

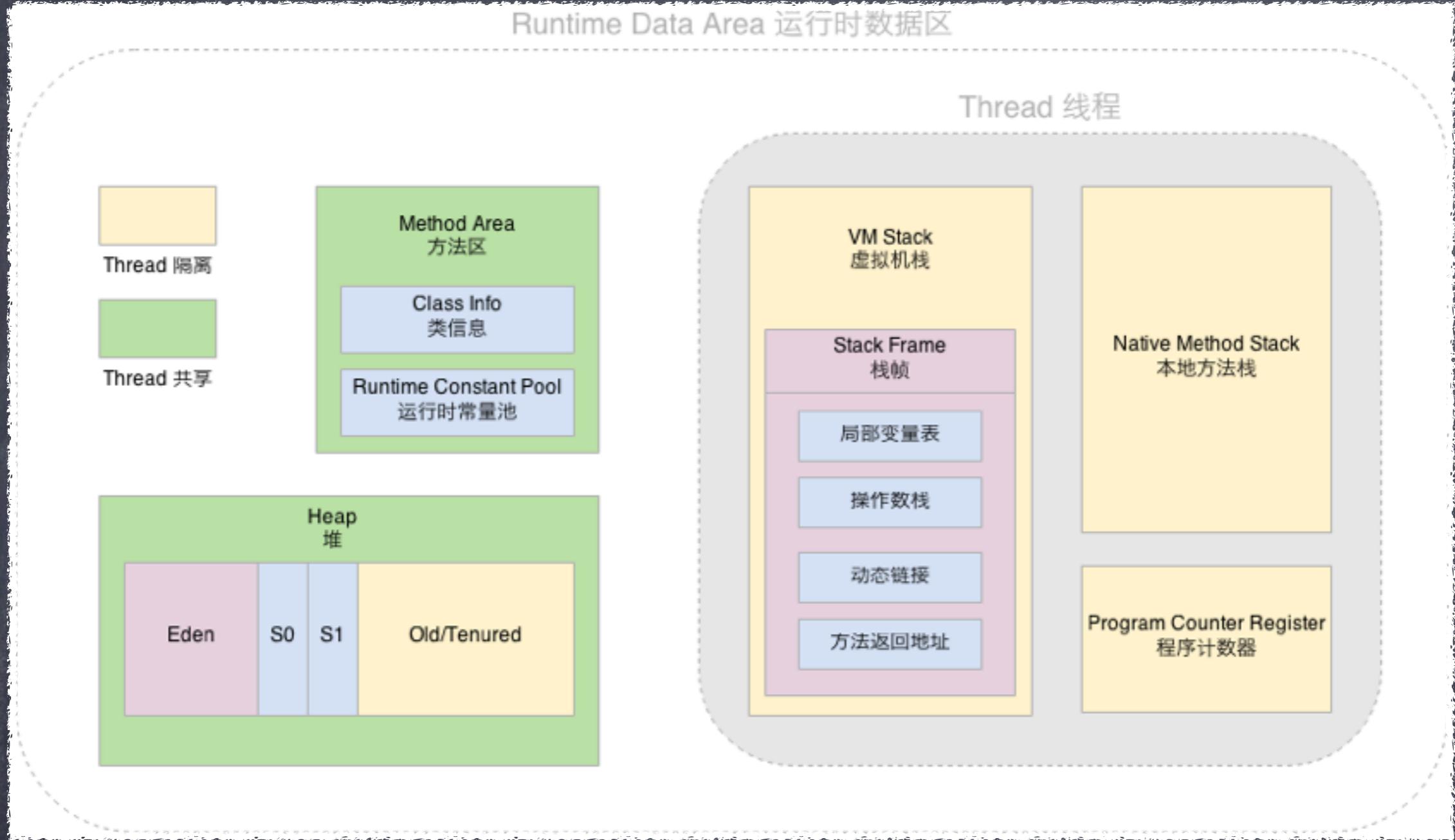
# java 内存管理与实践

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## Runtime Data Area 运行时数据区

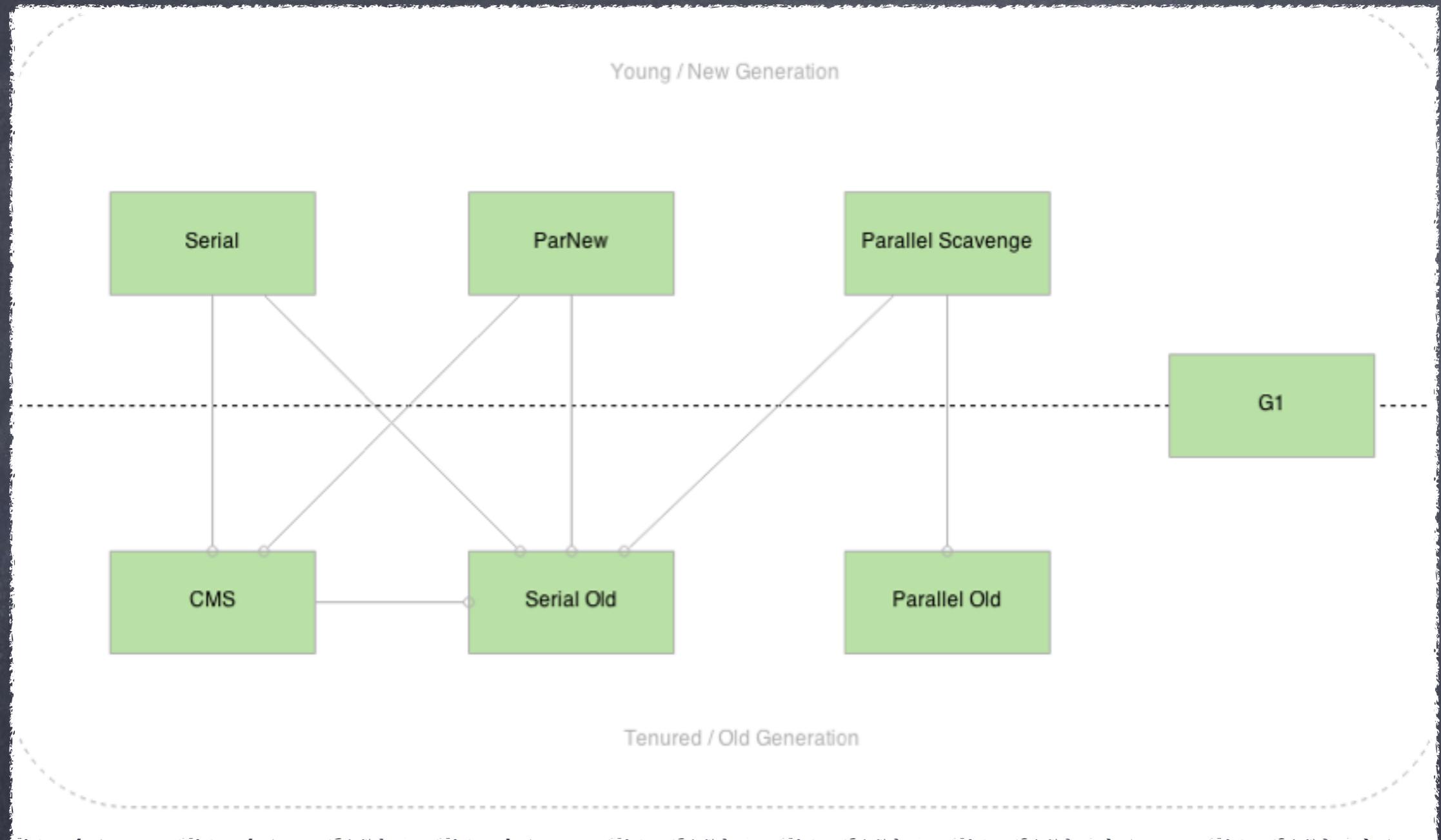


