/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

To be the apostrophe which changed "Impossible" into "I'm possible"!

POC code of chapter 5 in book "Lookaside Using"

file name : heap\_lookaside.c

author : failwest

date : 2010.09.04

description : demo show of how heap works

Noticed : 1 only run on windows 2000

2 complied with VC 6.0

3 build into release version

4 only used for run time debugging

version : 1.0

E-mail : failwest@gmail.com

Only for educational purposes enjoy the fun from exploiting :)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

#include <stdio.h>

#include <windows.h>

void main()

{

HLOCAL h1,h2,h3,h4;

HANDLE hp;

hp = HeapCreate(0,0,0);

\_\_asm int 3

h1 = HeapAlloc(hp,HEAP\_ZERO\_MEMORY,8);

h2 = HeapAlloc(hp,HEAP\_ZERO\_MEMORY,8);

h3 = HeapAlloc(hp,HEAP\_ZERO\_MEMORY,16);

h4 = HeapAlloc(hp,HEAP\_ZERO\_MEMORY,24);

HeapFree(hp,0,h1);

HeapFree(hp,0,h2);

HeapFree(hp,0,h3);

HeapFree(hp,0,h4);

h2 = HeapAlloc(hp,HEAP\_ZERO\_MEMORY,16);

HeapFree(hp,0,h2);

}

Release然后运行，attach

初始化的堆区

00360000 C8 00 00 00 00 01 00 00 FF EE FF EE 02 10 00 00 ?.....??..

00360010 00 00 00 00 00 FE 00 00 00 00 10 00 00 20 00 00 .....?..... ..

00360020 00 02 00 00 00 20 00 00 2F 02 00 00 FF EF FD 7F .... ../..稞

00360030 04 00 08 06 00 00 00 00 00 00 00 00 00 00 00 00 .............

00360040 00 00 00 00 98 05 36 00 0F 00 00 00 F8 FF FF FF ....?6....?

00360050 50 00 36 00 50 00 36 00 40 06 36 00 00 00 00 00 P.6.P.6.@6.....

00360060 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360070 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360080 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360090 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600A0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600B0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600C0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600D0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600E0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600F0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360100 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360110 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360120 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360130 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360140 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360150 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360160 00 00 00 00 00 00 00 00 00 00 00 00 01 00 00 00 ...............

00360170 00 00 00 00 00 00 00 00 90 1E 36 00 90 1E 36 00 ........?6.?6.

00360180 80 01 36 00 80 01 36 00 88 01 36 00 88 01 36 00 €6.€6.?6.?6.

00360190 90 01 36 00 90 01 36 00 98 01 36 00 98 01 36 00 ?6.?6.?6.?6.

003601A0 A0 01 36 00 A0 01 36 00 A8 01 36 00 A8 01 36 00 ?6.?6.?6.?6.

003601B0 B0 01 36 00 B0 01 36 00 B8 01 36 00 B8 01 36 00 ?6.?6.?6.?6.

003601C0 C0 01 36 00 C0 01 36 00 C8 01 36 00 C8 01 36 00 ?6.?6.?6.?6.

003601D0 D0 01 36 00 D0 01 36 00 D8 01 36 00 D8 01 36 00 ?6.?6.?6.?6.

003601E0 E0 01 36 00 E0 01 36 00 E8 01 36 00 E8 01 36 00 ?6.?6.?6.?6.

003601F0 F0 01 36 00 F0 01 36 00 F8 01 36 00 F8 01 36 00 ?6.?6.?6.?6.

00360200 00 02 36 00 00 02 36 00 08 02 36 00 08 02 36 00 .6..6.6.6.

00360210 10 02 36 00 10 02 36 00 18 02 36 00 18 02 36 00 6.6.6.6.

00360220 20 02 36 00 20 02 36 00 28 02 36 00 28 02 36 00 6. 6.(6.(6.

00360230 30 02 36 00 30 02 36 00 38 02 36 00 38 02 36 00 06.06.86.86.

00360240 40 02 36 00 40 02 36 00 48 02 36 00 48 02 36 00 @6.@6.H6.H6.

