0.0090033 secs] [Times: user=0.02 sys=0.00, real=0.01 secs]
2020-10-23T16:02:20.417+0800: 1.438: [Full GC (Ergonomics) [PSYoungGen: 17577K->0K(116736K)] [ParOldGen: 305914K->265556K(349696K)] 323492K->265556K(466432K), [Metaspace: 3606K->3606K(1056768K)], 0.0485150 secs] [Times: user=0.17 sys=0.00, real=0.05 secs]
2020-10-23T16:02:20.465+0800: 1.487: Total time for which application threads were stopped: 0.0579281 seconds, Stopping threads took: 0.0000363 seconds
2020-10-23T16:02:20.478+0800: 1.499: [GC (Allocation Failure) [PSYoungGen: 58771K->23050K(116736K)] 324328K->288606K(466432K), 0.0049518 secs] [Times: user=0.06 sys=0.00, real=0.01 secs]
2020-10-23T16:02:20.483+0800: 1.505: Total time for which application threads were stopped: 0.0051776 seconds, Stopping threads took: 0.0000414 seconds
2020-10-23T16:02:20.494+0800: 1.516: [GC (Allocation Failure) [PSYoungGen: 81930K->22422K(116736K)] 347486K->309605K(466432K), 0.0087926 secs] [Times: user=0.05 sys=0.00, real=0.01 secs]
2020-10-23T16:02:20.503+0800: 1.524: Total time for which application threads were stopped: 0.0090121 seconds, Stopping threads took: 0.0000330 seconds
2020-10-23T16:02:20.514+0800: 1.535: [GC (Allocation Failure) [PSYoungGen: 81302K->17015K(116736K)] 368485K->325863K(466432K), 0.0083509 secs] [Times: user=0.00 sys=0.00, real=0.01 secs]
2020-10-23T16:02:20.522+0800: 1.543: [Full GC (Ergonomics) [PSYoungGen: 17015K->0K(116736K)] [ParOldGen: 308848K->276897K(349696K)] 325863K->276897K(466432K), [Metaspace: 3606K->3606K(1056768K)], 0.0508895 secs] [Times: user=0.14 sys=0.00, real=0.05 secs]
2020-10-23T16:02:20.573+0800: 1.594: Total time for which application threads were stopped: 0.0595512 seconds, Stopping threads took: 0.0000304 seconds
2020-10-23T16:02:20.583+0800: 1.604: [GC (Allocation Failure) [PSYoungGen: 58447K->23132K(116736K)] 335344K->300029K(466432K), 0.0052634 secs] [Times: user=0.00 sys=0.00, real=0.01 secs]
2020-10-23T16:02:20.588+0800: 1.609: Total time for which application threads were stopped: 0.0054364 seconds, Stopping threads took: 0.0000304 seconds

```

2020-10-23T16:02:20.601+0800: 1.622: [GC (Allocation Failure) [PSYoungGen:
82012K->18059K(116736K)] 358909K->316546K(466432K), 0.0078850 secs] [Times:
user=0.05 sys=0.00, real=0.01 secs]
2020-10-23T16:02:20.609+0800: 1.630: Total time for which application threads
were stopped: 0.0081155 seconds, Stopping threads took: 0.0000510 seconds
2020-10-23T16:02:20.623+0800: 1.644: [GC (Allocation Failure) [PSYoungGen:
76939K->18256K(116736K)] 375426K->333215K(466432K), 0.0152754 secs] [Times:
user=0.03 sys=0.00, real=0.02 secs]
2020-10-23T16:02:20.638+0800: 1.660: [Full GC (Ergonomics) [PSYoungGen: 18256K-
>0K(116736K)] [ParOldGen: 314958K->286950K(349696K)] 333215K->286950K(466432K),
[Metaspace: 3606K->3606K(1056768K)], 0.0729792 secs] [Times: user=0.19 sys=0.00,
real=0.07 secs]
2020-10-23T16:02:20.711+0800: 1.733: Total time for which application threads
were stopped: 0.0885813 seconds, Stopping threads took: 0.0000345 seconds
2020-10-23T16:02:20.724+0800: 1.745: [GC (Allocation Failure) [PSYoungGen:
58880K->21214K(116736K)] 345830K->308164K(466432K), 0.0044892 secs] [Times:
user=0.00 sys=0.00, real=0.00 secs]
2020-10-23T16:02:20.728+0800: 1.750: Total time for which application threads
were stopped: 0.0046508 seconds, Stopping threads took: 0.0000301 seconds
2020-10-23T16:02:20.740+0800: 1.761: [GC (Allocation Failure) [PSYoungGen:
80019K->21752K(116736K)] 366969K->328841K(466432K), 0.0148766 secs] [Times:
user=0.02 sys=0.00, real=0.02 secs]
2020-10-23T16:02:20.755+0800: 1.776: Total time for which application threads
were stopped: 0.0150702 seconds, Stopping threads took: 0.0000286 seconds
2020-10-23T16:02:20.768+0800: 1.789: [GC (Allocation Failure) [PSYoungGen:
80632K->22734K(116736K)] 387721K->350547K(466432K), 0.0106250 secs] [Times:
user=0.02 sys=0.03, real=0.01 secs]
2020-10-23T16:02:20.779+0800: 1.800: [Full GC (Ergonomics) [PSYoungGen: 22734K-
>0K(116736K)] [ParOldGen: 327813K->302962K(349696K)] 350547K->302962K(466432K),
[Metaspace: 3606K->3606K(1056768K)], 0.0577265 secs] [Times: user=0.13 sys=0.00,
real=0.06 secs]
2020-10-23T16:02:20.836+0800: 1.858: Total time for which application threads
were stopped: 0.0686733 seconds, Stopping threads took: 0.0000330 seconds

```

Heap

```

PSYoungGen      total 116736K, used 3076K [0x00000000f5580000,
0x0000000100000000, 0x0000000100000000)
  eden space 58880K, 5% used
    [0x00000000f5580000,0x00000000f5881100,0x00000000f8f00000)
  from space 57856K, 0% used
    [0x00000000fc780000,0x00000000fc780000,0x0000000100000000)
  to   space 57856K, 0% used
    [0x00000000f8f00000,0x00000000f8f00000,0x00000000fc780000)
ParOldGen       total 349696K, used 302962K [0x00000000e0000000,
0x00000000f5580000, 0x00000000f5580000)
  object space 349696K, 86% used
    [0x00000000e0000000,0x00000000f27dcb10,0x00000000f5580000)
Metaspace       used 3612K, capacity 4502K, committed 4864K, reserved 1056768K
  class space   used 387K, capacity 390K, committed 512K, reserved 1048576K

```

Java HotSpot(TM) 64-Bit Server VM (25.161-b12) for windows-amd64 JRE (1.8.0_161-b12), built on Dec 19 2017 17:52:25 by "java_re" with MS VC++ 10.0 (VS2010)
Memory: 4k page, physical 12459296k(3924828k free), swap 24916692k(14139124k free)

CommandLine flags:

```

-XX:InitialHeapSize=1073741824(1g)
-XX:MaxHeapSize=1073741824(1g)
-XX:+PrintGC
-XX:+PrintGCApplicationStoppedTime
-XX:+PrintGCDateStamps
-XX:+PrintGCDetails
-XX:+PrintGCTimeStamps
-XX:+UseCompressedClassPointers
-XX:+UseCompressedOops
-XX:-UseLargePagesIndividualAllocation
-XX:+UseParallelGC

```

2020-10-23T16:05:59.864+0800: 0.905: Total time for which application threads were stopped: 0.0003820 seconds, Stopping threads took: 0.0002445 seconds
 2020-10-23T16:06:00.072+0800: 1.113: [GC (Allocation Failure) [PSYoungGen: 262144K->43516K(305664K)] 262144K->87610K(1005056K), 0.0470953 secs] [Times: user=0.03 sys=0.11, real=0.05 secs]
 2020-10-23T16:06:00.120+0800: 1.160: Total time for which application threads were stopped: 0.0473526 seconds, Stopping threads took: 0.0000308 seconds
 2020-10-23T16:06:00.170+0800: 1.211: [GC (Allocation Failure) [PSYoungGen: 305660K->43515K(305664K)] 349754K->162847K(1005056K), 0.0500967 secs] [Times: user=0.03 sys=0.14, real=0.05 secs]
 2020-10-23T16:06:00.220+0800: 1.261: Total time for which application threads were stopped: 0.0502748 seconds, Stopping threads took: 0.0000264 seconds
 2020-10-23T16:06:00.267+0800: 1.308: [GC (Allocation Failure) [PSYoungGen: 305124K->43504K(305664K)] 424455K->234434K(1005056K), 0.0385007 secs] [Times: user=0.06 sys=0.08, real=0.04 secs]
 2020-10-23T16:06:00.306+0800: 1.346: Total time for which application threads were stopped: 0.0387148 seconds, Stopping threads took: 0.0000389 seconds
 2020-10-23T16:06:00.354+0800: 1.395: [GC (Allocation Failure) [PSYoungGen: 305648K->43518K(305664K)] 496578K->302616K(1005056K), 0.0322986 secs] [Times: user=0.05 sys=0.06, real=0.03 secs]
 2020-10-23T16:06:00.387+0800: 1.427: Total time for which application threads were stopped: 0.0324889 seconds, Stopping threads took: 0.0000356 seconds
 2020-10-23T16:06:00.435+0800: 1.475: [GC (Allocation Failure) [PSYoungGen: 305662K->43515K(305664K)] 564760K->383756K(1005056K), 0.0686183 secs] [Times: user=0.06 sys=0.06, real=0.07 secs]
 2020-10-23T16:06:00.503+0800: 1.544: Total time for which application threads were stopped: 0.0688826 seconds, Stopping threads took: 0.0000436 seconds
 2020-10-23T16:06:00.557+0800: 1.598: [GC (Allocation Failure) [PSYoungGen: 305659K->43505K(160256K)] 645900K->453824K(859648K), 0.0614588 secs] [Times: user=0.11 sys=0.03, real=0.06 secs]
 2020-10-23T16:06:00.618+0800: 1.659: Total time for which application threads were stopped: 0.0616564 seconds, Stopping threads took: 0.0000433 seconds
 2020-10-23T16:06:00.639+0800: 1.680: [GC (Allocation Failure) [PSYoungGen: 160130K->66190K(232960K)] 570448K->484582K(932352K), 0.0174213 secs] [Times: user=0.05 sys=0.00, real=0.02 secs]
 2020-10-23T16:06:00.657+0800: 1.698: Total time for which application threads were stopped: 0.0176434 seconds, Stopping threads took: 0.0000319 seconds
 2020-10-23T16:06:00.677+0800: 1.717: [GC (Allocation Failure) [PSYoungGen: 182926K->91449K(232960K)] 601318K->520184K(932352K), 0.0208079 secs] [Times: user=0.06 sys=0.00, real=0.02 secs]
 2020-10-23T16:06:00.698+0800: 1.738: Total time for which application threads were stopped: 0.0210872 seconds, Stopping threads took: 0.0000381 seconds
 2020-10-23T16:06:00.723+0800: 1.763: [GC (Allocation Failure) [PSYoungGen: 208106K->104447K(232960K)] 636840K->549932K(932352K), 0.0385685 secs] [Times: user=0.06 sys=0.02, real=0.04 secs]
 2020-10-23T16:06:00.761+0800: 1.802: Total time for which application threads were stopped: 0.0388182 seconds, Stopping threads took: 0.0000301 seconds
 2020-10-23T16:06:00.784+0800: 1.825: [GC (Allocation Failure) [PSYoungGen: 221183K->72401K(232960K)] 666668K->579042K(932352K), 0.0504566 secs] [Times: user=0.02 sys=0.06, real=0.05 secs]
 2020-10-23T16:06:00.835+0800: 1.876: Total time for which application threads were stopped: 0.0506751 seconds, Stopping threads took: 0.0000367 seconds
 2020-10-23T16:06:00.857+0800: 1.898: [GC (Allocation Failure) [PSYoungGen: 189101K->37936K(232960K)] 695742K->610467K(932352K), 0.0435280 secs] [Times: user=0.05 sys=0.08, real=0.04 secs]
 2020-10-23T16:06:00.900+0800: 1.941: Total time for which application threads were stopped: 0.0437461 seconds, Stopping threads took: 0.0000528 seconds

