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JVM Optimizations in Java9

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Java Your Next (Cloud)

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Agenda of the day …

1. Code Cache Segmentation - JEP 197
2. Garbage First (G1) Collector - JEP 248
3. Compact Strings - JEP 254
4. Unified JVM Logging - JEP 158
5. Compiler Control - JEP 165
6. References

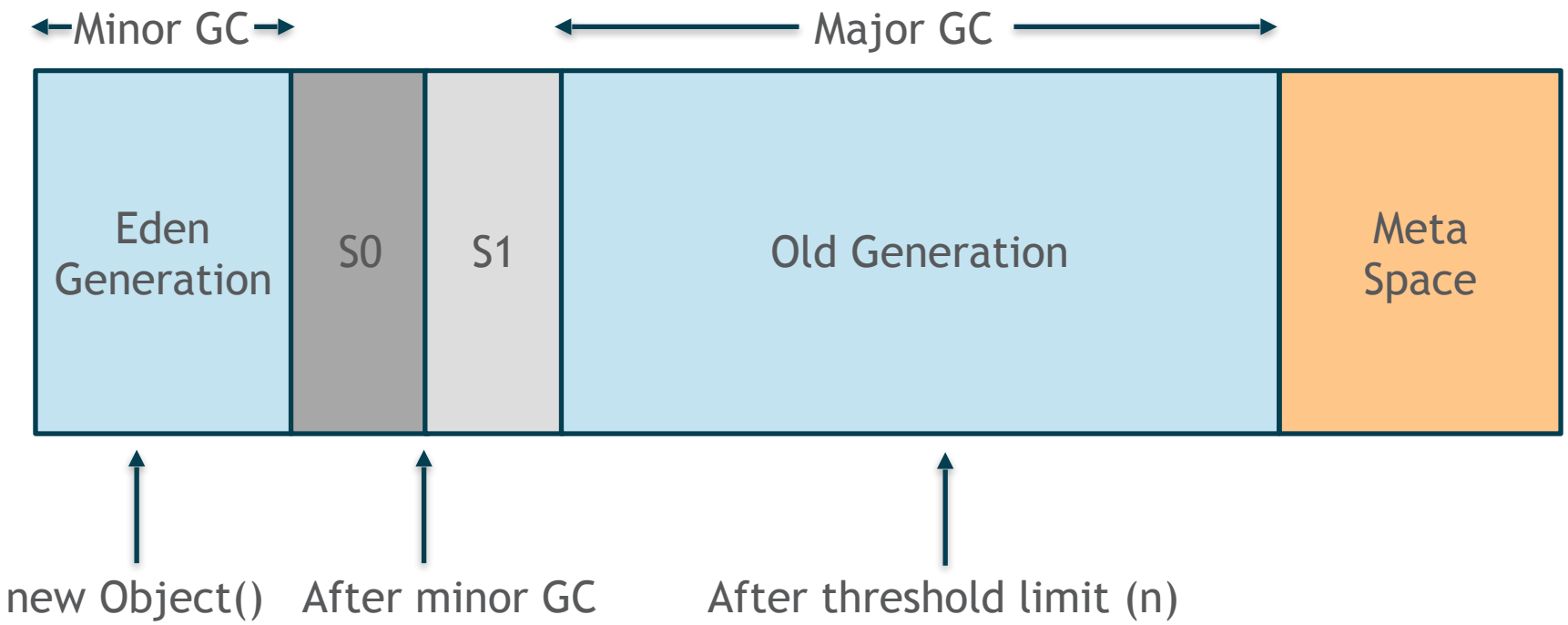
Code Cache Segmentation - JEP 197

- Lets understand a bit of Runtime Compilers
  - C1, C2
  - Tiered Compilation
- What if code cache is smaller than expected ?
- Pre-Java9 - Code cache was not segmented.
- Code cache segmentation
  - ‘non-nmethods’
  - ‘non-profiled nmethods’
  - ‘profiled nmethods’

Garbage First (G1) Collector - JEP 248

- Default collector in Java9.
- Long time replacement of CMS
- Compacting, Concurrent, Parallel, Stop the World.
- Can be used in Java7 and Java8 as well [use -XX:+UseG1GC].
- G1 Goals
  - Low latency
  - Predictable (Can’t be 100 percent)
  - Easy to use (Less parameter settings)