# 内存区域

# 内存分配

- 栈上分配
- 堆上分配
- *Eden* 优先分配
- *Old/Tenured* 区大对象分配
- 对象按年龄晋升



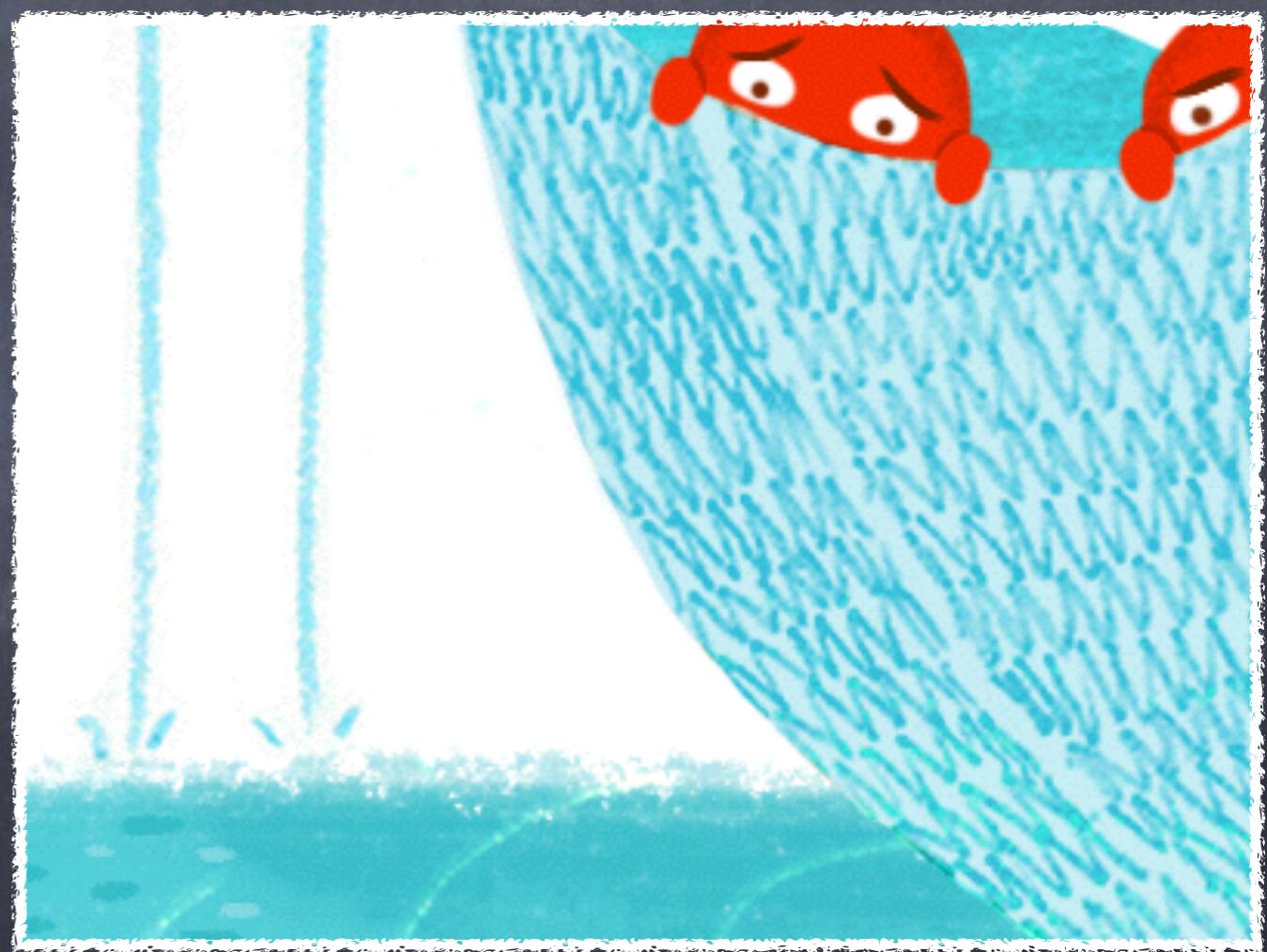


# 内存回收

GC

# 内存溢出

- memory leak
- memory overflow



# 堆溢出

java.lang.OutOfMemoryError: Java heap space



# 栈溢出

- `java.lang.StackOverflowError`
- `java.lang.OutOfMemoryError: unable to create new native thread`