Heap

PSYoungGen total 232960K, used 42884K [0x00000000eab00000, 0x0000000100000000, 0x0000000100000000)
 eden space 116736K, 4% used
 [0x00000000eab00000, 0x00000000eafd4ee8, 0x00000000f1d00000)
 from space 116224K, 32% used
 [0x00000000f1d00000, 0x00000000f420c318, 0x00000000f8e80000)
 to space 116224K, 0% used
 [0x00000000f8e80000, 0x00000000f8e80000, 0x0000000100000000)
 ParOldGen total 699392K, used 572530K [0x00000000c0000000, 0x00000000eab00000, 0x00000000eab00000)


```
object space 699392K, 81% used
[0x00000000c0000000,0x00000000e2f1c978,0x00000000eab00000)
Metaspace      used 3613K, capacity 4502K, committed 4864K, reserved 1056768K
class space    used 387K, capacity 390K, committed 512K, reserved 1048576K
```

Java HotSpot(TM) 64-Bit Server VM (25.161-b12) for windows-amd64 JRE (1.8.0_161-b12), built on Dec 19 2017 17:52:25 by "java_re" with MS VC++ 10.0 (VS2010)
Memory: 4k page, physical 12459296k(3899380k free), swap 24916692k(14118516k free)

CommandLine flags:

```
-XX:InitialHeapSize=2147483648(2G)
-XX:MaxHeapSize=2147483648(2G)
-XX:+PrintGC
-XX:+PrintGCApplicationStoppedTime
-XX:+PrintGCDateStamps
-XX:+PrintGCDetails
-XX:+PrintGCTimeStamps
-XX:+UseCompressedClassPointers
-XX:+UseCompressedOops
-XX:-UseLargePagesIndividualAllocation
-XX:+UseParallelGC
```

```
2020-10-23T16:08:24.703+0800: 1.066: Total time for which application threads
were stopped: 0.0001085 seconds, Stopping threads took: 0.0000315 seconds
2020-10-23T16:08:25.053+0800: 1.417: [GC (Allocation Failure) [PSYoungGen:
524800K->87037K(611840K)] 524800K->147495K(2010112K), 0.0839898 secs] [Times:
user=0.08 sys=0.22, real=0.08 secs]
2020-10-23T16:08:25.137+0800: 1.501: Total time for which application threads
were stopped: 0.0842310 seconds, Stopping threads took: 0.0000334 seconds
2020-10-23T16:08:25.265+0800: 1.628: [GC (Allocation Failure) [PSYoungGen:
611837K->87033K(611840K)] 672295K->261961K(2010112K), 0.1315844 secs] [Times:
user=0.06 sys=0.33, real=0.13 secs]
2020-10-23T16:08:25.396+0800: 1.760: Total time for which application threads
were stopped: 0.1317662 seconds, Stopping threads took: 0.0000389 seconds
2020-10-23T16:08:25.508+0800: 1.872: [GC (Allocation Failure) [PSYoungGen:
611833K->87038K(611840K)] 786761K->373063K(2010112K), 0.0719023 secs] [Times:
user=0.08 sys=0.06, real=0.07 secs]
2020-10-23T16:08:25.580+0800: 1.944: Total time for which application threads
were stopped: 0.0721035 seconds, Stopping threads took: 0.0000378 seconds
2020-10-23T16:08:25.675+0800: 2.039: [GC (Allocation Failure) [PSYoungGen:
611838K->87037K(611840K)] 897863K->479766K(2010112K), 0.0638516 secs] [Times:
user=0.08 sys=0.13, real=0.06 secs]
2020-10-23T16:08:25.739+0800: 2.103: Total time for which application threads
were stopped: 0.0640474 seconds, Stopping threads took: 0.0000323 seconds
```

Heap

```
PSYoungGen      total 611840K, used 108149K [0x00000000d5580000,
0x00000000100000000, 0x00000000100000000)
  eden space 524800K, 4% used
  [0x00000000d5580000,0x00000000d6a1dc98,0x00000000f5600000)
  from space 87040K, 99% used
  [0x00000000fab00000,0x00000000ffffff70,0x00000000100000000)
  to   space 87040K, 0% used
  [0x00000000f5600000,0x00000000f5600000,0x00000000fab00000)
ParOldGen       total 1398272K, used 392728K [0x0000000080000000,
0x00000000d5580000, 0x00000000d5580000)
  object space 1398272K, 28% used
  [0x0000000080000000,0x0000000097f863d8,0x00000000d5580000)
Metaspace       used 3613K, capacity 4502K, committed 4864K, reserved 1056768K
class space     used 387K, capacity 390K, committed 512K, reserved 1048576K
```

Java HotSpot(TM) 64-Bit Server VM (25.161-b12) for windows-amd64 JRE (1.8.0_161-b12), built on Dec 19 2017 17:52:25 by "java_re" with MS VC++ 10.0 (VS2010)
Memory: 4k page, physical 12459296k(3894588k free), swap 24916692k(14122764k free)

```

CommandLine flags:
-XX:InitialHeapSize=4294967296(4g)
-XX:MaxHeapSize=4294967296(4g)
-XX:+PrintGC
-XX:+PrintGCApplicationStoppedTime
-XX:+PrintGCDateStamps
-XX:+PrintGCDetails
-XX:+PrintGCTimeStamps
-XX:+UseCompressedClassPointers
-XX:+UseCompressedOops
-XX:-UseLargePagesIndividualAllocation
-XX:+UseParallelGC
2020-10-23T16:10:10.381+0800: 0.814: Total time for which application threads
were stopped: 0.0005095 seconds, Stopping threads took: 0.0004347 seconds
2020-10-23T16:10:11.080+0800: 1.512: [GC (Allocation Failure) [PSYoungGen:
1048576K->174583K(1223168K)] 1048576K->236034K(4019712K), 0.1590569 secs] [Times:
user=0.03 sys=0.42, real=0.16 secs]
2020-10-23T16:10:11.239+0800: 1.672: Total time for which application threads
were stopped: 0.1593014 seconds, Stopping threads took: 0.0000367 seconds

Heap
PSYoungGen      total 1223168K, used 905873K [0x000000076ab00000,
0x00000007c0000000, 0x00000007c0000000)
  eden space 1048576K, 69% used
[0x000000076ab00000,0x00000007975267a0,0x00000007aab00000)
  from space 174592K, 99% used
[0x00000007aab00000,0x00000007b557df88,0x00000007b5580000)
  to   space 174592K, 0% used
[0x00000007b5580000,0x00000007b5580000,0x00000007c0000000)
ParOldGen       total 2796544K, used 61450K [0x00000006c0000000,
0x000000076ab00000, 0x000000076ab00000)
  object space 2796544K, 2% used
[0x00000006c0000000,0x00000006c3c02998,0x000000076ab00000)
Metaspace       used 3613K, capacity 4502K, committed 4864K, reserved 1056768K
class space     used 387K, capacity 390K, committed 512K, reserved 1048576K

```

结论：并行GC在堆空间越来越大的情况下，可以明显减少GC的次数，但是堆越大每次GC耗时越长，但是同比串行GC在相同堆大小的情况下，GC暂停时间有明显的减少。

3.CMS在内存容量由大到小的GC日志

```

Java HotSpot(TM) 64-Bit Server VM (25.161-b12) for windows-amd64 JRE (1.8.0_161-b12), built on Dec 19 2017 17:52:25 by "java_re" with MS VC++ 10.0 (VS2010)
Memory: 4k page, physical 12459296k(3885408k free), swap 24916692k(14148924k free)
CommandLine flags:
-XX:InitialHeapSize=536870912(512m)
-XX:MaxHeapSize=536870912(512m)
-XX:MaxNewSize=178958336
-XX:MaxTenuringThreshold=6
-XX:NewSize=178958336
-XX:OldPLABSize=16
-XX:OldSize=357912576
-XX:+PrintGC
-XX:+PrintGCApplicationStoppedTime
-XX:+PrintGCDateStamps
-XX:+PrintGCDetails
-XX:+PrintGCTimeStamps
-XX:+UseCompressedClassPointers
-XX:+UseCompressedOops
-XX:+UseConcMarkSweepGC
-XX:-UseLargePagesIndividualAllocation
-XX:+UseParNewGC

```

2020-10-23T16:13:32.571+0800: 0.822: Total time for which application threads were stopped: 0.0001257 seconds, Stopping threads took: 0.0000352 seconds
2020-10-23T16:13:32.691+0800: 0.942: [GC (Allocation Failure) 2020-10-23T16:13:32.691+0800: 0.942: [ParNew: 139776K->17471K(157248K), 0.0164851 secs] 139776K->39910K(506816K), 0.0166944 secs] [Times: user=0.00 sys=0.06, real=0.02 secs]
2020-10-23T16:13:32.708+0800: 0.958: Total time for which application threads were stopped: 0.0168824 seconds, Stopping threads took: 0.0000308 seconds
2020-10-23T16:13:32.739+0800: 0.989: [GC (Allocation Failure) 2020-10-23T16:13:32.739+0800: 0.989: [ParNew: 157247K->17472K(157248K), 0.0247916 secs] 179686K->79829K(506816K), 0.0249034 secs] [Times: user=0.01 sys=0.05, real=0.02 secs]
2020-10-23T16:13:32.764+0800: 1.014: Total time for which application threads were stopped: 0.0250672 seconds, Stopping threads took: 0.0000293 seconds
2020-10-23T16:13:32.802+0800: 1.052: [GC (Allocation Failure) 2020-10-23T16:13:32.802+0800: 1.052: [ParNew: 157248K->17472K(157248K), 0.0274377 secs] 219605K->123150K(506816K), 0.0275701 secs] [Times: user=0.06 sys=0.05, real=0.03 secs]
2020-10-23T16:13:32.829+0800: 1.080: Total time for which application threads were stopped: 0.0277343 seconds, Stopping threads took: 0.0000356 seconds
2020-10-23T16:13:32.853+0800: 1.103: [GC (Allocation Failure) 2020-10-23T16:13:32.853+0800: 1.103: [ParNew: 157248K->17472K(157248K), 0.0311949 secs] 262926K->173387K(506816K), 0.0313093 secs] [Times: user=0.06 sys=0.02, real=0.03 secs]
2020-10-23T16:13:32.884+0800: 1.135: Total time for which application threads were stopped: 0.0314629 seconds, Stopping threads took: 0.0000337 seconds
2020-10-23T16:13:32.910+0800: 1.161: [GC (Allocation Failure) 2020-10-23T16:13:32.910+0800: 1.161: [ParNew: 157131K->17472K(157248K), 0.0289366 secs] 313046K->220740K(506816K), 0.0290429 secs] [Times: user=0.11 sys=0.02, real=0.03 secs]
2020-10-23T16:13:32.939+0800: 1.190: Total time for which application threads were stopped: 0.0292082 seconds, Stopping threads took: 0.0000315 seconds
----- 一次CMS的全过程
2020-10-23T16:13:32.942+0800: 1.193: [GC (CMS Initial Mark) [1 CMS-initial-mark: 203268K(349568K)] 239585K(506816K), 0.0002471 secs] [Times: user=0.00 sys=0.00, real=0.00 secs] 初始标记, 存在STW
2020-10-23T16:13:32.943+0800: 1.193: Total time for which application threads were stopped: 0.0003871 seconds, Stopping threads took: 0.0000568 seconds
2020-10-23T16:13:32.943+0800: 1.193: [CMS-concurrent-mark-start]
2020-10-23T16:13:32.950+0800: 1.200: [CMS-concurrent-mark: 0.007/0.007 secs] [Times: user=0.00 sys=0.00, real=0.01 secs] 并发标记, 不存在STW
2020-10-23T16:13:32.950+0800: 1.200: [CMS-concurrent-preclean-start]
2020-10-23T16:13:32.951+0800: 1.201: [CMS-concurrent-preclean: 0.001/0.001 secs] [Times: user=0.00 sys=0.00, real=0.00 secs] 并发预清理, 不存在STW
2020-10-23T16:13:32.951+0800: 1.201: [CMS-concurrent-abortable-preclean-start]
2020-10-23T16:13:32.969+0800: 1.219: [GC (Allocation Failure) 2020-10-23T16:13:32.969+0800: 1.219: [ParNew: 156831K->17472K(157248K), 0.0266867 secs] 360100K->264461K(506816K), 0.0268062 secs] [Times: user=0.03 sys=0.02, real=0.03 secs]
2020-10-23T16:13:32.996+0800: 1.246: Total time for which application threads were stopped: 0.0269832 seconds, Stopping threads took: 0.0000374 seconds
2020-10-23T16:13:33.028+0800: 1.279: [GC (Allocation Failure) 2020-10-23T16:13:33.028+0800: 1.279: [ParNew: 157248K->17472K(157248K), 0.0277882 secs] 404237K->306533K(506816K), 0.0279986 secs] [Times: user=0.08 sys=0.01, real=0.03 secs]
2020-10-23T16:13:33.056+0800: 1.307: Total time for which application threads were stopped: 0.0281866 seconds, Stopping threads took: 0.0000381 seconds
2020-10-23T16:13:33.084+0800: 1.335: [GC (Allocation Failure) 2020-10-23T16:13:33.085+0800: 1.335: [ParNew: 157248K->17472K(157248K), 0.0335955 secs] 446309K->347583K(506816K), 0.0337161 secs] [Times: user=0.08 sys=0.02, real=0.03 secs]
2020-10-23T16:13:33.118+0800: 1.369: Total time for which application threads were stopped: 0.0338869 seconds, Stopping threads took: 0.0000370 seconds
2020-10-23T16:13:33.119+0800: 1.370: [CMS-concurrent-abortable-preclean: 0.005/0.169 secs] [Times: user=0.28 sys=0.05, real=0.17 secs]
2020-10-23T16:13:33.119+0800: 1.370: [GC (CMS Final Remark) [YG occupancy: 24529 K (157248 K)] 2020-10-23T16:13:33.119+0800: 1.370: [Rescan (parallel) , 0.0004835 secs] 2020-10-23T16:13:33.120+0800: 1.370: [weak refs processing, 0.0000260 secs] 2020-10-23T16:13:33.120+0800: 1.371: [class unloading, 0.0004553 secs] 2020-10-23T16:13:33.121+0800: 1.371: [scrub symbol table, 0.0006899 secs] 2020-10-

