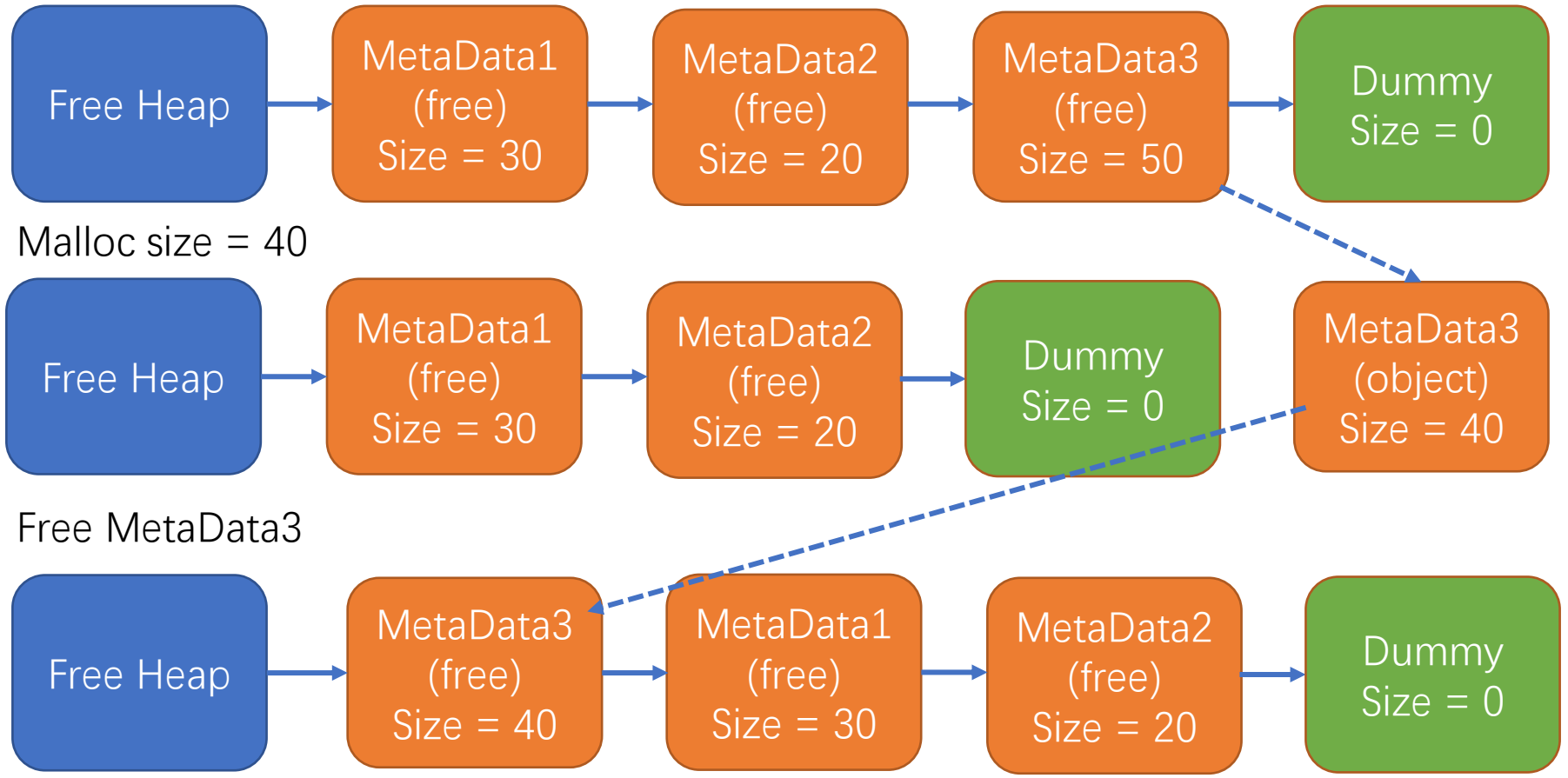
Simple Malloc

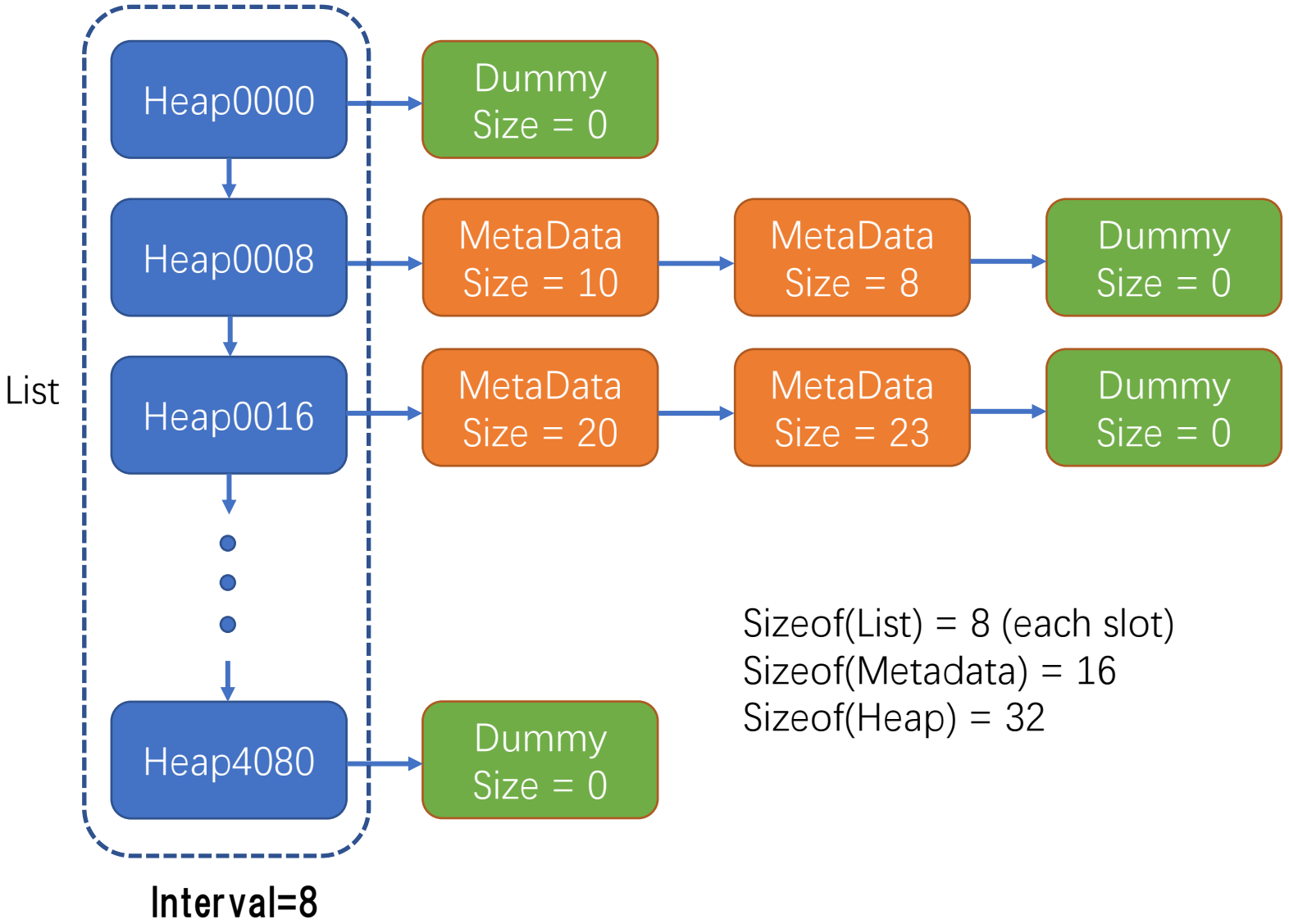


Drawback
(1) Search for a proper MetaData is slow

(2) The first available slot may not be the most proper one.

