Gaea

- jvm 参数:

  -XX:CICompilerCount=15 -XX:ConcGCThreads=8 -XX:G1ConcRefinementThreads=33 -XX:G1HeapRegionSize=2097152 -XX:GCDrainStackTargetSize=64 -XX:+HeapDumpOnOutOfMemoryError -XX:InitialHeapSize=1073741824 -XX:MarkStackSize=4194304 -XX:MaxHeapSize=10737418240 -XX:MaxNewSize=6442450944 -XX:MinHeapDeltaBytes=2097152 -XX:NativeMemoryTracking=summary -XX:NonNMethodCodeHeapSize=8182140 -XX:NonProfiledCodeHeapSize=121738050 -XX:+PrintGCDetails -XX:ProfiledCodeHeapSize=121738050 -XX:ReservedCodeCacheSize=251658240 -XX:+SegmentedCodeCache -XX:+UseCompressedClassPointers -XX:+UseCompressedOops -XX:+UseFastUnorderedTimeStamps -XX:+UseG1GC

- 参数说明:

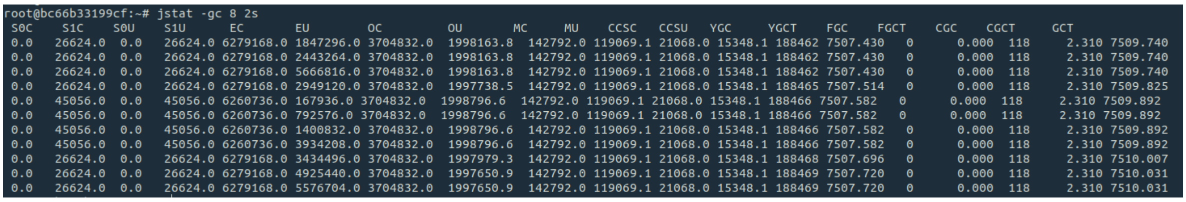
  最小堆大小（InitialHeapSize）：1073741824（1G）
  最大堆大小（MaxHeapSize）：10737418240 （10G）
  最大新生代大小（MaxNewSize）：6442450944（6G）（G1不设置新生代大小，默认为最大堆的60%，新生代实际大小G1会动态调整）

- 实际内存使用分布:

```
root@bc66b33199cf:~# jcmd 8 VM.native_memory summary scale=MB
8:

Native Memory Tracking:

Total: reserved=17510MB, committed=14196MB    -----> reserved表示程序可以使用的内
存，指申请的虚拟地址空间大小，
                                                     commited表示程序正在使用的内存
大小，指操作系统实际分配的大小
-                  Java Heap (reserved=10240MB, committed=9776MB)      ------>
java堆空间，可用10G,实际使用9.7G左右
                            (mmap: reserved=10240MB, committed=9776MB)

-                      Class (reserved=1150MB, committed=146MB)      --------> 主
要对应meta空间
                            (classes #16666)                          ------> 已经
加载的类数量
                            (  instance classes #15939, array classes #727)
                            (malloc=6MB #92989)
                            (mmap: reserved=1144MB, committed=139MB)
                            (  Metadata:   )
                            (    reserved=120MB, committed=119MB)
                            (    used=101MB)
                            (    free=18MB)
                            (    waste=0MB =0.00%)
                            (  Class space:)
                            (    reserved=1024MB, committed=21MB)
                            (    used=15MB)
                            (    free=6MB)
                            (    waste=0MB =0.00%)
```

```
-                    Thread (reserved=1900MB, committed=205MB)       -----------
-> 主要对应线程栈大小
                            (thread #1884)                         --------------
-> 线程数量
                            (stack: reserved=1891MB, committed=196MB)
                            (malloc=7MB #11306)
                            (arena=2MB #3766)

-                      Code (reserved=245MB, committed=111MB)      --------------
> JIT 编译的热点代码
                            (malloc=3MB #9872)
                            (mmap: reserved=242MB, committed=108MB)
-                        GC (reserved=552MB, committed=534MB)       -------------
> 帮助GC使用的内存
                            (malloc=134MB #184452)
                            (mmap: reserved=417MB, committed=400MB)

-                  Compiler (reserved=21MB, committed=21MB)
                            (malloc=21MB #9152)

-                  Internal (reserved=216MB, committed=216MB)
                            (malloc=216MB #2783270)

-                     Other (reserved=3111MB, committed=3111MB)      -----------
---> 其他未归类的内存
                            (malloc=3111MB #965)

-                    Symbol (reserved=23MB, committed=23MB)
                            (malloc=20MB #201424)
                            (arena=3MB #1)

-    Native Memory Tracking (reserved=51MB, committed=51MB)
                            (tracking overhead=51MB)

-              Synchronizer (reserved=1MB, committed=1MB)
                            (malloc=1MB #10544)
```