# 方法区溢出

java.lang.OutOfMemoryError: PermGen space



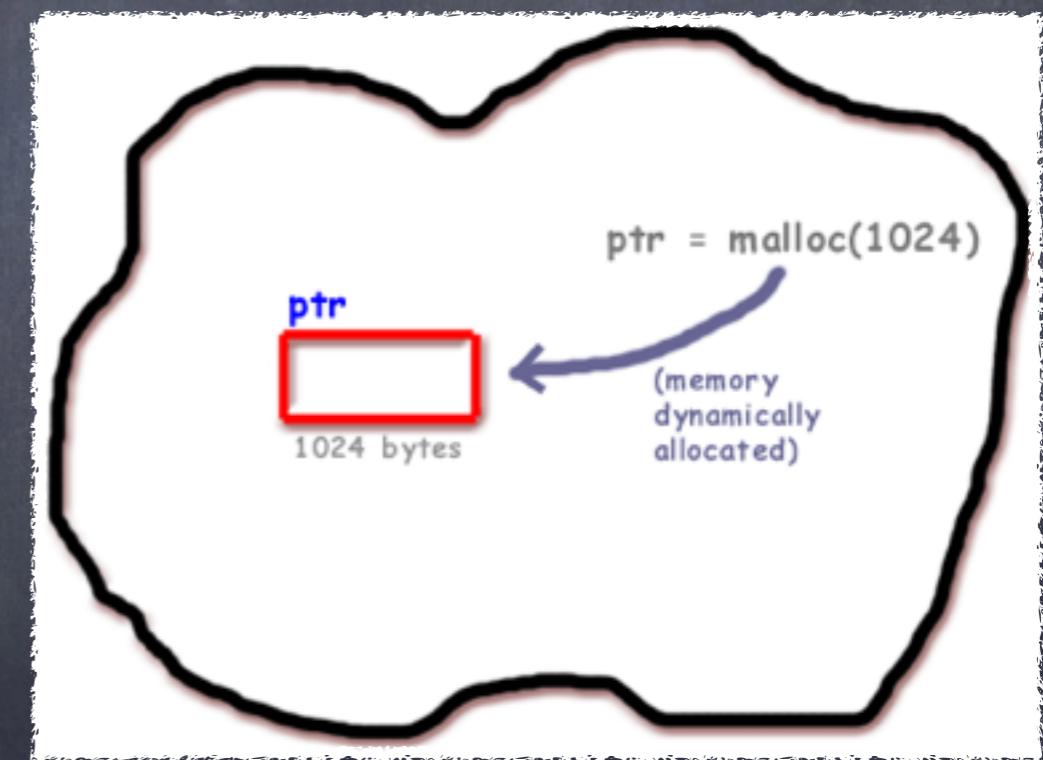
# 时间溢出

- java.lang.OutOfMemoryError: GC overhead limit exceeded - JDK1.6
- more than 98% time spent on gc and less than 2% heap recycle



# OS 内存溢出

- `java.lang.OutOfMemoryError: requested 1024 bytes for {} Out of swap space?`
- OS refuse JVM's request to allocate more memory



# OS 地址空间溢出

- java.lang.OutOfMemoryError:Map failed
- cat /proc/sys/vm/max\_map\_count

# 内存工具

## ① jstat

- jstat -gcutil pid

## ② jmap

- jmap -F -dump:format=b,file=java.dump pid

## ③ jhat

- jhat -J-mx8192m -p 7000 java.dump

## ④ jstack

- jstack -F pid



## Heap Histogram

### All Classes (excluding platform)

Class	Instance Count	Total Size
class IB	107823	1933000662
class IC	171552	15375596
class IL,java.util.HashMap\$Entry;	33032	7326280
class IL,java.lang.Object;	27477	5005088
class org.jboss.netty.channel.DefaultChannelFuture	85166	3917636
class java.lang.String	186211	3724220
class java.util.HashMap\$Entry	103567	2899876
class org.jboss.netty.channel.DownstreamMessageEvent	83401	2668832
class java.lang.reflect.Method	17964	2317356
class org.jboss.util.internal.LinkedTransferQueue\$Node	85266	2131650
class IL,java.util.concurrent.ConcurrentHashMap\$HashEntry;	49832	2069760
class II	11980	2024328
class org.jboss.netty.buffer.BigEndianHeapChannelBuffer	83359	2000616
class java.util.concurrent.ConcurrentHashMap\$HashEntry	64147	1796116
class java.lang.Class	11305	1627920
class java.util.concurrent.ConcurrentHashMap\$Segment	49844	1595008
class java.util.concurrent.locks.ReentrantLock\$NonfairSync	52276	1463728
class java.util.LinkedHashMap\$Entry	31652	1392688
class I<other>	16373	1282552
class java.util.HashMap	20313	975024
class com.id.chat.domain.walter.PopWalterGroup	39183	910440
class org.jboss.netty.buffer.TruncatedChannelBuffer	31955	894740

```
coyjy-nuteng-m:tmp minowind$ jnat -J=mx4896m -p 7000 chat=core.dump
Reading from chat-core.dump...
Jump file created Fri Feb 21 11:58:45 CST 2014
Snapshot read, resolving...
Resolving 1881828 objects...
WARNING: Failed to resolve object id 0x7f794ec50 for field first (signature L)
WARNING: Failed to resolve object id 0x7f79735f0 for field unfinalized (signature L)
WARNING: Failed to resolve object id 0x7f79ef930 for field pending (signature L)
WARNING: Failed to resolve object id 0x7f789b228 for field head (signature L)
WARNING: Failed to resolve object id 0x7f79eb388 for field _next (signature L)
WARNING: Failed to resolve object id 0x7f7992fb0 for field value (signature L)
WARNING: Failed to resolve object id 0x7f77b4ad8 for field value (signature L)
WARNING: Failed to resolve object id 0x7f7748f88 for field value (signature L)
WARNING: Failed to resolve object id 0x7f78eac78 for field head (signature L)
WARNING: Failed to resolve object id 0x7f798d790 for field value (signature L)
WARNING: Failed to resolve object id 0x7f789ffd8 for field head (signature L)
WARNING: Failed to resolve object id 0x7f79307c8 for field value (signature L)
Tracing references, expect 376 dots.....
Eliminating duplicate references.....
Snapshot resolved.
started HTTP server on port 7000
Server is ready.
```

"stay hungry stay foolish."

-Steve Jobs