23T16:13:33.121+0800: 1.372: [scrub string table, 0.0001844 secs][1 CMS-remark: 330111K(349568K)] 354641K(506816K), 0.0020117 secs] [Times: user=0.00 sys=0.00, real=0.00 secs] 最终标记 存在STW
2020-10-23T16:13:33.122+0800: 1.372: Total time for which application threads were stopped: 0.0021260 seconds, Stopping threads took: 0.0000341 seconds
2020-10-23T16:13:33.122+0800: 1.372: [CMS-concurrent-sweep-start]
2020-10-23T16:13:33.123+0800: 1.374: [CMS-concurrent-sweep: 0.002/0.002 secs] [Times: user=0.00 sys=0.00, real=0.00 secs] 并发清除, 不存在STW
2020-10-23T16:13:33.123+0800: 1.374: [CMS-concurrent-reset-start]
2020-10-23T16:13:33.124+0800: 1.375: [CMS-concurrent-reset: 0.001/0.001 secs] [Times: user=0.00 sys=0.00, real=0.00 secs] 并发充值, 不存在STW
----- 一次CMS的全过程
2020-10-23T16:13:33.146+0800: 1.396: [GC (Allocation Failure) 2020-10-23T16:13:33.146+0800: 1.396: [ParNew: 157248K->17472K(157248K), 0.0124423 secs] 442141K->345187K(506816K), 0.0125717 secs] [Times: user=0.03 sys=0.00, real=0.01 secs]
2020-10-23T16:13:33.158+0800: 1.409: Total time for which application threads were stopped: 0.0127605 seconds, Stopping threads took: 0.0000352 seconds
2020-10-23T16:13:33.158+0800: 1.409: [GC (CMS Initial Mark) [1 CMS-initial-mark: 327715K(349568K)] 348009K(506816K), 0.0001693 secs] [Times: user=0.00 sys=0.00, real=0.00 secs]
2020-10-23T16:13:33.159+0800: 1.409: Total time for which application threads were stopped: 0.0002705 seconds, Stopping threads took: 0.0000367 seconds
2020-10-23T16:13:33.159+0800: 1.409: [CMS-concurrent-mark-start]
2020-10-23T16:13:33.164+0800: 1.414: [CMS-concurrent-mark: 0.005/0.005 secs] [Times: user=0.00 sys=0.00, real=0.01 secs]
2020-10-23T16:13:33.164+0800: 1.415: [CMS-concurrent-preclean-start]
2020-10-23T16:13:33.165+0800: 1.415: [CMS-concurrent-preclean: 0.001/0.001 secs] [Times: user=0.00 sys=0.00, real=0.00 secs]
2020-10-23T16:13:33.165+0800: 1.415: [CMS-concurrent-abortable-preclean-start]
2020-10-23T16:13:33.165+0800: 1.415: [CMS-concurrent-abortable-preclean: 0.000/0.000 secs] [Times: user=0.00 sys=0.00, real=0.00 secs]
2020-10-23T16:13:33.165+0800: 1.415: [GC (CMS Final Remark) [YG occupancy: 51622 K (157248 K)]2020-10-23T16:13:33.165+0800: 1.415: [Rescan (parallel) , 0.0004630 secs]2020-10-23T16:13:33.165+0800: 1.416: [weak refs processing, 0.0000205 secs]2020-10-23T16:13:33.165+0800: 1.416: [class unloading, 0.0004883 secs]2020-10-23T16:13:33.166+0800: 1.416: [scrub symbol table, 0.0008456 secs]2020-10-23T16:13:33.167+0800: 1.417: [scrub string table, 0.0001459 secs][1 CMS-remark: 327715K(349568K)] 379338K(506816K), 0.0020839 secs] [Times: user=0.00 sys=0.00, real=0.00 secs]
2020-10-23T16:13:33.167+0800: 1.417: Total time for which application threads were stopped: 0.0021938 seconds, Stopping threads took: 0.0000564 seconds
2020-10-23T16:13:33.167+0800: 1.417: [CMS-concurrent-sweep-start]
2020-10-23T16:13:33.168+0800: 1.419: [CMS-concurrent-sweep: 0.001/0.001 secs] [Times: user=0.00 sys=0.00, real=0.00 secs]
2020-10-23T16:13:33.168+0800: 1.419: [CMS-concurrent-reset-start]
2020-10-23T16:13:33.169+0800: 1.419: [CMS-concurrent-reset: 0.000/0.000 secs] [Times: user=0.00 sys=0.00, real=0.00 secs]
2020-10-23T16:13:33.188+0800: 1.439: [GC (Allocation Failure) 2020-10-23T16:13:33.188+0800: 1.439: [ParNew: 157248K->17472K(157248K), 0.0136157 secs] 392851K->299051K(506816K), 0.0137070 secs] [Times: user=0.00 sys=0.00, real=0.01 secs]
2020-10-23T16:13:33.202+0800: 1.453: Total time for which application threads were stopped: 0.0138613 seconds, Stopping threads took: 0.0000334 seconds
2020-10-23T16:13:33.202+0800: 1.453: [GC (CMS Initial Mark) [1 CMS-initial-mark: 281579K(349568K)] 299195K(506816K), 0.0001378 secs] [Times: user=0.00 sys=0.00, real=0.00 secs]
2020-10-23T16:13:33.202+0800: 1.453: Total time for which application threads were stopped: 0.0002452 seconds, Stopping threads took: 0.0000491 seconds

2020-10-23T16:13:33.202+0800: 1.453: [CMS-concurrent-mark-start]
2020-10-23T16:13:33.207+0800: 1.457: [CMS-concurrent-mark: 0.004/0.004 secs] [Times: user=0.03 sys=0.00, real=0.01 secs]
2020-10-23T16:13:33.207+0800: 1.457: [CMS-concurrent-preclean-start]
2020-10-23T16:13:33.207+0800: 1.458: [CMS-concurrent-preclean: 0.000/0.000 secs] [Times: user=0.00 sys=0.00, real=0.00 secs]
2020-10-23T16:13:33.207+0800: 1.458: [CMS-concurrent-abortable-preclean-start]
2020-10-23T16:13:33.229+0800: 1.480: [GC (Allocation Failure) 2020-10-23T16:13:33.229+0800: 1.480: [ParNew: 157248K->17472K(157248K), 0.0178340 secs]

438827K->348933K(506816K), 0.0179385 secs] [Times: user=0.02 sys=0.00, real=0.02 secs]
2020-10-23T16:13:33.247+0800: 1.498: Total time for which application threads were stopped: 0.0181122 seconds, Stopping threads took: 0.0000400 seconds
2020-10-23T16:13:33.279+0800: 1.529: [GC (Allocation Failure) 2020-10-23T16:13:33.279+0800: 1.529: [ParNew: 157248K->157248K(157248K), 0.0000290 secs]2020-10-23T16:13:33.279+0800: 1.529: [CMS2020-10-23T16:13:33.279+0800: 1.530: [CMS-concurrent-abortable-preclean: 0.002/0.072 secs] [Times: user=0.06 sys=0.00, real=0.07 secs]
(concurrent mode failure): 331461K->300166K(349568K), 0.0750312 secs] 488709K->300166K(506816K), [Metaspace: 3606K->3606K(1056768K)], 0.0751947 secs] [Times: user=0.08 sys=0.00, real=0.08 secs]
2020-10-23T16:13:33.354+0800: 1.605: Total time for which application threads were stopped: 0.0754088 seconds, Stopping threads took: 0.0000792 seconds
2020-10-23T16:13:33.382+0800: 1.633: [GC (Allocation Failure) 2020-10-23T16:13:33.382+0800: 1.633: [ParNew: 139554K->17472K(157248K), 0.0111132 secs] 439721K->349958K(506816K), 0.0112089 secs] [Times: user=0.03 sys=0.00, real=0.01 secs]
2020-10-23T16:13:33.393+0800: 1.644: Total time for which application threads were stopped: 0.0113603 seconds, Stopping threads took: 0.0000385 seconds
2020-10-23T16:13:33.393+0800: 1.644: [GC (CMS Initial Mark) [1 CMS-initial-mark: 332486K(349568K)] 350461K(506816K), 0.0002401 secs] [Times: user=0.00 sys=0.00, real=0.00 secs]
2020-10-23T16:13:33.394+0800: 1.644: Total time for which application threads were stopped: 0.0003394 seconds, Stopping threads took: 0.0000370 seconds
2020-10-23T16:13:33.394+0800: 1.644: [CMS-concurrent-mark-start]
2020-10-23T16:13:33.399+0800: 1.650: [CMS-concurrent-mark: 0.005/0.005 secs] [Times: user=0.00 sys=0.00, real=0.00 secs]
2020-10-23T16:13:33.399+0800: 1.650: [CMS-concurrent-preclean-start]
2020-10-23T16:13:33.400+0800: 1.650: [CMS-concurrent-preclean: 0.001/0.001 secs] [Times: user=0.00 sys=0.00, real=0.00 secs]
2020-10-23T16:13:33.400+0800: 1.651: [CMS-concurrent-abortable-preclean-start]
2020-10-23T16:13:33.400+0800: 1.651: [CMS-concurrent-abortable-preclean: 0.000/0.000 secs] [Times: user=0.00 sys=0.00, real=0.00 secs]
2020-10-23T16:13:33.401+0800: 1.651: [GC (CMS Final Remark) [YG occupancy: 47961 K (157248 K)]2020-10-23T16:13:33.401+0800: 1.651: [Rescan (parallel) , 0.0004989 secs]2020-10-23T16:13:33.401+0800: 1.652: [weak refs processing, 0.0000143 secs]2020-10-23T16:13:33.401+0800: 1.652: [class unloading, 0.0003647 secs]2020-10-23T16:13:33.402+0800: 1.652: [scrub symbol table, 0.0004780 secs]2020-10-23T16:13:33.402+0800: 1.653: [scrub string table, 0.0001151 secs][1 CMS-remark: 332486K(349568K)] 380447K(506816K), 0.0016092 secs] [Times: user=0.00 sys=0.00, real=0.00 secs]
2020-10-23T16:13:33.402+0800: 1.653: Total time for which application threads were stopped: 0.0017100 seconds, Stopping threads took: 0.0000359 seconds
2020-10-23T16:13:33.403+0800: 1.653: [CMS-concurrent-sweep-start]
2020-10-23T16:13:33.404+0800: 1.654: [CMS-concurrent-sweep: 0.001/0.001 secs] [Times: user=0.00 sys=0.00, real=0.00 secs]
2020-10-23T16:13:33.404+0800: 1.654: [CMS-concurrent-reset-start]
2020-10-23T16:13:33.404+0800: 1.655: [CMS-concurrent-reset: 0.000/0.000 secs] [Times: user=0.00 sys=0.00, real=0.00 secs]
2020-10-23T16:13:33.425+0800: 1.675: [GC (Allocation Failure) 2020-10-23T16:13:33.425+0800: 1.675: [ParNew: 157214K->17472K(157248K), 0.0158513 secs] 451458K->359854K(506816K), 0.0159631 secs] [Times: user=0.02 sys=0.01, real=0.02 secs]
2020-10-23T16:13:33.441+0800: 1.691: Total time for which application threads were stopped: 0.0161357 seconds, Stopping threads took: 0.0000352 seconds
2020-10-23T16:13:33.441+0800: 1.692: [GC (CMS Initial Mark) [1 CMS-initial-mark: 342382K(349568K)] 360008K(506816K), 0.0001576 secs] [Times: user=0.00 sys=0.00, real=0.00 secs]
2020-10-23T16:13:33.442+0800: 1.692: Total time for which application threads were stopped: 0.0002625 seconds, Stopping threads took: 0.0000337 seconds
2020-10-23T16:13:33.442+0800: 1.692: [CMS-concurrent-mark-start]
2020-10-23T16:13:33.447+0800: 1.697: [CMS-concurrent-mark: 0.005/0.005 secs] [Times: user=0.00 sys=0.00, real=0.01 secs]
2020-10-23T16:13:33.447+0800: 1.697: [CMS-concurrent-preclean-start]
2020-10-23T16:13:33.448+0800: 1.698: [CMS-concurrent-preclean: 0.001/0.001 secs] [Times: user=0.00 sys=0.00, real=0.00 secs]
2020-10-23T16:13:33.448+0800: 1.698: [CMS-concurrent-abortable-preclean-start]
2020-10-23T16:13:33.448+0800: 1.698: [CMS-concurrent-abortable-preclean: 0.000/0.000 secs] [Times: user=0.00 sys=0.00, real=0.00 secs]