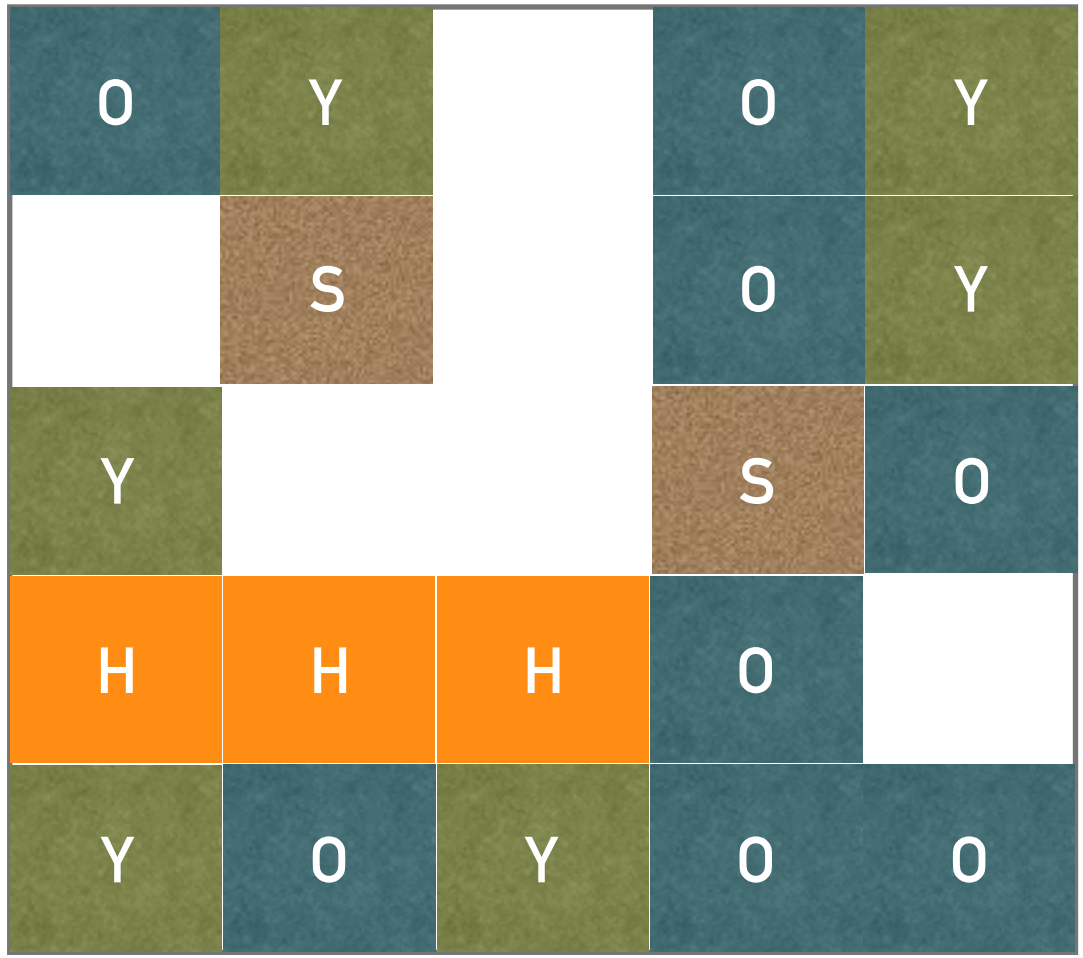
Java Heap Structure



Weak Generational Hypothesis :

- Most of the object die young.
- There are very few old to young reference.

Garbage First (G1) - Memory layout



- Memory is divided into small regions
- More than 2000 regions
- More flexible boundaries
- Use -XX:+G1HeapRegionSize
- Different regions :
  - Young
  - Survivor
  - Old
  - Humongous

Compact Strings - JEP 254

- In general, 20-25 percent of the java heap is String.
- In stead of char[], String is now byte[]
- “coder” field will decide UTF16 or Latin-1
- To disable the feature, use -XX:-CompactStrings
- Performance impact - Minimal

Unified JVM Logging - JEP 158

- Common Command Line option for all logging.
- Logging can use tags (compiler, gc, metaspace, …) and can use levels (error, warning, info, …)
- File rotations to log files.
- Print line-at-a-time
- Some examples :-
  - Xlog:gc*
  - Xlog:disable
  - Xlog:help

Compiler Control - JEP 165

- Fine grained and method context dependent control on JVM Compilers - C1 and C2.
- Ability to change the JVM compiler control at runtime.

```
[
  {
      // pattern to match against class+method+signature
      // leading and trailing wildcard (*) allowed
      match: “apa/Dingo.*",
      c2: {
          // control inlining of method
          // + force inline, - dont inline
          inline : [ "+java/util.*", "-com/sun.*"],
      }
      // applies to all compilers
      // + force inline, - dont inline
      inline : [ "+java/util.*", "-com/sun.*"],
      PrintInlining: true
  }
]
```