00360250 50 02 36 00 50 02 36 00 58 02 36 00 58 02 36 00 P6.P6.X6.X6.

00360260 60 02 36 00 60 02 36 00 68 02 36 00 68 02 36 00 `6.`6.h6.h6.

00360270 70 02 36 00 70 02 36 00 78 02 36 00 78 02 36 00 p6.p6.x6.x6.

00360280 80 02 36 00 80 02 36 00 88 02 36 00 88 02 36 00 €6.€6.?6.?6.

00360290 90 02 36 00 90 02 36 00 98 02 36 00 98 02 36 00 ?6.?6.?6.?6.

003602A0 A0 02 36 00 A0 02 36 00 A8 02 36 00 A8 02 36 00 ?6.?6.?6.?6.

003602B0 B0 02 36 00 B0 02 36 00 B8 02 36 00 B8 02 36 00 ?6.?6.?6.?6.

003602C0 C0 02 36 00 C0 02 36 00 C8 02 36 00 C8 02 36 00 ?6.?6.?6.?6.

003602D0 D0 02 36 00 D0 02 36 00 D8 02 36 00 D8 02 36 00 ?6.?6.?6.?6.

003602E0 E0 02 36 00 E0 02 36 00 E8 02 36 00 E8 02 36 00 ?6.?6.?6.?6.

003602F0 F0 02 36 00 F0 02 36 00 F8 02 36 00 F8 02 36 00 ?6.?6.?6.?6.

00360300 00 03 36 00 00 03 36 00 08 03 36 00 08 03 36 00 .6..6.6.6.

00360310 10 03 36 00 10 03 36 00 18 03 36 00 18 03 36 00 6.6.6.6.

00360320 20 03 36 00 20 03 36 00 28 03 36 00 28 03 36 00 6. 6.(6.(6.

00360330 30 03 36 00 30 03 36 00 38 03 36 00 38 03 36 00 06.06.86.86.

00360340 40 03 36 00 40 03 36 00 48 03 36 00 48 03 36 00 @6.@6.H6.H6.

00360350 50 03 36 00 50 03 36 00 58 03 36 00 58 03 36 00 P6.P6.X6.X6.

00360360 60 03 36 00 60 03 36 00 68 03 36 00 68 03 36 00 `6.`6.h6.h6.

00360370 70 03 36 00 70 03 36 00 78 03 36 00 78 03 36 00 p6.p6.x6.x6.

00360380 80 03 36 00 80 03 36 00 88 03 36 00 88 03 36 00 €6.€6.?6.?6.

00360390 90 03 36 00 90 03 36 00 98 03 36 00 98 03 36 00 ?6.?6.?6.?6.

003603A0 A0 03 36 00 A0 03 36 00 A8 03 36 00 A8 03 36 00 ?6.?6.?6.?6.

003603B0 B0 03 36 00 B0 03 36 00 B8 03 36 00 B8 03 36 00 ?6.?6.?6.?6.

003603C0 C0 03 36 00 C0 03 36 00 C8 03 36 00 C8 03 36 00 ?6.?6.?6.?6.

003603D0 D0 03 36 00 D0 03 36 00 D8 03 36 00 D8 03 36 00 ?6.?6.?6.?6.

003603E0 E0 03 36 00 E0 03 36 00 E8 03 36 00 E8 03 36 00 ?6.?6.?6.?6.

003603F0 F0 03 36 00 F0 03 36 00 F8 03 36 00 F8 03 36 00 ?6.?6.?6.?6.

00360400 00 04 36 00 00 04 36 00 08 04 36 00 08 04 36 00 .6..6.6.6.

00360410 10 04 36 00 10 04 36 00 18 04 36 00 18 04 36 00 6.6.6.6.

00360420 20 04 36 00 20 04 36 00 28 04 36 00 28 04 36 00 6. 6.(6.(6.

00360430 30 04 36 00 30 04 36 00 38 04 36 00 38 04 36 00 06.06.86.86.

00360440 40 04 36 00 40 04 36 00 48 04 36 00 48 04 36 00 @6.@6.H6.H6.

00360450 50 04 36 00 50 04 36 00 58 04 36 00 58 04 36 00 P6.P6.X6.X6.

