

# August 9, 2009

## [Shared pool freelists \(and durations\)](#)

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My earlier blog about shared pool duration got an offline response from one of my reader:

” So, you say that durations aka mini-heaps have been introduced from 10g onwards. I have been using Steve Adams’ script [shared\\_pool\\_free\\_lists.sql](#). Is that not accurate anymore?”

### **Shared pool free lists**

I have a great respect for [Steve Adams](#). In many ways, he has been a great virtual mentor and his insights are so remarkable.

Coming back to the question, I have used Steve’s script before and it is applicable prior to Oracle version 9i. In 9i, sub-heaps were introduced. Further, [shared pool durations](#) were introduced in Oracle version 10g. So, his script may not be applicable from version 9i onwards. We will probe this further in this blog.

This is the problem with writing anything about internals stuff, they tend to change from version to version and In many cases, our work can become obsolete in future releases(including this blog!).

In version 9i, each sub-heap of the shared\_pool has its own free list. In version 10g and 11g, each **duration** in sub-heap has its own free list. This is visible through x\$ksmsp and column x\$ksmsp.ksmchdur indicates the duration that chunk belongs to. In 9i, that column always has a value of 1 (at least, that I have experimented so far). In 10g & 11g (up to 11.1.0.7), there are exactly 4 durations in each sub-heap and values range from 1-4 for this column ksmchdur. Each duration has its own free list.

### **Shared\_pool\_free\_list.sql script**

I couldn’t find any script depicting shared pool free list accurately for versions 9i and above. So, I wrote a small script to print shared pool free list information from x\$ksmsp. [Warning: Accessing x\$ksmsp would add more pressure on shared pool latches.] Complete script can be downloaded from orainternals.com script archive [shared\\_pool\\_free\\_lists\\_9i.sql](#).

```
SQL> @"shared_pool_free_lists_9i.sql"
```

| KSMCHIDX | KSMCHDUR | BUCKET | FREE_SPACE | FREE_CHUNKS | AVERAGE_SIZE | BIGGEST  |
|----------|----------|--------|------------|-------------|--------------|----------|
| 1        | 1        | 1      | 1320       | 33          | 40           | 40       |
|          |          | 2      | 2160       | 45          | 48           | 48       |
|          |          | 3      | 1400       | 25          | 56           | 56       |
|          |          | 4      | 2240       | 35          | 64           | 64       |
|          |          | 5      | 2448       | 34          | 72           | 72       |
|          |          | 6      | 3360       | 42          | 80           | 80       |
|          |          | 7      | 792        | 9           | 88           | 88       |
|          |          | 8      | 672        | 7           | 96           | 96       |
|          |          | 9      | 1664       | 16          | 104          | 104      |
|          |          | 10     | 2352       | 21          | 112          | 112      |
|          |          | 11     | 1680       | 14          | 120          | 120      |
|          |          | 12     | 1792       | 14          | 128          | 128      |
|          |          | 13     | 4896       | 36          | 136          | 136      |
|          |          | 14     | 2016       | 14          | 144          | 144      |
|          |          | 15     | 3040       | 20          | 152          | 152      |
|          |          | 16     | 2880       | 18          | 160          | 160      |
|          |          | 88     | 736        | 1           | 736          | 736      |
|          |          | 252    | 45824      | 2           | 22912        | 22928    |
|          |          | 253    | 528212104  | 41          | 12883222     | 15597568 |
| ...      |          |        |            |             |              |          |

Above output shows shared pool free list for sub-heap 1 (ksmchidx=1), duration 1(ksmchdur=1) more technically sga heap (1, 1). In a free list, free Chunks are attached to a bucket classified by chunk size. This facilitates chunk search so that a chunk of a specific size can be easily found. For example, bucket 7 holds chunks bigger than 88 bytes but smaller than 96 bytes. Bucket 8 has chunks bigger than 96 and smaller than 104. Say, for example, for an allocation request of chunk with size of 96 bytes, code can quickly look up bucket 8 and after to find a chunk of size at least 96 bytes. Above script is an excellent indicator to see if the shared pool is fragmented (In this case, shared pool is not fragmented since number of chunks are few).

Problem is that this script also does not depict free list information accurately 10g or 11g. In version 9i, bucket size between two adjacent buckets are 8 until size is less than 1672 bytes and then increases to 48, followed by near 8K difference and so the script works fine in 9i.

```

...
case
  when ksmchsiz < 1672 then trunc((ksmchsiz-32)/8)
  when ksmchsiz < 4120 then trunc((ksmchsiz+7928)/48)
  when ksmchsiz < 8216 then 250
  when ksmchsiz < 16408 then 251
  when ksmchsiz < 32792 then 252
  when ksmchsiz = 65560 then 253
end bucket,...
```

But, in 10g and 11g, that is not true anymore (at least that I can observe). For example, in the output below, after bucket 239, difference between two adjacent buckets went down to 8. So, the script method is not dependable. Still, I must insist, that script output is a pretty good indicator of shared pool free space fragmentation.

```

...
Bucket 239 size=4024 48
Bucket 240 size=4096 72
```

```

Bucket 241 size=4104 8
Bucket 242 size=4120 16
Bucket 243 size=8216 4096
Bucket 244 size=16408 8192
Bucket 245 size=16888 480
Bucket 246 size=16896 8
Bucket 247 size=16904
...

```

## heapdump\_freelist.ksh

Must we need more accurate picture, we can parse heapdump trace file to print it. I wrote another korn shell based awk script [heapdump\\_freelist.sh](#). This script parses heapdump level 2 trace files and prints the shared pool free list information more accurately. This script works correctly in Oracle versions 9i,10g and 11g. This script accepts an heapdump level 2 trace file as an argument.

```
./heapdump_freelists.ksh DEV11g_ora_553.trc
```

```
-- Heapdump freelist v1.00 by Riyaj Shamsudeen @OraInternals
```

```
This script prints shared pool freelists details
```

```
1. /tmp/shared_pool_freelist.lst - Freelist information for various heaps
```

Few lines from /tmp/shared\_pool\_freelist.lst shows that freelist information is printed at more granular level.

```

-----
sga heap(1,1)
-----
Bucket          1          size=40 Count=      75 Sum=      3000
Bucket          2          size=48 Count=     176 Sum=      8448
Bucket          3          size=56 Count=      72 Sum=      4032
Bucket          4          size=64 Count=      86 Sum=      5504
Bucket          5          size=72 Count=     173 Sum=     12456
...
Bucket          42          size=368 Count=       1 Sum=       368
Bucket          51          size=440 Count=       1 Sum=       440
...
Bucket          243          size=8216 Count=       3 Sum=     29904
Bucket          248          size=16912 Count=       1 Sum=     17208
Bucket          252          size=20552 Count=       2 Sum=     45152
Bucket          253          size=32792 Count=       1 Sum=     47064
Bucket          254          size=65560 Count=       6 Sum=    52860352
-----
sga heap(1,2)
-----
Bucket          1          size=40 Count=       1 Sum=       40
Bucket          3          size=56 Count=       2 Sum=      112
Bucket          5          size=72 Count=       1 Sum=       72
..

```

## Summary

In summary, shared\_pool\_free\_lists.sql is immensely helpful, but alas internal working details changes from version to version. We have added two scripts to print shared pool free list more accurately:

1. shared\_pool\_free\_lists.sql to show freespace fragmentation through SQL.
2. heapdump\_freelist.ksh to parse heapdump trace file and print free list information more accurately.