- 堆内存使用情况:



```
root@bc66b33199cf:~# jstat -gc 8 2s
 S0C    S1C    S0U    S1U      EC       EU        OC         OU       MC     MU    CCSC   CCSU   YGC     YGCT    FGC    FGCT     CGC    CGCT     GCT
 0.0   26624.0  0.0   26624.0 6279168.0 1847296.0 3704832.0  1998163.8  142792.0 119069.1 21068.0 15348.1 188462 7507.430   0      0.000  118      2.310 7509.740
 0.0   26624.0  0.0   26624.0 6279168.0 2443264.0 3704832.0  1998163.8  142792.0 119069.1 21068.0 15348.1 188462 7507.430   0      0.000  118      2.310 7509.740
 0.0   26624.0  0.0   26624.0 6279168.0 5666816.0 3704832.0  1998163.8  142792.0 119069.1 21068.0 15348.1 188462 7507.430   0      0.000  118      2.310 7509.740
 0.0   26624.0  0.0   26624.0 6279168.0 2949120.0 3704832.0  1997738.5  142792.0 119069.1 21068.0 15348.1 188465 7507.514   0      0.000  118      2.310 7509.825
 0.0   45056.0  0.0   45056.0 6260736.0 167936.0 3704832.0  1998796.6  142792.0 119069.1 21068.0 15348.1 188466 7507.582   0      0.000  118      2.310 7509.892
 0.0   45056.0  0.0   45056.0 6260736.0 792576.0 3704832.0  1998796.6  142792.0 119069.1 21068.0 15348.1 188466 7507.582   0      0.000  118      2.310 7509.892
 0.0   45056.0  0.0   45056.0 6260736.0 1400832.0 3704832.0  1998796.6  142792.0 119069.1 21068.0 15348.1 188466 7507.582   0      0.000  118      2.310 7509.892
 0.0   45056.0  0.0   45056.0 6260736.0 3934208.0 3704832.0  1998796.6  142792.0 119069.1 21068.0 15348.1 188466 7507.582   0      0.000  118      2.310 7509.892
 0.0   26624.0  0.0   26624.0 6279168.0 3434496.0 3704832.0  1997979.3  142792.0 119069.1 21068.0 15348.1 188468 7507.696   0      0.000  118      2.310 7510.007
 0.0   26624.0  0.0   26624.0 6279168.0 4925440.0 3704832.0  1997650.9  142792.0 119069.1 21068.0 15348.1 188469 7507.720   0      0.000  118      2.310 7510.031
 0.0   26624.0  0.0   26624.0 6279168.0 5576704.0 3704832.0  1997650.9  142792.0 119069.1 21068.0 15348.1 188469 7507.720   0      0.000  118      2.310 7510.031
```

```
EC: 新生代内存大小  EU: 新生代实际占用内存
OC: 老年代内存大小  OU: 老年代实际使用内存大小
YGC: 新生代GC次数 YGCT: 新生代GC总时间
FGC: 老年代GC次数     FGCT: 老年代GC总时间
```

- 分析:

应用程序整个使用内存为15G左右，整个堆占用10G，堆内存中新生代占用6G，老年代占用3.7G左右，通过堆内存使用情况可以看出差不多10s左右会有yang GC，而GC回收内存能从5.6G回收到168M,说明新生代产生垃圾较多，分析主要是Gaea中有同步和拓扑变更的操作，并且使用scala做值传递，每个消息对象或者业务对象在函数调用完成后都会变成垃圾，所以新生代回收频率较高

- 总结:

  内存状态正常

Uranus:

- jvm 参数:

  -XX:CICompilerCount=15 -XX:ConcGCThreads=8 -XX:G1ConcRefinementThreads=33 -XX:G1HeapRegionSize=2097152 -XX:GCDrainStackTargetSize=64 -XX:+HeapDumpOnOutOfMemoryError -XX:InitialHeapSize=2147483648 -XX:MarkStackSize=4194304 -XX:MaxHeapSize=6442450944 -XX:MaxNewSize=3865051136 -XX:MinHeapDeltaBytes=2097152 -XX:NativeMemoryTracking=summary -XX:NonNMethodCodeHeapSize=8182140 -XX:NonProfiledCodeHeapSize=121738050 -XX:+PrintGCDetails -XX:ProfiledCodeHeapSize=121738050 -XX:ReservedCodeCacheSize=251658240 -XX:+SegmentedCodeCache -XX:+UseCompressedClassPointers -XX:+UseCompressedOops -XX:+UseFastUnorderedTimeStamps -XX:+UseG1GC

- 参数说明:

  最小堆大小（InitialHeapSize）：2147483648（2G）

  最大堆大小（MaxHeapSize）：6442450944 （6G）

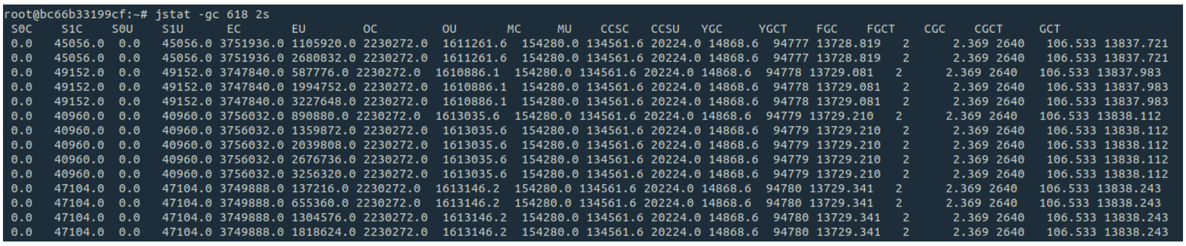
  最大新生代大小（MaxNewSize）：3865051136（3.6G） （G1不设置新生代大小，默认为最大堆的60%，新生代实际大小G1会动态调整）

- 实际内存分布：（参数代表含义参考Gaea）

```
618:

Native Memory Tracking:

Total: reserved=29900MB, committed=9487MB
-                 Java Heap (reserved=6144MB, committed=5886MB)
                            (mmap: reserved=6144MB, committed=5886MB)

-                     Class (reserved=1176MB, committed=171MB)
                            (classes #23275)
                            (  instance classes #21973, array classes #1302)
                            (malloc=20MB #128358)
                            (mmap: reserved=1156MB, committed=151MB)
                            (  Metadata:   )
                            (    reserved=132MB, committed=131MB)
                            (    used=117MB)
                            (    free=14MB)
                            (    waste=0MB =0.00%)
                            (  Class space:)
                            (    reserved=1024MB, committed=20MB)
                            (    used=15MB)
                            (    free=5MB)
                            (    waste=0MB =0.00%)

-                    Thread (reserved=20272MB, committed=1251MB)
```

```
                            (thread #20098)
                            (stack: reserved=20178MB, committed=1157MB)
                            (malloc=71MB #120602)
                            (arena=23MB #40198)

-                      Code (reserved=248MB, committed=130MB)
                            (malloc=6MB #19652)
                            (mmap: reserved=242MB, committed=123MB)

-                        GC (reserved=474MB, committed=464MB)
                            (malloc=211MB #265075)
                            (mmap: reserved=263MB, committed=253MB)

-                  Compiler (reserved=30MB, committed=30MB)
                            (malloc=30MB #16149)

-                  Internal (reserved=148MB, committed=148MB)
                            (malloc=148MB #231325)

-                     Other (reserved=1345MB, committed=1345MB)
                            (malloc=1345MB #15420)

-                    Symbol (reserved=24MB, committed=24MB)
                            (malloc=21MB #288254)
                            (arena=3MB #1)

-    Native Memory Tracking (reserved=24MB, committed=24MB)
                            (malloc=5MB #72717)
                            (tracking overhead=19MB)

-               Arena Chunk (reserved=5MB, committed=5MB)
                            (malloc=5MB)

-                    Module (reserved=1MB, committed=1MB)
                            (malloc=1MB #4969)

-              Synchronizer (reserved=9MB, committed=9MB)
                            (malloc=9MB #68133)
```