(3) When we free a data, the MetaData size will be the object size, but not the previous size.

My Malloc (Design)



Sizeof(List) = 8 (each slot)
Sizeof(Metadata) = 16
Sizeof(Heap) = 32

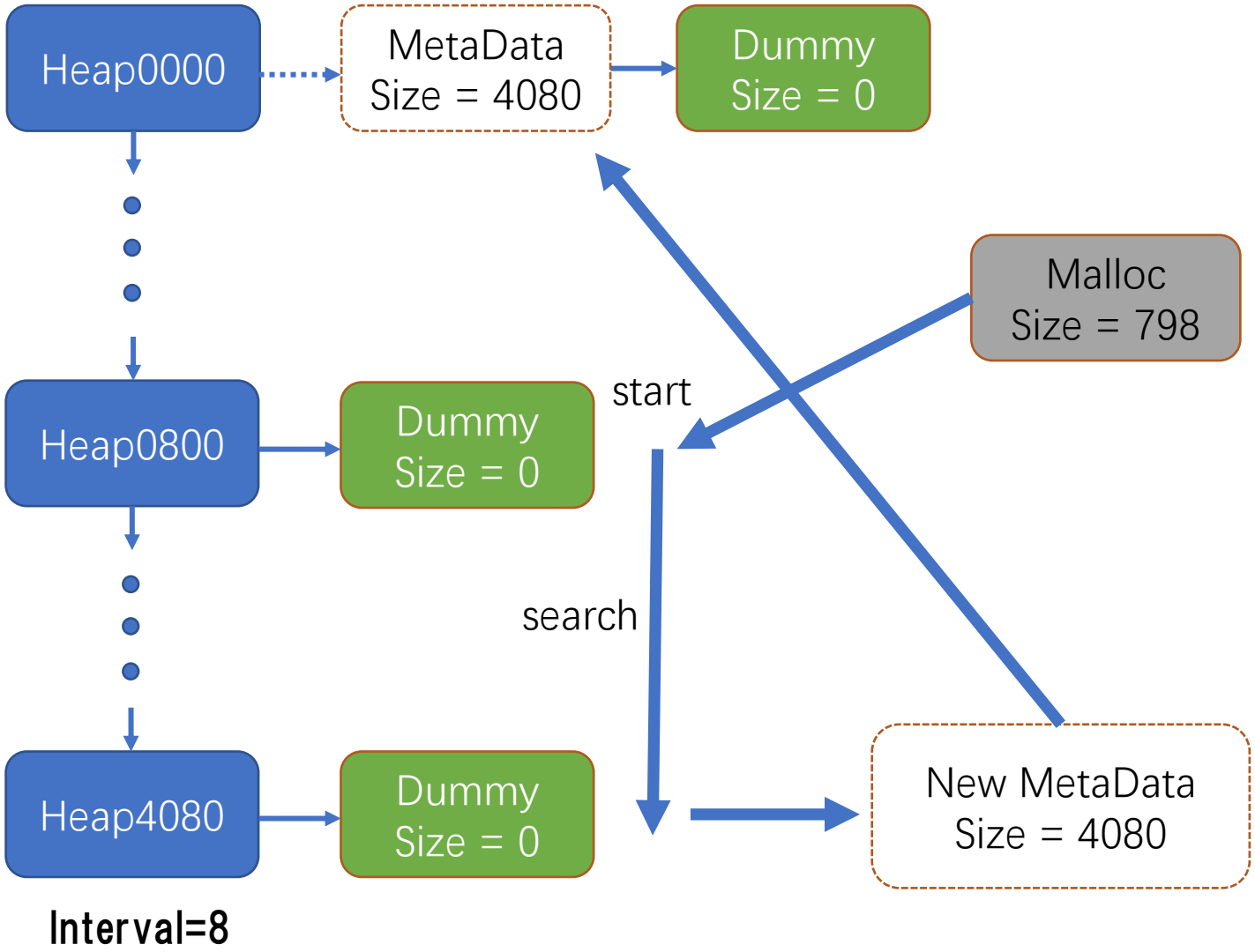
In My Malloc, heaps are linked and we only put metadata into the heap that:
heap size <= size < next heap size.

e.x. Heap0008->Heap0016->Heap0024
Heap0008 can contain size = 8~15
Heap0016 can contain size = 16~23
**
If we allocate new memory, we put the new metadata into Heap0000

We have n additional heaps so we need first allocate new memory and use size = $32 * n$ for heaps.
We can use list to search faster, we also need size = $8 * n$ for the list.

