

## Interleaved Loaders Test:

- Load N classes into M groups of class loaders
- release each group of loaders and collect them
- observe Metaspace used and committed size

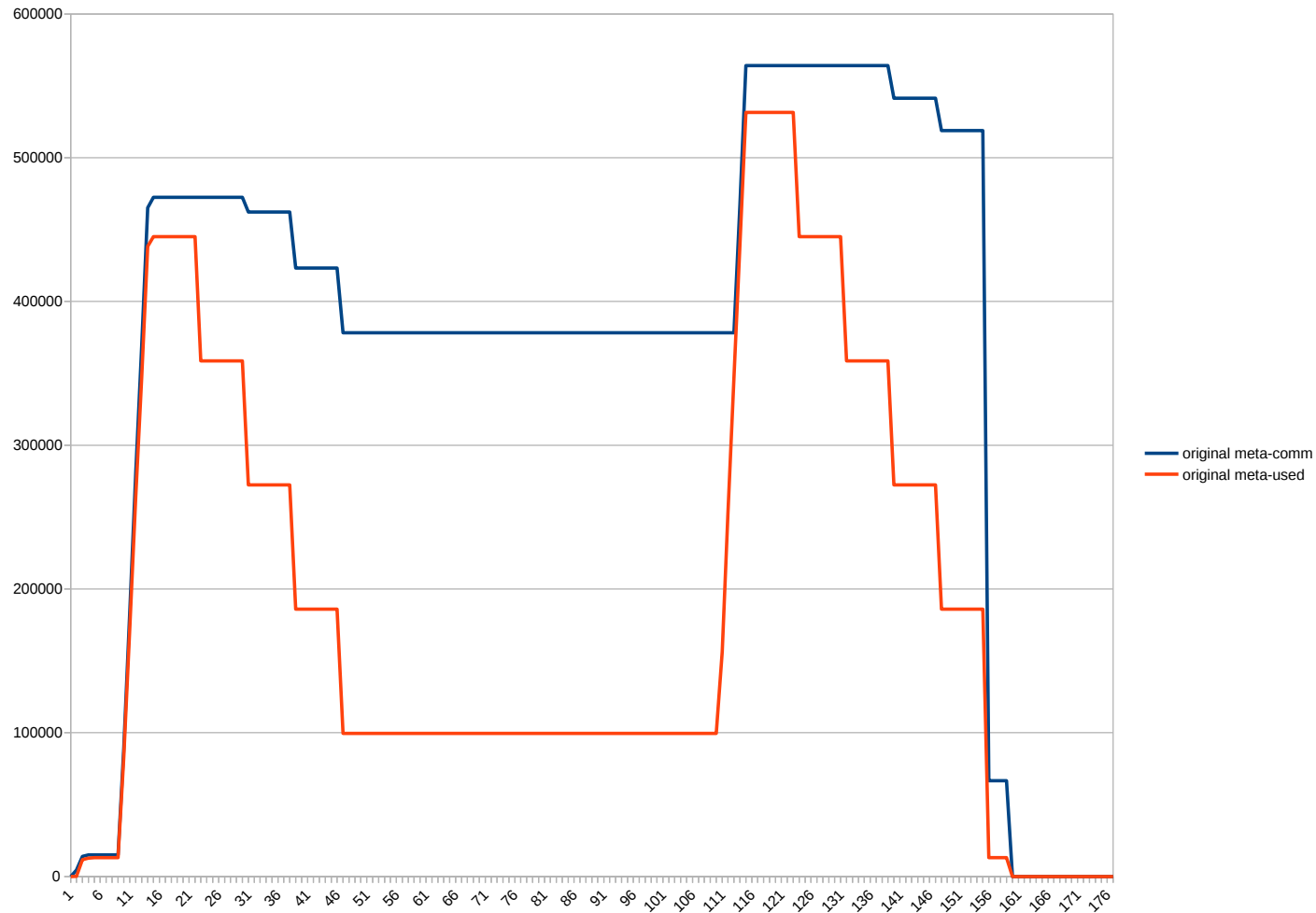
Original test sources:

<https://github.com/tstuefe/ojdk-repros/blob/master/repros8/src/main/java/de/stuefe/repros/metaspacespace/InterleavedLoaders2.java>

Raw test results:

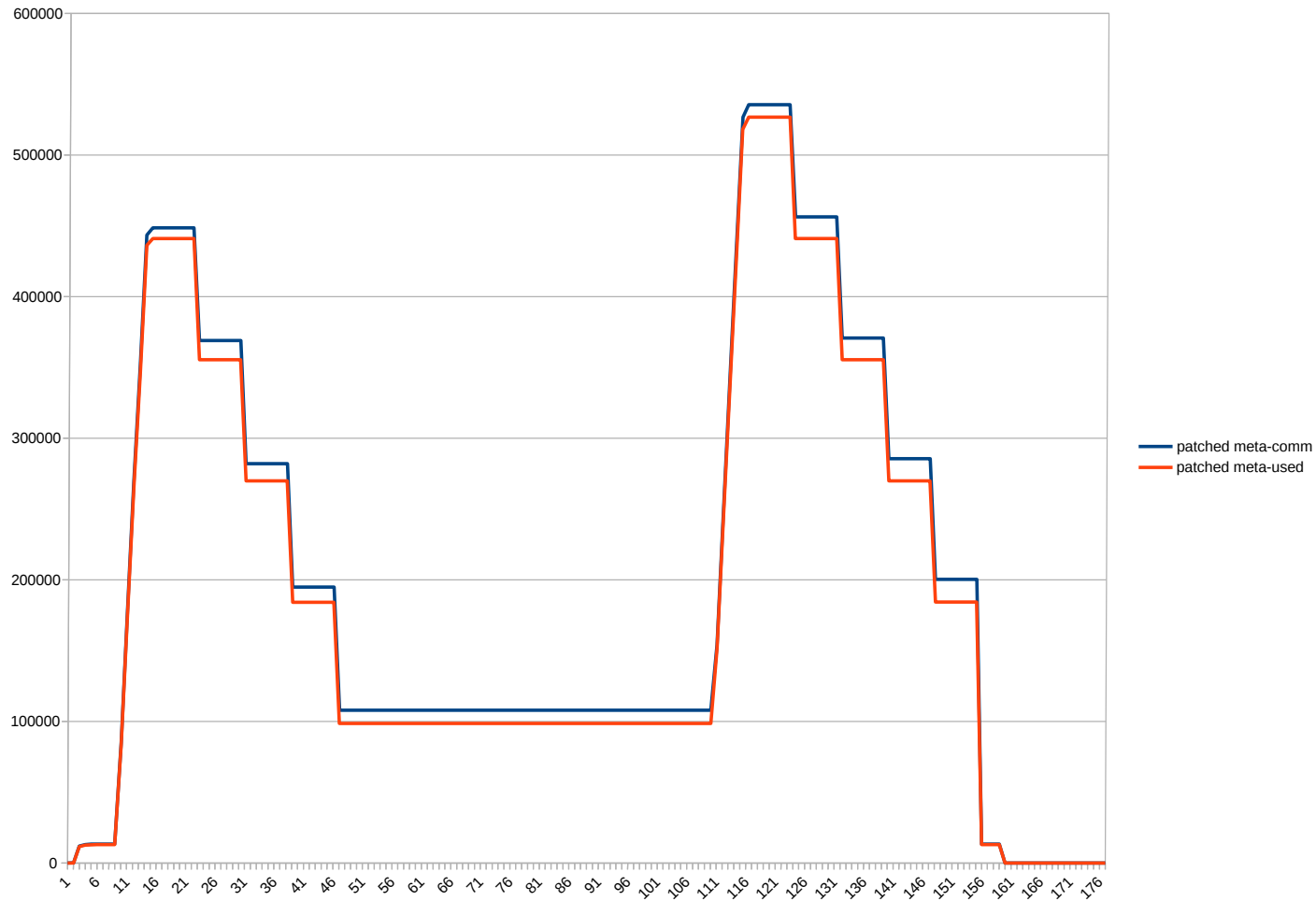
<https://github.com/tstuefe/JEP-Improve-Metaspace-Allocator/tree/master/test/test1>