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2020-10-23T16:13:33.448+0800: 1.699: [GC (CMS Final Remark) [YG occupancy: 47406
K (157248 K)]2020-10-23T16:13:33.448+0800: 1.699: [Rescan (parallel) , 0.0003585
secs]2020-10-23T16:13:33.449+0800: 1.699: [weak refs processing, 0.0000176
secs]2020-10-23T16:13:33.449+0800: 1.699: [class unloading, 0.0004303 secs]2020-
10-23T16:13:33.449+0800: 1.700: [scrub symbol table, 0.0007020 secs]2020-10-
23T16:13:33.450+0800: 1.700: [scrub string table, 0.0001906 secs][1 CMS-remark:
342382K(349568K)] 389788K(506816K), 0.0018559 secs] [Times: user=0.00 sys=0.00,
real=0.00 secs]
2020-10-23T16:13:33.450+0800: 1.701: Total time for which application threads
were stopped: 0.0021165 seconds, Stopping threads took: 0.0001873 seconds
2020-10-23T16:13:33.450+0800: 1.701: [CMS-concurrent-sweep-start]
2020-10-23T16:13:33.451+0800: 1.702: [CMS-concurrent-sweep: 0.001/0.001 secs]
[Times: user=0.00 sys=0.00, real=0.00 secs]
2020-10-23T16:13:33.451+0800: 1.702: [CMS-concurrent-reset-start]
2020-10-23T16:13:33.452+0800: 1.702: [CMS-concurrent-reset: 0.000/0.000 secs]
[Times: user=0.00 sys=0.00, real=0.00 secs]
2020-10-23T16:13:33.475+0800: 1.725: [GC (Allocation Failure) 2020-10-
23T16:13:33.475+0800: 1.725: [ParNew: 157248K->157248K(157248K), 0.0000403
secs]2020-10-23T16:13:33.475+0800: 1.725: [CMS: 302247K->323757K(349568K),
0.0718118 secs] 459495K->323757K(506816K), [Metaspace: 3606K->3606K(1056768K)],
0.0719903 secs] [Times: user=0.08 sys=0.00, real=0.07 secs]
2020-10-23T16:13:33.547+0800: 1.797: Total time for which application threads
were stopped: 0.0721471 seconds, Stopping threads took: 0.0000370 seconds
2020-10-23T16:13:33.547+0800: 1.798: [GC (CMS Initial Mark) [1 CMS-initial-mark:
323757K(349568K)] 326641K(506816K), 0.0003138 secs] [Times: user=0.00 sys=0.00,
real=0.00 secs]
2020-10-23T16:13:33.548+0800: 1.798: Total time for which application threads
were stopped: 0.0005000 seconds, Stopping threads took: 0.0001111 seconds
2020-10-23T16:13:33.548+0800: 1.798: [CMS-concurrent-mark-start]
2020-10-23T16:13:33.551+0800: 1.802: [CMS-concurrent-mark: 0.004/0.004 secs]
[Times: user=0.00 sys=0.00, real=0.00 secs]
2020-10-23T16:13:33.552+0800: 1.802: [CMS-concurrent-preclean-start]
2020-10-23T16:13:33.552+0800: 1.803: [CMS-concurrent-preclean: 0.001/0.001 secs]
[Times: user=0.00 sys=0.00, real=0.00 secs]
2020-10-23T16:13:33.552+0800: 1.803: [CMS-concurrent-abortable-preclean-start]
2020-10-23T16:13:33.577+0800: 1.828: [GC (Allocation Failure) 2020-10-
23T16:13:33.577+0800: 1.828: [ParNew: 139776K->139776K(157248K), 0.0000304
secs]2020-10-23T16:13:33.577+0800: 1.828: [CMS2020-10-23T16:13:33.577+0800:
1.828: [CMS-concurrent-abortable-preclean: 0.001/0.025 secs] [Times: user=0.02
sys=0.00, real=0.02 secs]
(concurrent mode failure): 323757K->327107K(349568K), 0.0739400 secs] 463533K-
>327107K(506816K), [Metaspace: 3606K->3606K(1056768K)], 0.0740972 secs] [Times:
user=0.08 sys=0.00, real=0.07 secs]
2020-10-23T16:13:33.651+0800: 1.902: Total time for which application threads
were stopped: 0.0743058 seconds, Stopping threads took: 0.0000528 seconds
Heap
par new generation   total 157248K, used 5789K [0x00000000e0000000,
0x00000000eaaaa0000, 0x00000000eaaaa0000)
  eden space 139776K,    4% used [0x00000000e0000000, 0x00000000e05a7528,
0x00000000e8880000)
    from space 17472K,    0% used [0x00000000e9990000, 0x00000000e9990000,
0x00000000eaaaa0000)
      to   space 17472K,    0% used [0x00000000e8880000, 0x00000000e8880000,
0x00000000e9990000)
concurrent mark-sweep generation total 349568K, used 327107K [0x00000000eaaa0000,
0x00000000100000000, 0x00000000100000000)
Metaspace          used 3613K, capacity 4502K, committed 4864K, reserved 1056768K
  class space      used 387K, capacity 390K, committed 512K, reserved 1048576K

```

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Java HotSpot(TM) 64-Bit Server VM (25.161-b12) for windows-amd64 JRE (1.8.0_161-
b12), built on Dec 19 2017 17:52:25 by "java_re" with MS VC++ 10.0 (VS2010)
Memory: 4k page, physical 12459296k(3904240k free), swap 24916692k(14189988k
free)
CommandLine flags:
  -XX:InitialHeapSize=1073741824(1G)
  -XX:MaxHeapSize=1073741824(1G)
  -XX:MaxNewSize=348966912

```

-XX:MaxTenuringThreshold=6
-XX:NewSize=348966912
-XX:OldPLABSize=16
-XX:OldSize=697933824
-XX:+PrintGC
-XX:+PrintGCApplicationStoppedTime
-XX:+PrintGCDateStamps
-XX:+PrintGCDetails
-XX:+PrintGCTimeStamps
-XX:+UseCompressedClassPointers
-XX:+UseCompressedOops
-XX:+UseConcMarkSweepGC
-XX:-UseLargePagesIndividualAllocation
-XX:+UseParNewGC

2020-10-23T16:27:45.501+0800: 1.074: Total time for which application threads were stopped: 0.0001078 seconds, Stopping threads took: 0.0000301 seconds
2020-10-23T16:27:45.709+0800: 1.283: [GC (Allocation Failure) 2020-10-23T16:27:45.709+0800: 1.283: [ParNew: 272640K->34048K(306688K), 0.0502697 secs] 272640K->88015K(1014528K), 0.0504596 secs] [Times: user=0.03 sys=0.16, real=0.05 secs]
2020-10-23T16:27:45.760+0800: 1.333: Total time for which application threads were stopped: 0.0506461 seconds, Stopping threads took: 0.0000282 seconds
2020-10-23T16:27:45.817+0800: 1.390: [GC (Allocation Failure) 2020-10-23T16:27:45.817+0800: 1.390: [ParNew: 306688K->34048K(306688K), 0.0461078 secs] 360655K->166418K(1014528K), 0.0462442 secs] [Times: user=0.02 sys=0.16, real=0.05 secs]
2020-10-23T16:27:45.863+0800: 1.437: Total time for which application threads were stopped: 0.0464253 seconds, Stopping threads took: 0.0000337 seconds
2020-10-23T16:27:45.914+0800: 1.487: [GC (Allocation Failure) 2020-10-23T16:27:45.914+0800: 1.487: [ParNew: 306688K->34048K(306688K), 0.0454128 secs] 439058K->242081K(1014528K), 0.0455114 secs] [Times: user=0.11 sys=0.03, real=0.05 secs]
2020-10-23T16:27:45.959+0800: 1.533: Total time for which application threads were stopped: 0.0456705 seconds, Stopping threads took: 0.0000279 seconds
2020-10-23T16:27:46.009+0800: 1.583: [GC (Allocation Failure) 2020-10-23T16:27:46.009+0800: 1.583: [ParNew: 306688K->34048K(306688K), 0.0425156 secs] 514721K->320645K(1014528K), 0.0426058 secs] [Times: user=0.08 sys=0.06, real=0.04 secs]
2020-10-23T16:27:46.052+0800: 1.625: Total time for which application threads were stopped: 0.0427403 seconds, Stopping threads took: 0.0000326 seconds
2020-10-23T16:27:46.106+0800: 1.679: [GC (Allocation Failure) 2020-10-23T16:27:46.106+0800: 1.679: [ParNew: 306688K->34048K(306688K), 0.0415977 secs] 593285K->396704K(1014528K), 0.0417110 secs] [Times: user=0.13 sys=0.01, real=0.04 secs]
2020-10-23T16:27:46.148+0800: 1.721: Total time for which application threads were stopped: 0.0418712 seconds, Stopping threads took: 0.0000334 seconds
2020-10-23T16:27:46.148+0800: 1.721: [GC (CMS Initial Mark) [1 CMS-initial-mark: 362656K(707840K)] 396800K(1014528K), 0.0002412 secs] [Times: user=0.00 sys=0.00, real=0.00 secs] 存在STW
2020-10-23T16:27:46.148+0800: 1.721: Total time for which application threads were stopped: 0.0003332 seconds, Stopping threads took: 0.0000297 seconds
2020-10-23T16:27:46.148+0800: 1.722: [CMS-concurrent-mark-start]
2020-10-23T16:27:46.162+0800: 1.736: [CMS-concurrent-mark: 0.014/0.014 secs] [Times: user=0.03 sys=0.00, real=0.01 secs]
2020-10-23T16:27:46.162+0800: 1.736: [CMS-concurrent-preclean-start]
2020-10-23T16:27:46.164+0800: 1.737: [CMS-concurrent-preclean: 0.002/0.002 secs] [Times: user=0.00 sys=0.00, real=0.00 secs]
2020-10-23T16:27:46.164+0800: 1.737: [CMS-concurrent-abortable-preclean-start]
2020-10-23T16:27:46.203+0800: 1.776: [GC (Allocation Failure) 2020-10-23T16:27:46.203+0800: 1.776: [ParNew: 306172K->34048K(306688K), 0.0444642 secs] 668828K->482143K(1014528K), 0.0445665 secs] [Times: user=0.06 sys=0.06, real=0.04 secs]
2020-10-23T16:27:46.248+0800: 1.821: Total time for which application threads were stopped: 0.0447296 seconds, Stopping threads took: 0.0000447 seconds
2020-10-23T16:27:46.296+0800: 1.870: [GC (Allocation Failure) 2020-10-23T16:27:46.296+0800: 1.870: [ParNew: 306688K->34048K(306688K), 0.0464989 secs] 754783K->558434K(1014528K), 0.0465961 secs] [Times: user=0.11 sys=0.05, real=0.05 secs]
2020-10-23T16:27:46.343+0800: 1.916: Total time for which application threads were stopped: 0.0467680 seconds, Stopping threads took: 0.0000389 seconds

```

2020-10-23T16:27:46.423+0800: 1.997: [GC (Allocation Failure) 2020-10-
23T16:27:46.423+0800: 1.997: [ParNew2020-10-23T16:27:46.451+0800: 2.024: [CMS-
concurrent-abortable-preclean: 0.008/0.287 secs] [Times: user=0.36 sys=0.16,
real=0.29 secs]
: 306688K->34048K(306688K), 0.0724466 secs] 831074K->643268K(1014528K), 0.0725705
secs] [Times: user=0.11 sys=0.05, real=0.07 secs]
2020-10-23T16:27:46.496+0800: 2.069: Total time for which application threads
were stopped: 0.0727619 seconds, Stopping threads took: 0.0000396 seconds
Heap
par new generation total 306688K, used 67692K [0x00000000c0000000,
0x00000000d4cc0000, 0x00000000d4cc0000)
eden space 272640K, 12% used [0x00000000c0000000, 0x00000000c20db148,
0x00000000d0a40000)
from space 34048K, 100% used [0x00000000d0a40000, 0x00000000d2b80000,
0x00000000d2b80000)
to space 34048K, 0% used [0x00000000d2b80000, 0x00000000d2b80000,
0x00000000d4cc0000)
concurrent mark-sweep generation total 707840K, used 609220K [0x00000000d4cc0000,
0x0000000010000000, 0x0000000010000000)
Metaspace used 3613K, capacity 4502K, committed 4864K, reserved 1056768K
class space used 387K, capacity 390K, committed 512K, reserved 1048576K