00360460 60 04 36 00 60 04 36 00 68 04 36 00 68 04 36 00 `6.`6.h6.h6.

00360470 70 04 36 00 70 04 36 00 78 04 36 00 78 04 36 00 p6.p6.x6.x6.

00360480 80 04 36 00 80 04 36 00 88 04 36 00 88 04 36 00 €6.€6.?6.?6.

00360490 90 04 36 00 90 04 36 00 98 04 36 00 98 04 36 00 ?6.?6.?6.?6.

003604A0 A0 04 36 00 A0 04 36 00 A8 04 36 00 A8 04 36 00 ?6.?6.?6.?6.

003604B0 B0 04 36 00 B0 04 36 00 B8 04 36 00 B8 04 36 00 ?6.?6.?6.?6.

003604C0 C0 04 36 00 C0 04 36 00 C8 04 36 00 C8 04 36 00 ?6.?6.?6.?6.

003604D0 D0 04 36 00 D0 04 36 00 D8 04 36 00 D8 04 36 00 ?6.?6.?6.?6.

003604E0 E0 04 36 00 E0 04 36 00 E8 04 36 00 E8 04 36 00 ?6.?6.?6.?6.

003604F0 F0 04 36 00 F0 04 36 00 F8 04 36 00 F8 04 36 00 ?6.?6.?6.?6.

00360500 00 05 36 00 00 05 36 00 08 05 36 00 08 05 36 00 .6..6.6.6.

00360510 10 05 36 00 10 05 36 00 18 05 36 00 18 05 36 00 6.6.6.6.

00360520 20 05 36 00 20 05 36 00 28 05 36 00 28 05 36 00 6. 6.(6.(6.

00360530 30 05 36 00 30 05 36 00 38 05 36 00 38 05 36 00 06.06.86.86.

00360540 40 05 36 00 40 05 36 00 48 05 36 00 48 05 36 00 @6.@6.H6.H6.

00360550 50 05 36 00 50 05 36 00 58 05 36 00 58 05 36 00 P6.P6.X6.X6.

00360560 60 05 36 00 60 05 36 00 68 05 36 00 68 05 36 00 `6.`6.h6.h6.

00360570 70 05 36 00 70 05 36 00 08 06 36 00 00 00 00 00 p6.p6.6.....

00360580 88 06 36 00 00 00 01 00 00 00 00 00 00 30 36 00 ?6.........06.

00360590 00 D0 03 00 00 00 00 00 A8 05 36 00 00 00 00 00 .?.....?6.....

003605A0 00 00 00 00 00 00 00 00 B8 05 36 00 00 00 00 00 ........?6.....

003605B0 00 00 00 00 00 00 00 00 C8 05 36 00 00 00 00 00 ........?6.....

003605C0 00 00 00 00 00 00 00 00 D8 05 36 00 00 00 00 00 ........?6.....

003605D0 00 00 00 00 00 00 00 00 E8 05 36 00 00 00 00 00 ........?6.....

003605E0 00 00 00 00 00 00 00 00 F8 05 36 00 00 00 00 00 ........?6.....

003605F0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360600 00 00 00 00 00 00 00 00 C0 06 FD 77 FF FF FF FF ........?齱

00360610 00 00 00 00 00 00 00 00 2C 00 00 00 00 00 00 00 ........,.......

00360620 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360630 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360640 08 00 C8 00 00 01 00 00 EE FF EE FF 00 00 00 00 .?...??....

00360650 00 00 36 00 00 D0 03 00 00 00 36 00 40 00 00 00 ..6..?...6.@...

00360660 80 06 36 00 00 00 3A 00 3D 00 00 00 01 00 00 00 €6...:.=......

00360670 88 05 36 00 00 00 00 00 88 1E 36 00 00 00 00 00 ?6.....?6.....

00360680 01 03 08 00 00 01 08 00 00 00 00 00 00 00 00 00 ...........

00360690 04 00 00 01 00 00 00 00 00 00 00 00 00 00 00 00 ..............

003606A0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003606B0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003606C0 04 00 00 01 00 00 00 00 00 00 00 00 00 00 00 00 ..............