# Stock VM (jdk 14), Metaspace used (red) vs committed (blue)



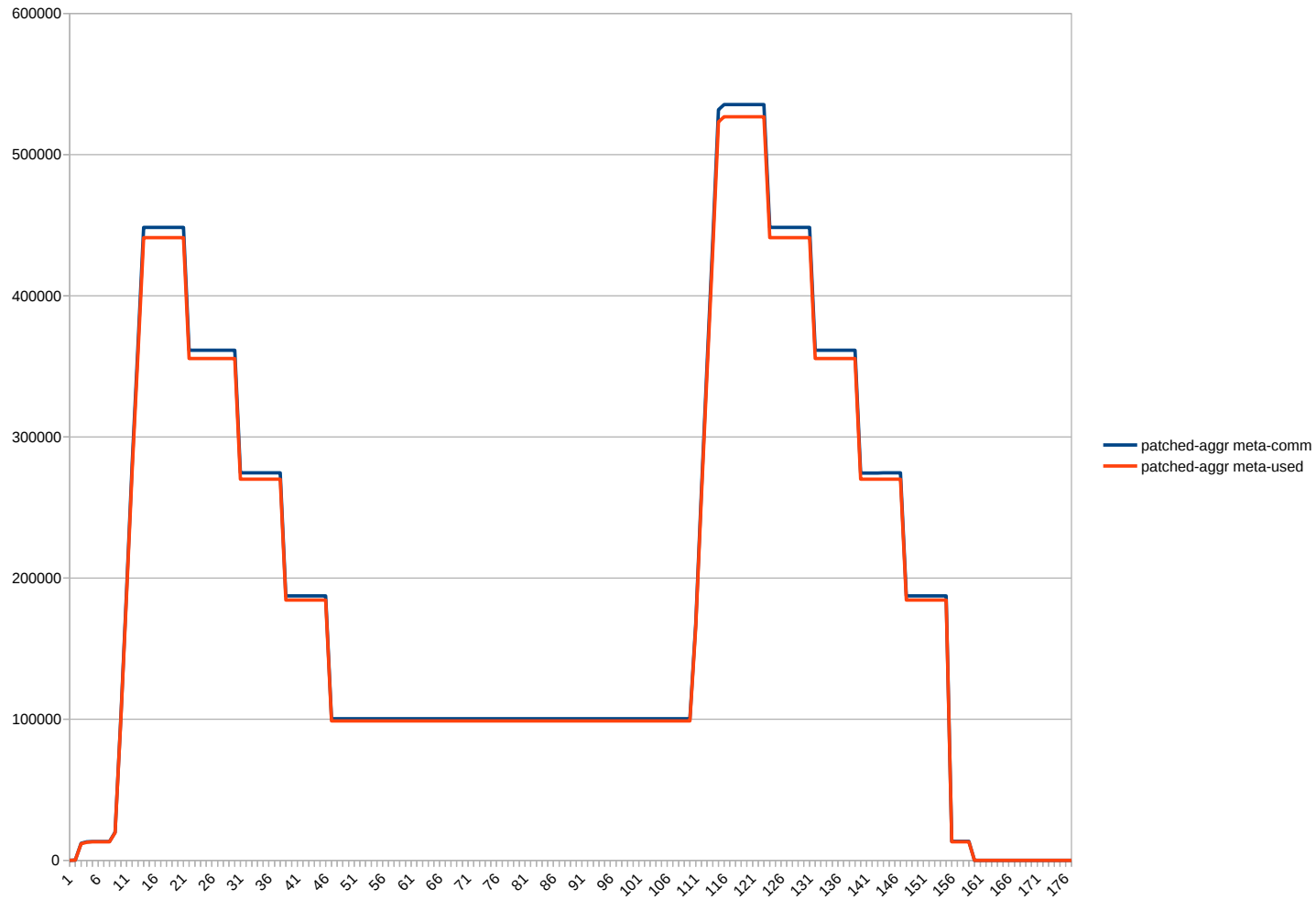
- Spikes in used metaspace carry over
- After the first spike, almost 300M of unused data retained