```

```

Java HotSpot(TM) 64-Bit Server VM (25.161-b12) for windows-amd64 JRE (1.8.0_161-
b12), built on Dec 19 2017 17:52:25 by "java_re" with MS VC++ 10.0 (VS2010)
Memory: 4k page, physical 12459296k(3968292k free), swap 24916692k(14491960k
free)

```

CommandLine flags:

```

-XX:InitialHeapSize=2147483648(2G)
-XX:MaxHeapSize=2147483648(2G)
-XX:MaxNewSize=348966912
-XX:MaxTenuringThreshold=6
-XX:NewSize=348966912
-XX:OldPLABSize=16
-XX:OldSize=697933824
-XX:+PrintGC
-XX:+PrintGCApplicationStoppedTime
-XX:+PrintGCDateStamps
-XX:+PrintGCDetails
-XX:+PrintGCTimeStamps
-XX:+UseCompressedClassPointers
-XX:+UseCompressedOops
-XX:+UseConcMarkSweepGC
-XX:-UseLargePagesIndividualAllocation
-XX:+UseParNewGC

```

```

2020-10-23T16:31:45.169+0800: 0.943: Total time for which application threads
were stopped: 0.0001232 seconds, Stopping threads took: 0.0000462 seconds
2020-10-23T16:31:45.428+0800: 1.202: [GC (Allocation Failure) 2020-10-
23T16:31:45.429+0800: 1.202: [ParNew: 272640K->34048K(306688K), 0.0336076 secs]
272640K->85276K(2063104K), 0.0338634 secs] [Times: user=0.03 sys=0.08, real=0.03
secs]
2020-10-23T16:31:45.462+0800: 1.236: Total time for which application threads
were stopped: 0.0340416 seconds, Stopping threads took: 0.0000271 seconds
2020-10-23T16:31:45.519+0800: 1.293: [GC (Allocation Failure) 2020-10-
23T16:31:45.519+0800: 1.293: [ParNew: 306688K->34048K(306688K), 0.0497917 secs]
357916K->162728K(2063104K), 0.0499160 secs] [Times: user=0.08 sys=0.11, real=0.05
secs]
2020-10-23T16:31:45.569+0800: 1.343: Total time for which application threads
were stopped: 0.0500853 seconds, Stopping threads took: 0.0000319 seconds
2020-10-23T16:31:45.626+0800: 1.400: [GC (Allocation Failure) 2020-10-
23T16:31:45.626+0800: 1.400: [ParNew: 306688K->34048K(306688K), 0.0599189 secs]
435368K->237035K(2063104K), 0.0600728 secs] [Times: user=0.16 sys=0.06, real=0.06
secs]
2020-10-23T16:31:45.686+0800: 1.460: Total time for which application threads
were stopped: 0.0602411 seconds, Stopping threads took: 0.0000356 seconds
2020-10-23T16:31:45.736+0800: 1.510: [GC (Allocation Failure) 2020-10-
23T16:31:45.736+0800: 1.510: [ParNew: 306688K->34048K(306688K), 0.0530614 secs]

```

```

509675K->314539K(2063104K), 0.0531669 secs] [Times: user=0.22 sys=0.00, real=0.05
secs]
2020-10-23T16:31:45.790+0800: 1.564: Total time for which application threads
were stopped: 0.0533597 seconds, Stopping threads took: 0.0000385 seconds
2020-10-23T16:31:45.833+0800: 1.607: [GC (Allocation Failure) 2020-10-
23T16:31:45.833+0800: 1.607: [ParNew: 306688K->34048K(306688K), 0.0539884 secs]
587179K->402466K(2063104K), 0.0541226 secs] [Times: user=0.19 sys=0.02, real=0.06
secs]
2020-10-23T16:31:45.888+0800: 1.661: Total time for which application threads
were stopped: 0.0543011 seconds, Stopping threads took: 0.0000315 seconds
2020-10-23T16:31:45.940+0800: 1.713: [GC (Allocation Failure) 2020-10-
23T16:31:45.940+0800: 1.714: [ParNew: 306688K->34048K(306688K), 0.0493529 secs]
675106K->485060K(2063104K), 0.0494684 secs] [Times: user=0.11 sys=0.05, real=0.05
secs]
2020-10-23T16:31:45.989+0800: 1.763: Total time for which application threads
were stopped: 0.0497393 seconds, Stopping threads took: 0.0000334 seconds
2020-10-23T16:31:46.040+0800: 1.814: [GC (Allocation Failure) 2020-10-
23T16:31:46.040+0800: 1.814: [ParNew: 306688K->34048K(306688K), 0.0500707 secs]
757700K->569579K(2063104K), 0.0501729 secs] [Times: user=0.17 sys=0.02, real=0.05
secs]
2020-10-23T16:31:46.090+0800: 1.864: Total time for which application threads
were stopped: 0.0503375 seconds, Stopping threads took: 0.0000308 seconds
2020-10-23T16:31:46.151+0800: 1.925: [GC (Allocation Failure) 2020-10-
23T16:31:46.151+0800: 1.925: [ParNew: 306688K->34048K(306688K), 0.0514023 secs]
842219K->639599K(2063104K), 0.0515152 secs] [Times: user=0.08 sys=0.00, real=0.05
secs]
2020-10-23T16:31:46.203+0800: 1.977: Total time for which application threads
were stopped: 0.0516949 seconds, Stopping threads took: 0.0000396 seconds
Heap
par new generation   total 306688K, used 45183K [0x0000000080000000,
0x0000000094cc0000, 0x0000000094cc0000)
  eden space 272640K,   4% used [0x0000000080000000, 0x0000000080adfee0,
0x0000000090a40000)
  from space 34048K, 100% used [0x0000000090a40000, 0x0000000092b80000,
0x0000000092b80000)
  to   space 34048K,   0% used [0x0000000092b80000, 0x0000000092b80000,
0x0000000094cc0000)
concurrent mark-sweep generation total 1756416K, used 605551K
[0x0000000094cc0000, 0x0000000100000000, 0x0000000100000000)
Metaspace          used 3612K, capacity 4502K, committed 4864K, reserved 1056768K
  class space      used 387K, capacity 390K, committed 512K, reserved 1048576K

```

Java HotSpot(TM) 64-Bit Server VM (25.161-b12) for windows-amd64 JRE (1.8.0_161-b12), built on Dec 19 2017 17:52:25 by "java_re" with MS VC++ 10.0 (VS2010)
Memory: 4k page, physical 12459296k(3954056k free), swap 24916692k(14488904k free)

CommandLine flags:

```

-XX:InitialHeapSize=4294967296(4g)
-XX:MaxHeapSize=4294967296(4g)
-XX:MaxNewSize=348966912
-XX:MaxTenuringThreshold=6
-XX:NewSize=348966912
-XX:OldPLABSize=16
-XX:OldSize=697933824
-XX:+PrintGC
-XX:+PrintGCApplicationStoppedTime
-XX:+PrintGCDateStamps
-XX:+PrintGCDetails
-XX:+PrintGCTimeStamps
-XX:+UseCompressedClassPointers
-XX:+UseCompressedOops
-XX:+UseConcMarkSweepGC
-XX:-UseLargePagesIndividualAllocation
-XX:+UseParNewGC

```

```

2020-10-23T16:35:35.202+0800: 0.967: Total time for which application threads
were stopped: 0.0015703 seconds, Stopping threads took: 0.0014845 seconds

```

```

2020-10-23T16:35:35.397+0800: 1.162: [GC (Allocation Failure) 2020-10-
23T16:35:35.398+0800: 1.162: [ParNew: 272640K->34048K(306688K), 0.0419269 secs]
272640K->80627K(4160256K), 0.0421226 secs] [Times: user=0.08 sys=0.02, real=0.04
secs]
2020-10-23T16:35:35.440+0800: 1.204: Total time for which application threads
were stopped: 0.0423081 seconds, Stopping threads took: 0.0000326 seconds
2020-10-23T16:35:35.503+0800: 1.267: [GC (Allocation Failure) 2020-10-
23T16:35:35.503+0800: 1.267: [ParNew: 306688K->34048K(306688K), 0.0500058 secs]
353267K->157236K(4160256K), 0.0501330 secs] [Times: user=0.05 sys=0.11, real=0.05
secs]
2020-10-23T16:35:35.553+0800: 1.317: Total time for which application threads
were stopped: 0.0503122 seconds, Stopping threads took: 0.0000356 seconds
2020-10-23T16:35:35.621+0800: 1.386: [GC (Allocation Failure) 2020-10-
23T16:35:35.622+0800: 1.386: [ParNew: 306688K->34048K(306688K), 0.0574050 secs]
429876K->227477K(4160256K), 0.0575176 secs] [Times: user=0.14 sys=0.03, real=0.06
secs]
2020-10-23T16:35:35.679+0800: 1.443: Total time for which application threads
were stopped: 0.0577001 seconds, Stopping threads took: 0.0000370 seconds
2020-10-23T16:35:35.738+0800: 1.503: [GC (Allocation Failure) 2020-10-
23T16:35:35.738+0800: 1.503: [ParNew: 306688K->34048K(306688K), 0.0591385 secs]
500117K->307776K(4160256K), 0.0592415 secs] [Times: user=0.19 sys=0.05, real=0.06
secs]
2020-10-23T16:35:35.798+0800: 1.562: Total time for which application threads
were stopped: 0.0594002 seconds, Stopping threads took: 0.0000301 seconds
2020-10-23T16:35:35.857+0800: 1.621: [GC (Allocation Failure) 2020-10-
23T16:35:35.857+0800: 1.621: [ParNew: 306688K->34048K(306688K), 0.0618818 secs]
580416K->392557K(4160256K), 0.0619921 secs] [Times: user=0.12 sys=0.03, real=0.06
secs]
2020-10-23T16:35:35.919+0800: 1.683: Total time for which application threads
were stopped: 0.0621725 seconds, Stopping threads took: 0.0000506 seconds
2020-10-23T16:35:35.968+0800: 1.732: [GC (Allocation Failure) 2020-10-
23T16:35:35.968+0800: 1.732: [ParNew: 306688K->34048K(306688K), 0.0705886 secs]
665197K->478750K(4160256K), 0.0707055 secs] [Times: user=0.11 sys=0.06, real=0.07
secs]
2020-10-23T16:35:36.039+0800: 1.803: Total time for which application threads
were stopped: 0.0709104 seconds, Stopping threads took: 0.0000345 seconds
2020-10-23T16:35:36.104+0800: 1.868: [GC (Allocation Failure) 2020-10-
23T16:35:36.104+0800: 1.868: [ParNew: 306688K->34048K(306688K), 0.0561918 secs]
751390K->548325K(4160256K), 0.0562955 secs] [Times: user=0.14 sys=0.00, real=0.06
secs]
2020-10-23T16:35:36.160+0800: 1.925: Total time for which application threads
were stopped: 0.0564894 seconds, Stopping threads took: 0.0000455 seconds
Heap
par new generation   total 306688K, used 249969K [0x00000006c0000000,
0x00000006d4cc0000, 0x00000006d4cc0000)
  eden space 272640K,  79% used [0x00000006c0000000, 0x00000006cd2dc4a0,
0x00000006d0a40000)
  from space 34048K, 100% used [0x00000006d2b80000, 0x00000006d4cc0000,
0x00000006d4cc0000)
  to   space 34048K,   0% used [0x00000006d0a40000, 0x00000006d0a40000,
0x00000006d2b80000)
concurrent mark-sweep generation total 3853568K, used 514277K
[0x00000006d4cc0000, 0x00000007c0000000, 0x00000007c0000000)
Metaspace          used 3612K, capacity 4502K, committed 4864K, reserved 1056768K
class space        used 387K, capacity 390K, committed 512K, reserved 1048576K

```

结论：CMS在堆空间越来越大的情况下，可以看到和串行、并行GC一样的特性，就是对越大GC次数越少，但是单次GC时间越长，但是注意观察CMS日志，由于它只在初始标记和最终标记两个阶段需要STW，这两个阶段停顿时间极短，因此总体停顿时间优于串行GC和并行GC。

4.G1在内存容量由大到小的GC日志

```

Java HotSpot(TM) 64-Bit Server VM (25.161-b12) for windows-amd64 JRE (1.8.0_161-
b12), built on Dec 19 2017 17:52:25 by "java_re" with MS VC++ 10.0 (VS2010)