003606D0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003606E0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003606F0 04 00 00 01 00 00 00 00 00 00 00 00 00 00 00 00 ..............

00360700 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360710 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

先分析一下初始化的堆区

尾块有0x0000022F个堆单位可分配

0x00360020 00 02 00 00 00 20 00 00 2F 02 00 00 FF EF FD 7F

Freelist[0]为0x00361E90，表示尾块数据区的起始位置

0x00360170 00 00 00 00 00 00 00 00 90 1E 36 00 90 1E 36 00

快表的起始位置，原来未使用快表的时候这里是空表尾块的起始位置

0x00360680 01 03 08 00 00 01 08 00 00 00 00 00 00 00 00 00

接下来分析一下四次分配

第一次

h1 = HeapAlloc(hp,HEAP\_ZERO\_MEMORY,8);

00401017 90 nop

00401018 |. 8B3D 04504000 mov edi, dword ptr [<&KERNEL32.HeapA>; ntdll.RtlAllocateHeap

0040101E |. 6A 08 push 8 ; /HeapSize = 8

00401020 |. 6A 08 push 8 ; |Flags = HEAP\_ZERO\_MEMORY

00401022 |. 56 push esi ; |hHeap

00401023 |. FFD7 call edi ; \HeapAlloc

运行完的堆区

00360000 C8 00 00 00 00 01 00 00 FF EE FF EE 02 10 00 00 ?.....??..

00360010 00 00 00 00 00 FE 00 00 00 00 10 00 00 20 00 00 .....?..... ..

00360020 00 02 00 00 00 20 00 00 2D 02 00 00 FF EF FD 7F .... ..-..稞

00360030 04 00 08 06 00 00 00 00 00 00 00 00 00 00 00 00 .............

00360040 00 00 00 00 98 05 36 00 0F 00 00 00 F8 FF FF FF ....?6....?

00360050 50 00 36 00 50 00 36 00 40 06 36 00 00 00 00 00 P.6.P.6.@6.....

00360060 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360070 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360080 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360090 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600A0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600B0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600C0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600D0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600E0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600F0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360100 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360110 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360120 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360130 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360140 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360150 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360160 00 00 00 00 00 00 00 00 00 00 00 00 01 00 00 00 ...............

00360170 00 00 00 00 00 00 00 00 A0 1E 36 00 A0 1E 36 00 ........?6.?6.

00360180 80 01 36 00 80 01 36 00 88 01 36 00 88 01 36 00 €6.€6.?6.?6.

00360190 90 01 36 00 90 01 36 00 98 01 36 00 98 01 36 00 ?6.?6.?6.?6.

003601A0 A0 01 36 00 A0 01 36 00 A8 01 36 00 A8 01 36 00 ?6.?6.?6.?6.

003601B0 B0 01 36 00 B0 01 36 00 B8 01 36 00 B8 01 36 00 ?6.?6.?6.?6.

003601C0 C0 01 36 00 C0 01 36 00 C8 01 36 00 C8 01 36 00 ?6.?6.?6.?6.

003601D0 D0 01 36 00 D0 01 36 00 D8 01 36 00 D8 01 36 00 ?6.?6.?6.?6.

003601E0 E0 01 36 00 E0 01 36 00 E8 01 36 00 E8 01 36 00 ?6.?6.?6.?6.

003601F0 F0 01 36 00 F0 01 36 00 F8 01 36 00 F8 01 36 00 ?6.?6.?6.?6.

00360200 00 02 36 00 00 02 36 00 08 02 36 00 08 02 36 00 .6..6.6.6.

00360210 10 02 36 00 10 02 36 00 18 02 36 00 18 02 36 00 6.6.6.6.

00360220 20 02 36 00 20 02 36 00 28 02 36 00 28 02 36 00 6. 6.(6.(6.

00360230 30 02 36 00 30 02 36 00 38 02 36 00 38 02 36 00 06.06.86.86.

00360240 40 02 36 00 40 02 36 00 48 02 36 00 48 02 36 00 @6.@6.H6.H6.

00360250 50 02 36 00 50 02 36 00 58 02 36 00 58 02 36 00 P6.P6.X6.X6.