$n = 4096/interval$
$init_size = 40 * n = (40/interval) * 4096$

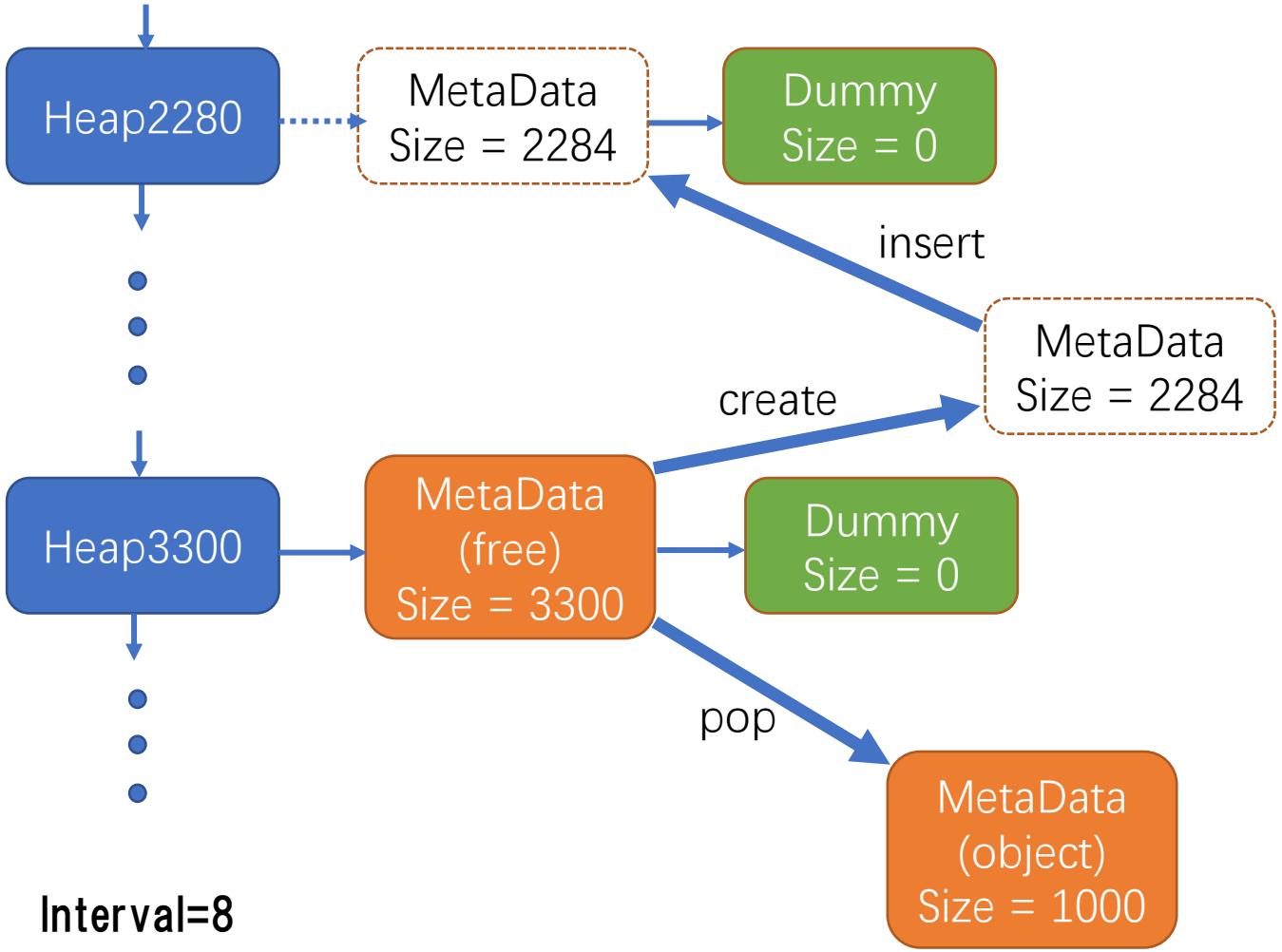
My Malloc (Malloc and allocate new)