- 堆内存使用情况（参数参考gaea）：



```
root@bc66b33199cf:~# jstat -gc 618 2s
 S0C    S1C    S0U    S1U      EC       EU        OC         OU       MC     MU    CCSC   CCSU   YGC     YGCT    FGC    FGCT     CGC    CGCT     GCT
 0.0   45056.0  0.0   45056.0 3751936.0 1105920.0 2230272.0  1611261.6  154280.0 134561.6 20224.0 14868.6  94777 13728.819   2      2.369 2640   106.533 13837.721
 0.0   45056.0  0.0   45056.0 3751936.0 2680832.0 2230272.0  1611261.6  154280.0 134561.6 20224.0 14868.6  94777 13728.819   2      2.369 2640   106.533 13837.721
 0.0   49152.0  0.0   49152.0 3747840.0 587776.0 2230272.0  1610886.1  154280.0 134561.6 20224.0 14868.6  94778 13729.081   2      2.369 2640   106.533 13837.983
 0.0   49152.0  0.0   49152.0 3747840.0 1994752.0 2230272.0  1610886.1  154280.0 134561.6 20224.0 14868.6  94778 13729.081   2      2.369 2640   106.533 13837.983
 0.0   49152.0  0.0   49152.0 3747840.0 3227648.0 2230272.0  1610886.1  154280.0 134561.6 20224.0 14868.6  94778 13729.081   2      2.369 2640   106.533 13837.983
 0.0   40960.0  0.0   40960.0 3756032.0 890880.0 2230272.0  1613035.6  154280.0 134561.6 20224.0 14868.6  94779 13729.210   2      2.369 2640   106.533 13838.112
 0.0   40960.0  0.0   40960.0 3756032.0 1359872.0 2230272.0  1613035.6  154280.0 134561.6 20224.0 14868.6  94779 13729.210   2      2.369 2640   106.533 13838.112
 0.0   40960.0  0.0   40960.0 3756032.0 2039808.0 2230272.0  1613035.6  154280.0 134561.6 20224.0 14868.6  94779 13729.210   2      2.369 2640   106.533 13838.112
 0.0   40960.0  0.0   40960.0 3756032.0 2676736.0 2230272.0  1613035.6  154280.0 134561.6 20224.0 14868.6  94779 13729.210   2      2.369 2640   106.533 13838.112
 0.0   40960.0  0.0   40960.0 3756032.0 3256320.0 2230272.0  1613035.6  154280.0 134561.6 20224.0 14868.6  94779 13729.210   2      2.369 2640   106.533 13838.112
 0.0   47104.0  0.0   47104.0 3749888.0 137216.0 2230272.0  1613146.2  154280.0 134561.6 20224.0 14868.6  94780 13729.341   2      2.369 2640   106.533 13838.243
 0.0   47104.0  0.0   47104.0 3749888.0 655360.0 2230272.0  1613146.2  154280.0 134561.6 20224.0 14868.6  94780 13729.341   2      2.369 2640   106.533 13838.243
 0.0   47104.0  0.0   47104.0 3749888.0 1304576.0 2230272.0  1613146.2  154280.0 134561.6 20224.0 14868.6  94780 13729.341   2      2.369 2640   106.533 13838.243
 0.0   47104.0  0.0   47104.0 3749888.0 1818624.0 2230272.0  1613146.2  154280.0 134561.6 20224.0 14868.6  94780 13729.341   2      2.369 2640   106.533 13838.243
```

- 分析:

  从堆内存使用情况分析，新生代占用大概3.6G, 老年代占用2.2G左右，新生代8-10s会GC一次，每次GC能回收2G左右的内存，老年代发生过2次FGC，主要是新生代GC会有对象送入老年代，烤机花费一周时间，发生两次回收属于正常GC，由于onos和设备之间有flowstats,tablestats的openflow消息通信，同时和gaea之间有同步流程，所以新生代回收效率也比较高，但是和gaea不同，方法间调用使用引用传递，产生的垃圾没有Gaea多

- 总结:

内存状态正常