```


Memory: 4k page, physical 12459296k(3964868k free), swap 24916692k(14239744k free)

CommandLine flags:

-XX:InitialHeapSize=536870912(512m)

-XX:MaxHeapSize=536870912(512m)

-XX:+PrintGC

-XX:+PrintGCApplicationStoppedTime

-XX:+PrintGCDateStamps

-XX:+PrintGCTimeStamps

-XX:+UseCompressedClassPointers

-XX:+UseCompressedOops

-XX:+UseG1GC

-XX:-UseLargePagesIndividualAllocation

2020-10-23T16:41:02.498+0800: 0.884: Total time for which application threads were stopped: 0.0002163 seconds, Stopping threads took: 0.0001151 seconds

2020-10-23T16:41:02.527+0800: 0.912: [GC pause (G1 Evacuation Pause) (young) 28M->8026K(512M), 0.0043668 secs]

2020-10-23T16:41:02.531+0800: 0.917: Total time for which application threads were stopped: 0.0049848 seconds, Stopping threads took: 0.0000385 seconds

Evacuation Pause Young ---> 将年轻代的存活对象拷贝到存活区

2020-10-23T16:41:02.544+0800: 0.929: [GC pause (G1 Evacuation Pause) (young) 32M->17M(512M), 0.0045838 secs]

2020-10-23T16:41:02.549+0800: 0.934: Total time for which application threads were stopped: 0.0048022 seconds, Stopping threads took: 0.0000352 seconds

2020-10-23T16:41:02.568+0800: 0.954: [GC pause (G1 Evacuation Pause) (young) 50M->28M(512M), 0.0055533 secs]

2020-10-23T16:41:02.574+0800: 0.960: Total time for which application threads were stopped: 0.0057296 seconds, Stopping threads took: 0.0000304 seconds

2020-10-23T16:41:02.695+0800: 1.081: [GC pause (G1 Evacuation Pause) (young) 210M->95M(512M), 0.0325618 secs]

2020-10-23T16:41:02.728+0800: 1.113: Total time for which application threads were stopped: 0.0327407 seconds, Stopping threads took: 0.0000348 seconds

2020-10-23T16:41:02.739+0800: 1.125: [GC pause (G1 Evacuation Pause) (young) 130M->108M(512M), 0.0050980 secs]

2020-10-23T16:41:02.745+0800: 1.130: Total time for which application threads were stopped: 0.0053125 seconds, Stopping threads took: 0.0000444 seconds

2020-10-23T16:41:02.776+0800: 1.162: [GC pause (G1 Evacuation Pause) (young) 191M->133M(512M), 0.0085151 secs]

2020-10-23T16:41:02.785+0800: 1.170: Total time for which application threads were stopped: 0.0086683 seconds, Stopping threads took: 0.0000264 seconds

2020-10-23T16:41:02.813+0800: 1.199: [GC pause (G1 Evacuation Pause) (young) 238M->165M(512M), 0.0238550 secs]

2020-10-23T16:41:02.837+0800: 1.223: Total time for which application threads were stopped: 0.0240368 seconds, Stopping threads took: 0.0000447 seconds

2020-10-23T16:41:02.882+0800: 1.267: [GC pause (G1 Evacuation Pause) (young) 314M->210M(512M), 0.0153795 secs]

2020-10-23T16:41:02.897+0800: 1.283: Total time for which application threads were stopped: 0.0155529 seconds, Stopping threads took: 0.0000282 seconds

2020-10-23T16:41:02.903+0800: 1.289: [GC pause (G1 Humongous Allocation) (young) (initial-mark) 233M->222M(512M), 0.0049958 secs] 初始标记

2020-10-23T16:41:02.908+0800: 1.294: [GC concurrent-root-region-scan-start]

2020-10-23T16:41:02.908+0800: 1.294: Total time for which application threads were stopped: 0.0051673 seconds, Stopping threads took: 0.0000312 seconds

2020-10-23T16:41:02.909+0800: 1.294: [GC concurrent-root-region-scan-end, 0.0001664 secs] Root区扫描

2020-10-23T16:41:02.909+0800: 1.294: [GC concurrent-mark-start] 并发标记

2020-10-23T16:41:02.918+0800: 1.303: [GC concurrent-mark-end, 0.0082603 secs]

2020-10-23T16:41:02.923+0800: 1.309: [GC remark, 0.0015729 secs] 再次标记

2020-10-23T16:41:02.925+0800: 1.310: Total time for which application threads were stopped: 0.0043935 seconds, Stopping threads took: 0.0027389 seconds

2020-10-23T16:41:02.926+0800: 1.311: [GC cleanup 252M->250M(512M), 0.0004384 secs] 清理

2020-10-23T16:41:02.926+0800: 1.312: Total time for which application threads were stopped: 0.0005194 seconds, Stopping threads took: 0.0000337 seconds

2020-10-23T16:41:02.926+0800: 1.312: [GC concurrent-cleanup-start]

2020-10-23T16:41:02.926+0800: 1.312: [GC concurrent-cleanup-end, 0.0000106 secs]

2020-10-23T16:41:03.000+0800: 1.385: [GC pause (G1 Evacuation Pause) (young)--414M->328M(512M), 0.0205941 secs]

2020-10-23T16:41:03.021+0800: 1.406: Total time for which application threads were stopped: 0.0208144 seconds, Stopping threads took: 0.0000279 seconds
2020-10-23T16:41:03.022+0800: 1.408: [GC pause (G1 Evacuation Pause) (mixed) 332M->305M(512M), 0.0086320 secs] **Evacuation Pause mixed 转移暂停: 混合模式, 不再仅仅清理年轻代, 同时回收一部分老年代, 该模式不一定会出现, 如果出现可能中间也会出现很多次年年轻的转移暂停**

2020-10-23T16:41:03.031+0800: 1.416: Total time for which application threads were stopped: 0.0088453 seconds, Stopping threads took: 0.0000517 seconds
2020-10-23T16:41:03.031+0800: 1.417: [GC pause (G1 Humongous Allocation) (young) (initial-mark) 307M->306M(512M), 0.0020131 secs]
2020-10-23T16:41:03.033+0800: 1.419: [GC concurrent-root-region-scan-start]
2020-10-23T16:41:03.033+0800: 1.419: Total time for which application threads were stopped: 0.0021795 seconds, Stopping threads took: 0.0000451 seconds
2020-10-23T16:41:03.034+0800: 1.419: [GC concurrent-root-region-scan-end, 0.0001895 secs]
2020-10-23T16:41:03.034+0800: 1.419: [GC concurrent-mark-start]
2020-10-23T16:41:03.042+0800: 1.427: [GC concurrent-mark-end, 0.0078582 secs]
2020-10-23T16:41:03.042+0800: 1.427: [GC remark, 0.0020545 secs]
2020-10-23T16:41:03.044+0800: 1.429: Total time for which application threads were stopped: 0.0022517 seconds, Stopping threads took: 0.0001140 seconds
2020-10-23T16:41:03.044+0800: 1.430: [GC cleanup 340M->338M(512M), 0.0004633 secs]
2020-10-23T16:41:03.045+0800: 1.430: Total time for which application threads were stopped: 0.0005711 seconds, Stopping threads took: 0.0000477 seconds
2020-10-23T16:41:03.045+0800: 1.430: [GC concurrent-cleanup-start]
2020-10-23T16:41:03.045+0800: 1.430: [GC concurrent-cleanup-end, 0.0000121 secs]
2020-10-23T16:41:03.066+0800: 1.452: [GC pause (G1 Evacuation Pause) (young) 410M->336M(512M), 0.0089964 secs]
2020-10-23T16:41:03.075+0800: 1.461: Total time for which application threads were stopped: 0.0091800 seconds, Stopping threads took: 0.0000447 seconds
2020-10-23T16:41:03.080+0800: 1.465: [GC pause (G1 Evacuation Pause) (mixed) 356M->299M(512M), 0.0054016 secs]
2020-10-23T16:41:03.085+0800: 1.471: Total time for which application threads were stopped: 0.0055680 seconds, Stopping threads took: 0.0000356 seconds
2020-10-23T16:41:03.092+0800: 1.477: [GC pause (G1 Evacuation Pause) (mixed) 324M->280M(512M), 0.0059239 secs]
2020-10-23T16:41:03.098+0800: 1.483: Total time for which application threads were stopped: 0.0061039 seconds, Stopping threads took: 0.0000414 seconds
2020-10-23T16:41:03.099+0800: 1.484: [GC pause (G1 Humongous Allocation) (young) (initial-mark) 283M->280M(512M), 0.0014127 secs]
2020-10-23T16:41:03.100+0800: 1.486: [GC concurrent-root-region-scan-start]
2020-10-23T16:41:03.100+0800: 1.486: Total time for which application threads were stopped: 0.0015842 seconds, Stopping threads took: 0.0000352 seconds
2020-10-23T16:41:03.100+0800: 1.486: [GC concurrent-root-region-scan-end, 0.0001943 secs]
2020-10-23T16:41:03.100+0800: 1.486: [GC concurrent-mark-start]
2020-10-23T16:41:03.109+0800: 1.494: [GC concurrent-mark-end, 0.0081064 secs]
2020-10-23T16:41:03.109+0800: 1.494: [GC remark, 0.0019043 secs]
2020-10-23T16:41:03.111+0800: 1.496: Total time for which application threads were stopped: 0.0020402 seconds, Stopping threads took: 0.0000557 seconds
2020-10-23T16:41:03.111+0800: 1.496: [GC cleanup 320M->320M(512M), 0.0003548 secs]
2020-10-23T16:41:03.111+0800: 1.497: Total time for which application threads were stopped: 0.0004413 seconds, Stopping threads took: 0.0000455 seconds
2020-10-23T16:41:03.133+0800: 1.518: [GC pause (G1 Evacuation Pause) (young)-- 413M->328M(512M), 0.0070206 secs]
2020-10-23T16:41:03.140+0800: 1.525: Total time for which application threads were stopped: 0.0071859 seconds, Stopping threads took: 0.0000271 seconds
2020-10-23T16:41:03.142+0800: 1.528: [GC pause (G1 Evacuation Pause) (mixed) 340M->306M(512M), 0.0087339 secs]
2020-10-23T16:41:03.151+0800: 1.537: Total time for which application threads were stopped: 0.0088820 seconds, Stopping threads took: 0.0000268 seconds
2020-10-23T16:41:03.152+0800: 1.537: [GC pause (G1 Humongous Allocation) (young) (initial-mark) 308M->306M(512M), 0.0012111 secs]
2020-10-23T16:41:03.153+0800: 1.538: [GC concurrent-root-region-scan-start]
2020-10-23T16:41:03.153+0800: 1.538: Total time for which application threads were stopped: 0.0013819 seconds, Stopping threads took: 0.0000381 seconds
2020-10-23T16:41:03.153+0800: 1.539: [GC concurrent-root-region-scan-end, 0.0001496 secs]