When we malloc a space, like size = 798.
We first view Heap0000, if it is vacant, then start from Heap0800.
While
heap->next == Dummy (vacant)
We go to the next heap.
So when we stop, the current heap must have a MetaData whose size >= object size.

If we viewed the last heap (Heap4080) but still find no proper MetaData.
We allocate for new memory (size =4096) and create a new MetaData (size = 4080) in Heap0000.
So that when we re-run the malloc function, we can find this MetaData at the first time.

My Malloc (Arrange object)

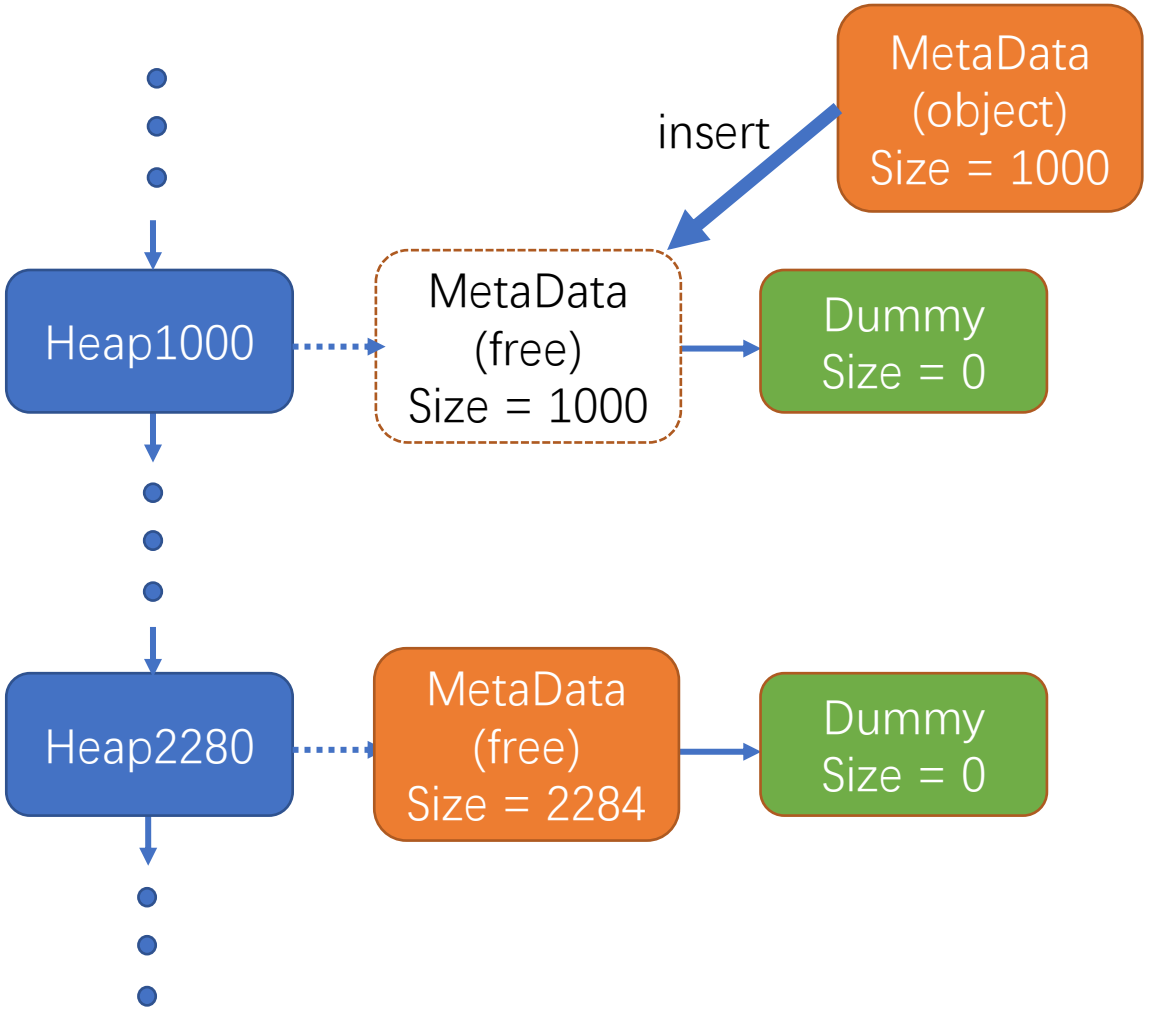


For example, when object size = 1000 and we find the proper MetaDate (size = 3300). Similar to simple malloc, we first use 1000 and the remaining size = 2300, then we use 16 for creating a new MetaData, and the rest become 2284.

Next, we will search a proper heap for 2284, that is Heap2280. So that we can insert the new MetaData.