# Patched VM (jdk 14), Metaspace used (red) vs committed (blue) *(default settings with 64K commit granule size)*



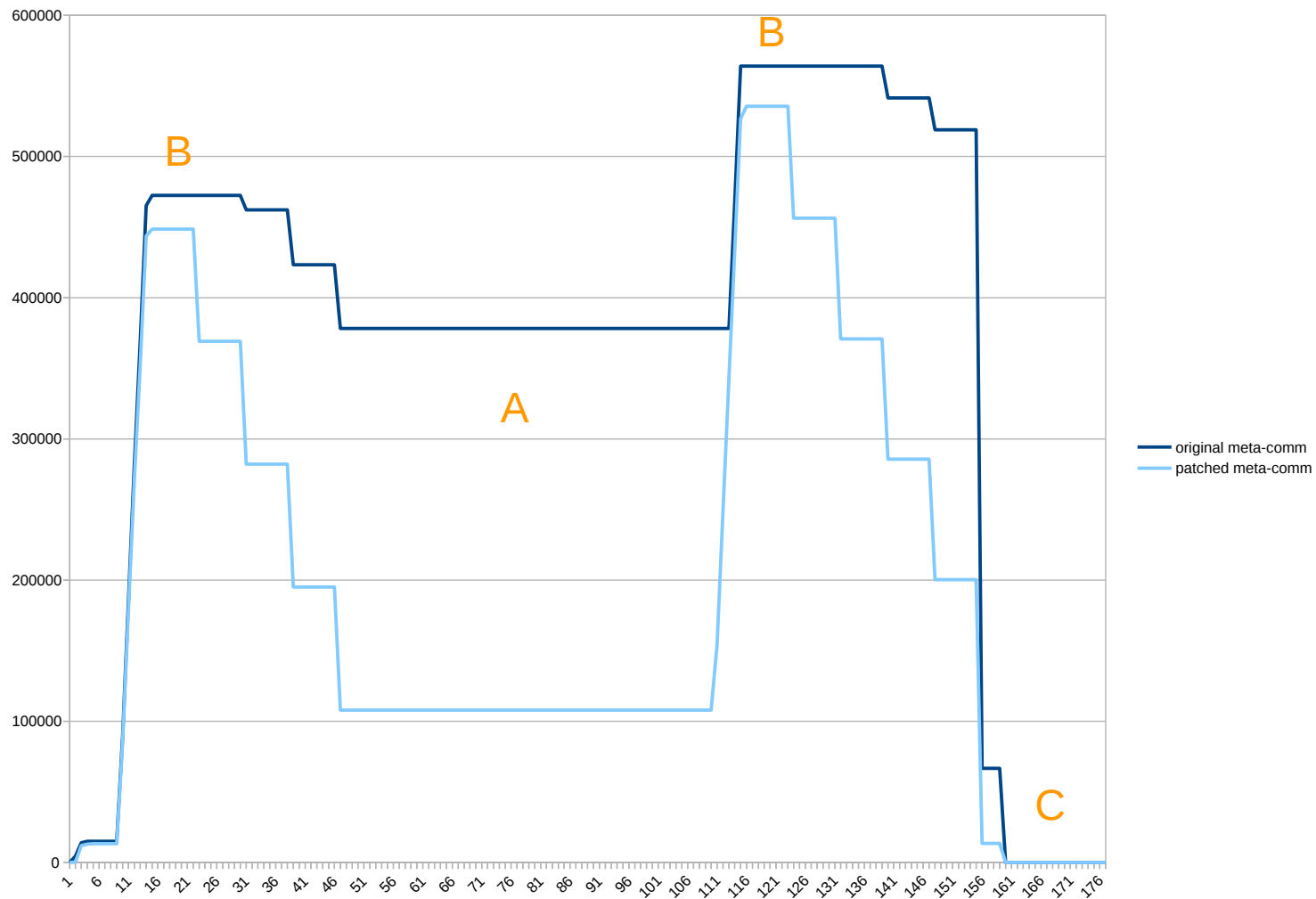
- We recover almost completely from the spikes