2020-10-23T16:41:03.153+0800: 1.539: [GC concurrent-mark-start]
2020-10-23T16:41:03.161+0800: 1.547: [GC concurrent-mark-end, 0.0077160 secs]
2020-10-23T16:41:03.162+0800: 1.547: [GC remark, 0.0021253 secs]
2020-10-23T16:41:03.164+0800: 1.549: Total time for which application threads were stopped: 0.0023357 seconds, Stopping threads took: 0.0001092 seconds
2020-10-23T16:41:03.164+0800: 1.549: [GC cleanup 346M->344M(512M), 0.0003816 secs]
2020-10-23T16:41:03.164+0800: 1.550: Total time for which application threads were stopped: 0.0004729 seconds, Stopping threads took: 0.0000238 seconds
2020-10-23T16:41:03.164+0800: 1.550: [GC concurrent-cleanup-start]
2020-10-23T16:41:03.164+0800: 1.550: [GC concurrent-cleanup-end, 0.0000125 secs]
2020-10-23T16:41:03.180+0800: 1.565: [GC pause (G1 Evacuation Pause) (young)--422M->381M(512M), 0.0060482 secs]
2020-10-23T16:41:03.186+0800: 1.572: Total time for which application threads were stopped: 0.0062003 seconds, Stopping threads took: 0.0000341 seconds
2020-10-23T16:41:03.191+0800: 1.576: [GC pause (G1 Evacuation Pause) (mixed) 400M->356M(512M), 0.0205278 secs]
2020-10-23T16:41:03.211+0800: 1.597: Total time for which application threads were stopped: 0.0207378 seconds, Stopping threads took: 0.0000345 seconds
2020-10-23T16:41:03.218+0800: 1.603: [GC pause (G1 Evacuation Pause) (mixed) 383M->364M(512M), 0.0105835 secs]
2020-10-23T16:41:03.229+0800: 1.614: Total time for which application threads were stopped: 0.0107496 seconds, Stopping threads took: 0.0000334 seconds
2020-10-23T16:41:03.229+0800: 1.615: [GC pause (G1 Humongous Allocation) (young) (initial-mark) 366M->364M(512M), 0.0066871 secs]
2020-10-23T16:41:03.236+0800: 1.622: Total time for which application threads were stopped: 0.0069275 seconds, Stopping threads took: 0.0000403 seconds
2020-10-23T16:41:03.236+0800: 1.622: [GC concurrent-root-region-scan-start]
2020-10-23T16:41:03.239+0800: 1.625: [GC concurrent-root-region-scan-end, 0.0026095 secs]
2020-10-23T16:41:03.239+0800: 1.625: [GC concurrent-mark-start]
2020-10-23T16:41:03.247+0800: 1.633: [GC pause (G1 Evacuation Pause) (young) 405M->377M(512M), 0.0034214 secs]
2020-10-23T16:41:03.251+0800: 1.636: Total time for which application threads were stopped: 0.0038056 seconds, Stopping threads took: 0.0002372 seconds
2020-10-23T16:41:03.253+0800: 1.639: [GC concurrent-mark-end, 0.0127572 secs]
2020-10-23T16:41:03.257+0800: 1.642: [GC remark, 0.0049518 secs]
2020-10-23T16:41:03.262+0800: 1.647: Total time for which application threads were stopped: 0.0074777 seconds, Stopping threads took: 0.0024347 seconds
2020-10-23T16:41:03.262+0800: 1.648: [GC cleanup 386M->384M(512M), 0.0008856 secs]
2020-10-23T16:41:03.263+0800: 1.649: Total time for which application threads were stopped: 0.0011044 seconds, Stopping threads took: 0.0001404 seconds
2020-10-23T16:41:03.263+0800: 1.649: [GC concurrent-cleanup-start]
2020-10-23T16:41:03.263+0800: 1.649: [GC concurrent-cleanup-end, 0.0000147 secs]
2020-10-23T16:41:03.270+0800: 1.655: [GC pause (G1 Evacuation Pause) (young) 404M->384M(512M), 0.0049349 secs]
2020-10-23T16:41:03.275+0800: 1.660: Total time for which application threads were stopped: 0.0052315 seconds, Stopping threads took: 0.0000634 seconds
2020-10-23T16:41:03.283+0800: 1.668: [GC pause (G1 Evacuation Pause) (mixed) 410M->348M(512M), 0.0077596 secs]
2020-10-23T16:41:03.291+0800: 1.676: Total time for which application threads were stopped: 0.0079432 seconds, Stopping threads took: 0.0000341 seconds
2020-10-23T16:41:03.300+0800: 1.686: [GC pause (G1 Evacuation Pause) (mixed) 374M->335M(512M), 0.0254756 secs]
2020-10-23T16:41:03.326+0800: 1.711: Total time for which application threads were stopped: 0.0256489 seconds, Stopping threads took: 0.0000308 seconds
2020-10-23T16:41:03.326+0800: 1.711: [GC pause (G1 Humongous Allocation) (young) (initial-mark) 335M->336M(512M), 0.0035794 secs]
2020-10-23T16:41:03.330+0800: 1.715: [GC concurrent-root-region-scan-start]
2020-10-23T16:41:03.330+0800: 1.715: Total time for which application threads were stopped: 0.0037770 seconds, Stopping threads took: 0.0000374 seconds
2020-10-23T16:41:03.330+0800: 1.715: [GC concurrent-root-region-scan-end, 0.0000279 secs]
2020-10-23T16:41:03.330+0800: 1.715: [GC concurrent-mark-start]
2020-10-23T16:41:03.342+0800: 1.728: [GC concurrent-mark-end, 0.0126223 secs]
2020-10-23T16:41:03.345+0800: 1.730: [GC remark, 0.0039229 secs]
2020-10-23T16:41:03.349+0800: 1.734: Total time for which application threads were stopped: 0.0064224 seconds, Stopping threads took: 0.0024171 seconds

2020-10-23T16:41:03.349+0800: 1.734: [GC cleanup 368M->368M(512M), 0.0003900 secs]
2020-10-23T16:41:03.349+0800: 1.735: Total time for which application threads were stopped: 0.0005080 seconds, Stopping threads took: 0.0000586 seconds
2020-10-23T16:41:03.359+0800: 1.745: [GC pause (G1 Evacuation Pause) (young) 405M->357M(512M), 0.0045167 secs]
2020-10-23T16:41:03.364+0800: 1.749: Total time for which application threads were stopped: 0.0046626 seconds, Stopping threads took: 0.0000282 seconds
2020-10-23T16:41:03.369+0800: 1.755: [GC pause (G1 Evacuation Pause) (mixed) 379M->343M(512M), 0.0080598 secs]
2020-10-23T16:41:03.378+0800: 1.763: Total time for which application threads were stopped: 0.0082893 seconds, Stopping threads took: 0.0000392 seconds
2020-10-23T16:41:03.383+0800: 1.769: [GC pause (G1 Evacuation Pause) (mixed) 370M->347M(512M), 0.0042828 secs]
2020-10-23T16:41:03.388+0800: 1.773: Total time for which application threads were stopped: 0.0044353 seconds, Stopping threads took: 0.0000260 seconds
2020-10-23T16:41:03.388+0800: 1.773: [GC pause (G1 Humongous Allocation) (young) (initial-mark) 347M->349M(512M), 0.0017129 secs]
2020-10-23T16:41:03.390+0800: 1.775: [GC concurrent-root-region-scan-start]
2020-10-23T16:41:03.390+0800: 1.775: Total time for which application threads were stopped: 0.0018881 seconds, Stopping threads took: 0.0000268 seconds
2020-10-23T16:41:03.390+0800: 1.775: [GC concurrent-root-region-scan-end, 0.0000235 secs]
2020-10-23T16:41:03.390+0800: 1.775: [GC concurrent-mark-start]
2020-10-23T16:41:03.398+0800: 1.783: [GC concurrent-mark-end, 0.0083443 secs]
2020-10-23T16:41:03.398+0800: 1.784: [GC remark, 0.0046534 secs]
2020-10-23T16:41:03.403+0800: 1.788: Total time for which application threads were stopped: 0.0048744 seconds, Stopping threads took: 0.0001367 seconds
2020-10-23T16:41:03.404+0800: 1.789: [GC cleanup 385M->385M(512M), 0.0005275 secs]
2020-10-23T16:41:03.404+0800: 1.790: Total time for which application threads were stopped: 0.0006723 seconds, Stopping threads took: 0.0000920 seconds
2020-10-23T16:41:03.410+0800: 1.796: [GC pause (G1 Evacuation Pause) (young) 404M->365M(512M), 0.0039614 secs]
2020-10-23T16:41:03.414+0800: 1.800: Total time for which application threads were stopped: 0.0041256 seconds, Stopping threads took: 0.0000348 seconds
2020-10-23T16:41:03.419+0800: 1.805: [GC pause (G1 Evacuation Pause) (mixed) 385M->347M(512M), 0.0086203 secs]
2020-10-23T16:41:03.428+0800: 1.813: Total time for which application threads were stopped: 0.0088112 seconds, Stopping threads took: 0.0000326 seconds
2020-10-23T16:41:03.433+0800: 1.819: [GC pause (G1 Evacuation Pause) (mixed) 373M->351M(512M), 0.0072911 secs]
2020-10-23T16:41:03.441+0800: 1.826: Total time for which application threads were stopped: 0.0074513 seconds, Stopping threads took: 0.0000345 seconds
2020-10-23T16:41:03.441+0800: 1.827: [GC pause (G1 Humongous Allocation) (young) (initial-mark) 352M->352M(512M), 0.0015945 secs]
2020-10-23T16:41:03.443+0800: 1.828: [GC concurrent-root-region-scan-start]
2020-10-23T16:41:03.443+0800: 1.828: Total time for which application threads were stopped: 0.0017386 seconds, Stopping threads took: 0.0000312 seconds
2020-10-23T16:41:03.443+0800: 1.828: [GC concurrent-root-region-scan-end, 0.0000268 secs]
2020-10-23T16:41:03.443+0800: 1.828: [GC concurrent-mark-start]
2020-10-23T16:41:03.452+0800: 1.837: [GC concurrent-mark-end, 0.0085550 secs]
2020-10-23T16:41:03.452+0800: 1.838: [GC remark, 0.0024046 secs]
2020-10-23T16:41:03.454+0800: 1.840: Total time for which application threads were stopped: 0.0026319 seconds, Stopping threads took: 0.0001466 seconds
2020-10-23T16:41:03.455+0800: 1.840: [GC cleanup 385M->385M(512M), 0.0003306 secs]
2020-10-23T16:41:03.455+0800: 1.841: Total time for which application threads were stopped: 0.0004274 seconds, Stopping threads took: 0.0000528 seconds
2020-10-23T16:41:03.460+0800: 1.846: [GC pause (G1 Evacuation Pause) (young) 404M->364M(512M), 0.0038734 secs]
2020-10-23T16:41:03.464+0800: 1.850: Total time for which application threads were stopped: 0.0040222 seconds, Stopping threads took: 0.0000271 seconds
2020-10-23T16:41:03.470+0800: 1.856: [GC pause (G1 Evacuation Pause) (mixed) 386M->348M(512M), 0.0096408 secs]
2020-10-23T16:41:03.480+0800: 1.865: Total time for which application threads were stopped: 0.0098277 seconds, Stopping threads took: 0.0000330 seconds
2020-10-23T16:41:03.485+0800: 1.870: [GC pause (G1 Evacuation Pause) (mixed) 372M->355M(512M), 0.0050178 secs]

2020-10-23T16:41:03.490+0800: 1.875: Total time for which application threads were stopped: 0.0051747 seconds, Stopping threads took: 0.0000308 seconds

Java HotSpot(TM) 64-Bit Server VM (25.161-b12) for windows-amd64 JRE (1.8.0_161-b12), built on Dec 19 2017 17:52:25 by "java_re" with MS VC++ 10.0 (VS2010)
Memory: 4k page, physical 12459296k(3915060k free), swap 24916692k(13935448k free)

CommandLine flags:

-XX:InitialHeapSize=1073741824(1G)

-XX:MaxHeapSize=1073741824(1G)

-XX:+PrintGC

-XX:+PrintGCApplicationStoppedTime

-XX:+PrintGCDateStamps

-XX:+PrintGCTimeStamps

-XX:+UseCompressedClassPointers

-XX:+UseCompressedOops

-XX:+UseG1GC

-XX:-UseLargePagesIndividualAllocation

2020-10-23T16:56:58.414+0800: 0.993: Total time for which application threads were stopped: 0.0001041 seconds, Stopping threads took: 0.0000286 seconds

2020-10-23T16:56:58.503+0800: 1.082: [GC pause (G1 Evacuation Pause) (young) 62M->24M(1024M), 0.0092460 secs]

2020-10-23T16:56:58.512+0800: 1.091: Total time for which application threads were stopped: 0.0095293 seconds, Stopping threads took: 0.0000374 seconds

2020-10-23T16:56:58.531+0800: 1.110: [GC pause (G1 Evacuation Pause) (young) 76M->43M(1024M), 0.0085558 secs]

2020-10-23T16:56:58.540+0800: 1.119: Total time for which application threads were stopped: 0.0087211 seconds, Stopping threads took: 0.0000323 seconds

2020-10-23T16:56:58.562+0800: 1.141: [GC pause (G1 Evacuation Pause) (young) 97M->65M(1024M), 0.0071808 secs]

2020-10-23T16:56:58.569+0800: 1.148: Total time for which application threads were stopped: 0.0073718 seconds, Stopping threads took: 0.0000535 seconds

2020-10-23T16:56:58.592+0800: 1.171: [GC pause (G1 Evacuation Pause) (young) 125M->88M(1024M), 0.0062190 secs]

2020-10-23T16:56:58.598+0800: 1.177: Total time for which application threads were stopped: 0.0064008 seconds, Stopping threads took: 0.0000499 seconds

2020-10-23T16:56:58.624+0800: 1.202: [GC pause (G1 Evacuation Pause) (young) 161M->113M(1024M), 0.0093933 secs]

2020-10-23T16:56:58.633+0800: 1.212: Total time for which application threads were stopped: 0.0095491 seconds, Stopping threads took: 0.0000348 seconds

2020-10-23T16:56:58.657+0800: 1.236: [GC pause (G1 Evacuation Pause) (young) 189M->137M(1024M), 0.0099813 secs]

2020-10-23T16:56:58.667+0800: 1.246: Total time for which application threads were stopped: 0.0101385 seconds, Stopping threads took: 0.0000323 seconds