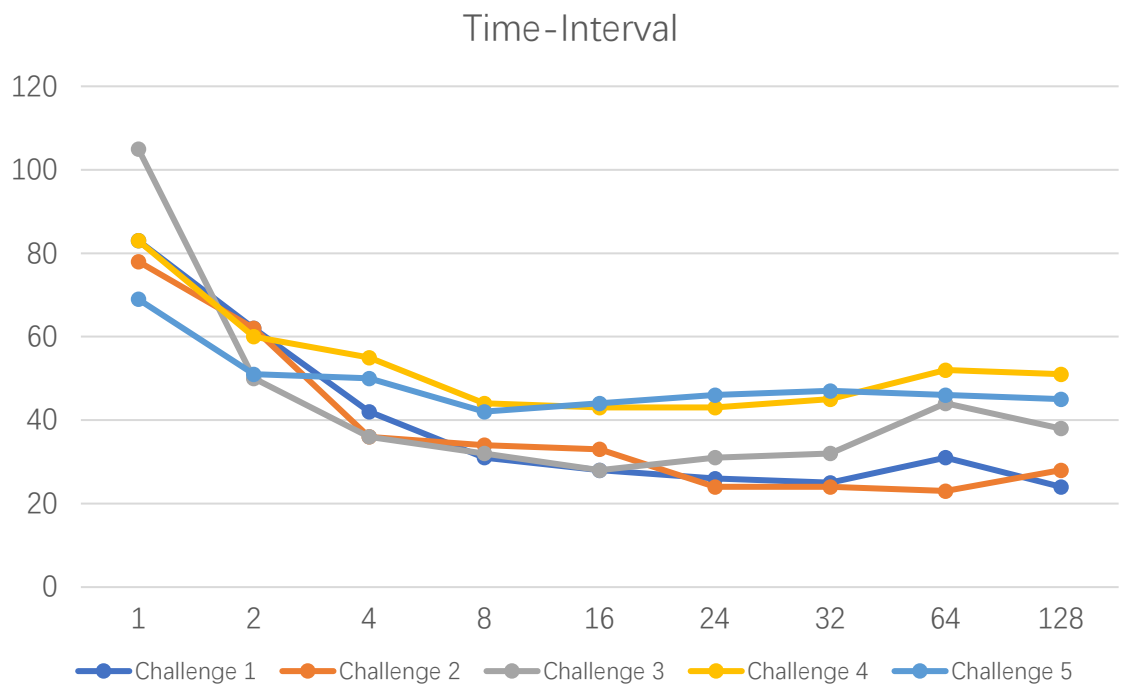
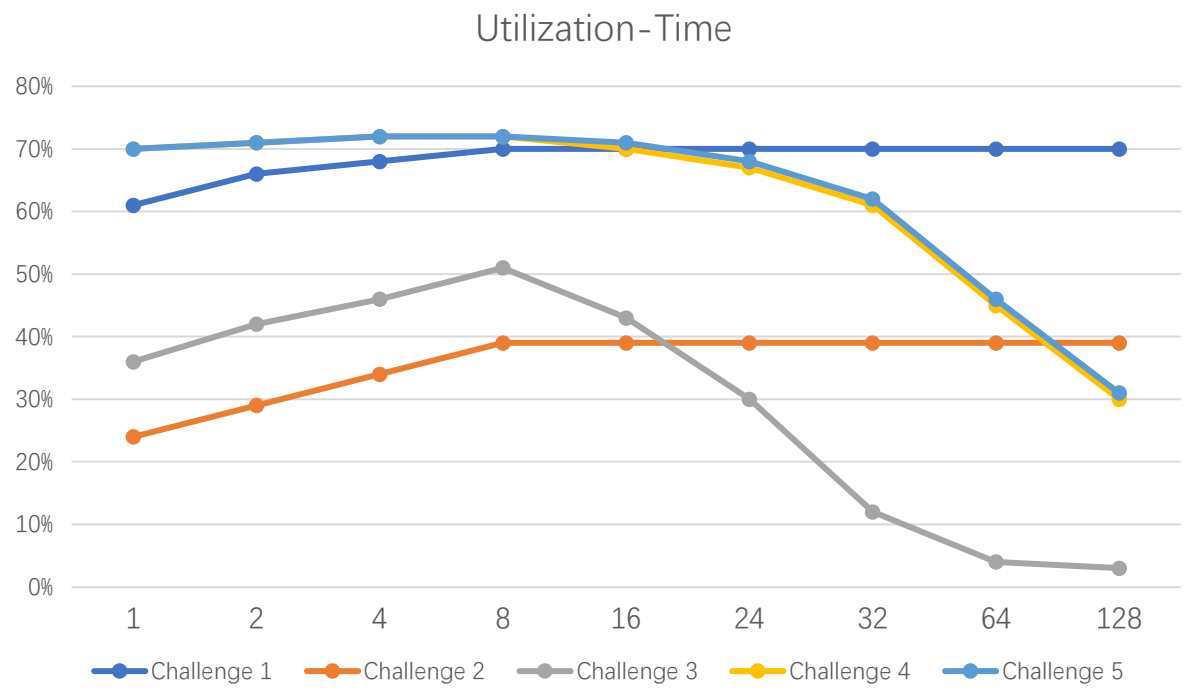
**
If the remaining size < 24, which can not contain a metadata(16) + object(>=8). We do not need to change the size, because when we free the MetaDate, its size would not change.

My Malloc (Free object)



Interval=8

Similar to the last page.

Have no time to use munmap_to_system to release the space.

	Interval=1	Interval=2	Interval=4	Interval=8	Interval=16	Interval=24	Interval=32	Interval=64	Interval=128
C1	83ms/61%	62ms/66%	42ms/68%	31ms/70%	28ms/70%	26ms/70%	25ms/70%	31ms/70%	24ms/70%
C2	78ms/24%	62ms/29%	36ms/34%	34ms/39%	33ms/39%	24ms/39%	25ms/39%	23ms/39%	28ms/39%
C3	85ms/36%	50ms/42%	36ms/46%	32ms/51%	28ms/43%	31ms/30%	32ms/12%	44ms/4%	38ms/3%
C4	83ms/70%	60ms/71%	55ms/72%	44ms/72%	43ms/70%	43ms/67%	45ms/61%	52ms/45%	51ms/30%
C5	69ms/70%	51ms/71%	50ms/72%	42ms/72%	44ms/71%	46ms/68%	47ms/62%	46ms/46%	45ms/31%