# Patched VM (jdk 14), Metaspace used (red) vs committed (blue) *(aggressive settings with 16K commit granule size)*



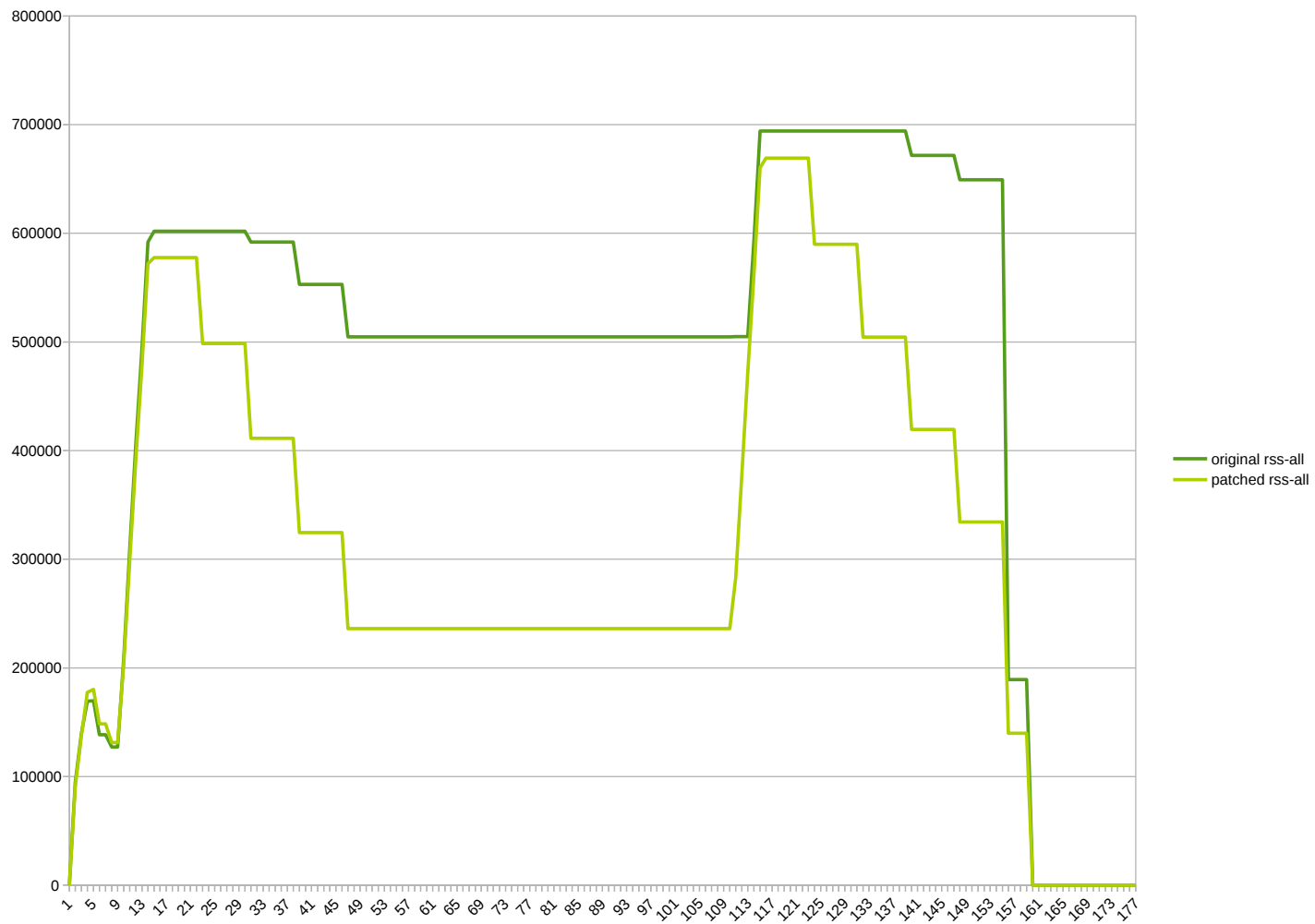
- In this scenario, almost no discernable advantage over default settings

# Metaspace committed – Stock VM (dark blue) vs Patched VM (light blue)



- (A) We retain about 280M less memory than the stock VM
- (B) Spikes are about 5% lower
- (C) After the test ran, we are back to base line, Stock VM is not.

# RSS – Stock VM (dark green) vs Patched VM (light green)



# Stock VM, jcmd VM.metaspaces output, after unloading 4/5 of all classes

27265:

Total Usage - 291 loaders, 10982 classes (972 shared):

<snip>

Virtual space:

Non-class space:	332,00 MB reserved,	331,26 MB (>99%) committed
Class space:	1,00 GB reserved,	42,22 MB ( 4%) committed
Both:	1,32 GB reserved,	373,48 MB ( 28%) committed

<snip>

Waste (percentages refer to total committed size 373,48 MB):

Committed unused:	280,00 KB ( <1%)
Waste in chunks in use:	2,45 KB ( <1%)
Free in chunks in use:	6,34 MB ( 2%)
Overhead in chunks in use:	186,75 KB ( <1%)
<b>In free chunks:</b>	<b>269,56 MB ( 72%)</b>
Deallocated from chunks in use:	998,98 KB ( <1%) (1763 blocks)
-total-:	277,33 MB ( 74%)

## Patched VM, jcmd VM.metaspace output, after unloading 4/5 of all classes

27149:

Total Usage - 291 loaders, 10986 classes (980 shared):

<snip>

Virtual space:

Non-class space:	408,00 MB reserved,	94,06 MB ( 23%) committed,	51 nodes.
Class space:	1,00 GB reserved,	11,38 MB ( 1%) committed,	1 nodes.
Both:	1,40 GB reserved,	105,44 MB ( 7%) committed.	

<snip>

Waste (unused committed space):(percentages refer to total committed size 105,44 MB):

Waste in chunks in use:	15,86 KB ( <1%)
Free in chunks in use:	1,59 MB ( 2%)
In free chunks:	11,14 MB ( 11%)
Deallocated from chunks in use:	194,36 KB ( <1%) (2085 blocks)
-total-:	12,93 MB ( 12%)