2020-10-23T16:56:59.264+0800: 1.843: [GC pause (G1 Evacuation Pause) (young)--900M->674M(1024M), 0.0155273 secs]

2020-10-23T16:56:59.280+0800: 1.859: Total time for which application threads were stopped: 0.0156882 seconds, Stopping threads took: 0.0000374 seconds

2020-10-23T16:56:59.283+0800: 1.861: [GC pause (G1 Humongous Allocation) (young) (initial-mark) 677M->674M(1024M), 0.0041578 secs]

2020-10-23T16:56:59.287+0800: 1.866: [GC concurrent-root-region-scan-start]

2020-10-23T16:56:59.287+0800: 1.866: Total time for which application threads were stopped: 0.0043246 seconds, Stopping threads took: 0.0000480 seconds

2020-10-23T16:56:59.287+0800: 1.866: [GC concurrent-root-region-scan-end, 0.0003655 secs]

2020-10-23T16:56:59.287+0800: 1.866: [GC concurrent-mark-start]

2020-10-23T16:56:59.299+0800: 1.878: [GC concurrent-mark-end, 0.0119317 secs]

2020-10-23T16:56:59.300+0800: 1.879: [GC remark, 0.0025344 secs]

2020-10-23T16:56:59.302+0800: 1.881: Total time for which application threads were stopped: 0.0027712 seconds, Stopping threads took: 0.0001514 seconds

2020-10-23T16:56:59.303+0800: 1.882: [GC cleanup 714M->709M(1024M), 0.0007929 secs]

2020-10-23T16:56:59.304+0800: 1.883: Total time for which application threads were stopped: 0.0008933 seconds, Stopping threads took: 0.0000334 seconds

2020-10-23T16:56:59.304+0800: 1.883: [GC concurrent-cleanup-start]

2020-10-23T16:56:59.304+0800: 1.883: [GC concurrent-cleanup-end, 0.0000183 secs]


```
2020-10-23T16:56:59.379+0800: 1.958: [GC pause (G1 Evacuation Pause) (young)
885M->720M(1024M), 0.0164389 secs]
2020-10-23T16:56:59.395+0800: 1.974: Total time for which application threads
were stopped: 0.0166214 seconds, Stopping threads took: 0.0000400 seconds
2020-10-23T16:56:59.405+0800: 1.984: [GC pause (G1 Evacuation Pause) (mixed)
761M->635M(1024M), 0.0083875 secs]
2020-10-23T16:56:59.413+0800: 1.992: Total time for which application threads
were stopped: 0.0085880 seconds, Stopping threads took: 0.0000304 seconds
2020-10-23T16:56:59.428+0800: 2.006: [GC pause (G1 Evacuation Pause) (mixed)
691M->561M(1024M), 0.0164316 secs]
2020-10-23T16:56:59.444+0800: 2.023: Total time for which application threads
were stopped: 0.0166108 seconds, Stopping threads took: 0.0000308 seconds
```

Java HotSpot(TM) 64-Bit Server VM (25.161-b12) for windows-amd64 JRE (1.8.0_161-b12), built on Dec 19 2017 17:52:25 by "java_re" with MS VC++ 10.0 (VS2010)
Memory: 4k page, physical 12459296k(3973560k free), swap 24916692k(14196108k free)

CommandLine flags:

```
-XX:InitialHeapSize=2147483648(2G)
-XX:MaxHeapSize=2147483648(2G)
-XX:+PrintGC
-XX:+PrintGCApplicationStoppedTime
-XX:+PrintGCDateStamps
-XX:+PrintGCTimeStamps
-XX:+UseCompressedClassPointers
-XX:+UseCompressedOops
-XX:+UseG1GC
-XX:-UseLargePagesIndividualAllocation
2020-10-23T17:01:19.254+0800: 0.955: [GC pause (G1 Evacuation Pause) (young)
121M->39M(2048M), 0.0130570 secs]
2020-10-23T17:01:19.267+0800: 0.968: Total time for which application threads
were stopped: 0.0133246 seconds, Stopping threads took: 0.0000429 seconds
2020-10-23T17:01:19.303+0800: 1.004: [GC pause (G1 Evacuation Pause) (young)
151M->73M(2048M), 0.0120652 secs]
2020-10-23T17:01:19.315+0800: 1.016: Total time for which application threads
were stopped: 0.0122393 seconds, Stopping threads took: 0.0000312 seconds
2020-10-23T17:01:19.344+0800: 1.045: [GC pause (G1 Evacuation Pause) (young)
186M->106M(2048M), 0.0101169 secs]
2020-10-23T17:01:19.354+0800: 1.055: Total time for which application threads
were stopped: 0.0102712 seconds, Stopping threads took: 0.0000264 seconds
2020-10-23T17:01:19.379+0800: 1.080: [GC pause (G1 Evacuation Pause) (young)
212M->136M(2048M), 0.0103706 secs]
2020-10-23T17:01:19.390+0800: 1.090: Total time for which application threads
were stopped: 0.0105480 seconds, Stopping threads took: 0.0000367 seconds
2020-10-23T17:01:19.420+0800: 1.121: [GC pause (G1 Evacuation Pause) (young)
256M->179M(2048M), 0.0142267 secs]
2020-10-23T17:01:19.434+0800: 1.135: Total time for which application threads
were stopped: 0.0143935 seconds, Stopping threads took: 0.0000297 seconds
2020-10-23T17:01:19.457+0800: 1.158: [GC pause (G1 Evacuation Pause) (young)
289M->212M(2048M), 0.0115380 secs]
2020-10-23T17:01:19.469+0800: 1.170: Total time for which application threads
were stopped: 0.0117041 seconds, Stopping threads took: 0.0000337 seconds
2020-10-23T17:01:19.503+0800: 1.204: [GC pause (G1 Evacuation Pause) (young)
343M->256M(2048M), 0.0176415 secs]
2020-10-23T17:01:19.521+0800: 1.222: Total time for which application threads
were stopped: 0.0178054 seconds, Stopping threads took: 0.0000330 seconds
2020-10-23T17:01:19.560+0800: 1.261: [GC pause (G1 Evacuation Pause) (young)
408M->297M(2048M), 0.0161130 secs]
2020-10-23T17:01:19.577+0800: 1.277: Total time for which application threads
were stopped: 0.0162765 seconds, Stopping threads took: 0.0000315 seconds
2020-10-23T17:01:19.828+0800: 1.529: [GC pause (G1 Evacuation Pause) (young)
747M->411M(2048M), 0.0359422 secs]
2020-10-23T17:01:19.864+0800: 1.565: Total time for which application threads
were stopped: 0.0361350 seconds, Stopping threads took: 0.0000352 seconds
2020-10-23T17:01:19.899+0800: 1.600: [GC pause (G1 Evacuation Pause) (young)
544M->441M(2048M), 0.0128371 secs]
```

```
2020-10-23T17:01:19.912+0800: 1.613: Total time for which application threads
were stopped: 0.0130303 seconds, Stopping threads took: 0.0000352 seconds
2020-10-23T17:01:19.983+0800: 1.684: [GC pause (G1 Evacuation Pause) (young)
727M->519M(2048M), 0.0199281 secs]
2020-10-23T17:01:20.003+0800: 1.704: Total time for which application threads
were stopped: 0.0200934 seconds, Stopping threads took: 0.0000315 seconds
2020-10-23T17:01:20.091+0800: 1.792: [GC pause (G1 Evacuation Pause) (young)
860M->600M(2048M), 0.0453003 secs]
2020-10-23T17:01:20.137+0800: 1.838: Total time for which application threads
were stopped: 0.0454546 seconds, Stopping threads took: 0.0000279 seconds
```

```
Java HotSpot(TM) 64-Bit Server VM (25.161-b12) for windows-amd64 JRE (1.8.0_161-
b12), built on Dec 19 2017 17:52:25 by "java_re" with MS VC++ 10.0 (VS2010)
Memory: 4k page, physical 12459296k(3956448k free), swap 24916692k(14431036k
free)
```

```
CommandLine flags:
```

```
-XX:InitialHeapSize=4294967296(4G)
-XX:MaxHeapSize=4294967296(4G)
-XX:+PrintGC -XX:+PrintGCApplicationStoppedTime
-XX:+PrintGCDateStamps
-XX:+PrintGCTimeStamps
-XX:+UseCompressedClassPointers
-XX:+UseCompressedOops
-XX:+UseG1GC
-XX:-UseLargePagesIndividualAllocation
```

```
2020-10-23T17:05:36.973+0800: 0.940: Total time for which application threads
were stopped: 0.0001737 seconds, Stopping threads took: 0.0000400 seconds
2020-10-23T17:05:37.151+0800: 1.118: [GC pause (G1 Evacuation Pause) (young)
204M->73M(4096M), 0.0245068 secs]
2020-10-23T17:05:37.176+0800: 1.143: Total time for which application threads
were stopped: 0.0248202 seconds, Stopping threads took: 0.0000345 seconds
2020-10-23T17:05:37.221+0800: 1.188: [GC pause (G1 Evacuation Pause) (young)
251M->129M(4096M), 0.0411256 secs]
2020-10-23T17:05:37.262+0800: 1.229: Total time for which application threads
were stopped: 0.0413111 seconds, Stopping threads took: 0.0000440 seconds
2020-10-23T17:05:37.300+0800: 1.267: [GC pause (G1 Evacuation Pause) (young)
307M->186M(4096M), 0.0214757 secs]
2020-10-23T17:05:37.322+0800: 1.289: Total time for which application threads
were stopped: 0.0216370 seconds, Stopping threads took: 0.0000323 seconds
2020-10-23T17:05:37.355+0800: 1.322: [GC pause (G1 Evacuation Pause) (young)
364M->253M(4096M), 0.0221113 secs]
2020-10-23T17:05:37.378+0800: 1.345: Total time for which application threads
were stopped: 0.0222700 seconds, Stopping threads took: 0.0000290 seconds
2020-10-23T17:05:37.408+0800: 1.376: [GC pause (G1 Evacuation Pause) (young)
431M->318M(4096M), 0.0206961 secs]
2020-10-23T17:05:37.429+0800: 1.396: Total time for which application threads
were stopped: 0.0209032 seconds, Stopping threads took: 0.0000389 seconds
2020-10-23T17:05:37.463+0800: 1.430: [GC pause (G1 Evacuation Pause) (young)
496M->379M(4096M), 0.0211828 secs]
2020-10-23T17:05:37.484+0800: 1.451: Total time for which application threads
were stopped: 0.0213515 seconds, Stopping threads took: 0.0000315 seconds
2020-10-23T17:05:37.521+0800: 1.488: [GC pause (G1 Evacuation Pause) (young)
557M->442M(4096M), 0.0298643 secs]
2020-10-23T17:05:37.551+0800: 1.518: Total time for which application threads
were stopped: 0.0300351 seconds, Stopping threads took: 0.0000356 seconds
2020-10-23T17:05:37.585+0800: 1.552: [GC pause (G1 Evacuation Pause) (young)
620M->507M(4096M), 0.0239906 secs]
2020-10-23T17:05:37.609+0800: 1.576: Total time for which application threads
were stopped: 0.0241483 seconds, Stopping threads took: 0.0000290 seconds
2020-10-23T17:05:37.639+0800: 1.606: [GC pause (G1 Evacuation Pause) (young)
685M->567M(4096M), 0.0201418 secs]
2020-10-23T17:05:37.659+0800: 1.627: Total time for which application threads
were stopped: 0.0203181 seconds, Stopping threads took: 0.0000326 seconds
2020-10-23T17:05:37.694+0800: 1.661: [GC pause (G1 Evacuation Pause) (young)
755M->639M(4096M), 0.0268355 secs]
2020-10-23T17:05:37.721+0800: 1.688: Total time for which application threads
were stopped: 0.0270015 seconds, Stopping threads took: 0.0000370 seconds
```

```
2020-10-23T17:05:37.786+0800: 1.753: [GC pause (G1 Evacuation Pause) (young)
885M->722M(4096M), 0.0301235 secs]
2020-10-23T17:05:37.816+0800: 1.783: Total time for which application threads
were stopped: 0.0303203 seconds, Stopping threads took: 0.0000381 seconds
2020-10-23T17:05:37.880+0800: 1.847: [GC pause (G1 Evacuation Pause) (young)
982M->811M(4096M), 0.0521098 secs]
2020-10-23T17:05:37.932+0800: 1.899: Total time for which application threads
were stopped: 0.0523081 seconds, Stopping threads took: 0.0000381 seconds
```

结论：G1在堆空间越来越大的情况下，可以看到和串行、并行GC一样的特性，就是对越大GC次数越少，但是单次GC时间越长，但是注意观察G1日志，再堆越来越大的情况下，每次GC暂停时间总体好过其他GC