00360260 60 02 36 00 60 02 36 00 68 02 36 00 68 02 36 00 `6.`6.h6.h6.

00360270 70 02 36 00 70 02 36 00 78 02 36 00 78 02 36 00 p6.p6.x6.x6.

00360280 80 02 36 00 80 02 36 00 88 02 36 00 88 02 36 00 €6.€6.?6.?6.

00360290 90 02 36 00 90 02 36 00 98 02 36 00 98 02 36 00 ?6.?6.?6.?6.

003602A0 A0 02 36 00 A0 02 36 00 A8 02 36 00 A8 02 36 00 ?6.?6.?6.?6.

003602B0 B0 02 36 00 B0 02 36 00 B8 02 36 00 B8 02 36 00 ?6.?6.?6.?6.

003602C0 C0 02 36 00 C0 02 36 00 C8 02 36 00 C8 02 36 00 ?6.?6.?6.?6.

003602D0 D0 02 36 00 D0 02 36 00 D8 02 36 00 D8 02 36 00 ?6.?6.?6.?6.

003602E0 E0 02 36 00 E0 02 36 00 E8 02 36 00 E8 02 36 00 ?6.?6.?6.?6.

003602F0 F0 02 36 00 F0 02 36 00 F8 02 36 00 F8 02 36 00 ?6.?6.?6.?6.

00360300 00 03 36 00 00 03 36 00 08 03 36 00 08 03 36 00 .6..6.6.6.

00360310 10 03 36 00 10 03 36 00 18 03 36 00 18 03 36 00 6.6.6.6.

00360320 20 03 36 00 20 03 36 00 28 03 36 00 28 03 36 00 6. 6.(6.(6.

00360330 30 03 36 00 30 03 36 00 38 03 36 00 38 03 36 00 06.06.86.86.

00360340 40 03 36 00 40 03 36 00 48 03 36 00 48 03 36 00 @6.@6.H6.H6.

00360350 50 03 36 00 50 03 36 00 58 03 36 00 58 03 36 00 P6.P6.X6.X6.

00360360 60 03 36 00 60 03 36 00 68 03 36 00 68 03 36 00 `6.`6.h6.h6.

00360370 70 03 36 00 70 03 36 00 78 03 36 00 78 03 36 00 p6.p6.x6.x6.

00360380 80 03 36 00 80 03 36 00 88 03 36 00 88 03 36 00 €6.€6.?6.?6.

00360390 90 03 36 00 90 03 36 00 98 03 36 00 98 03 36 00 ?6.?6.?6.?6.

003603A0 A0 03 36 00 A0 03 36 00 A8 03 36 00 A8 03 36 00 ?6.?6.?6.?6.

003603B0 B0 03 36 00 B0 03 36 00 B8 03 36 00 B8 03 36 00 ?6.?6.?6.?6.

003603C0 C0 03 36 00 C0 03 36 00 C8 03 36 00 C8 03 36 00 ?6.?6.?6.?6.

003603D0 D0 03 36 00 D0 03 36 00 D8 03 36 00 D8 03 36 00 ?6.?6.?6.?6.

003603E0 E0 03 36 00 E0 03 36 00 E8 03 36 00 E8 03 36 00 ?6.?6.?6.?6.

003603F0 F0 03 36 00 F0 03 36 00 F8 03 36 00 F8 03 36 00 ?6.?6.?6.?6.

00360400 00 04 36 00 00 04 36 00 08 04 36 00 08 04 36 00 .6..6.6.6.

00360410 10 04 36 00 10 04 36 00 18 04 36 00 18 04 36 00 6.6.6.6.

00360420 20 04 36 00 20 04 36 00 28 04 36 00 28 04 36 00 6. 6.(6.(6.

00360430 30 04 36 00 30 04 36 00 38 04 36 00 38 04 36 00 06.06.86.86.

00360440 40 04 36 00 40 04 36 00 48 04 36 00 48 04 36 00 @6.@6.H6.H6.

00360450 50 04 36 00 50 04 36 00 58 04 36 00 58 04 36 00 P6.P6.X6.X6.

00360460 60 04 36 00 60 04 36 00 68 04 36 00 68 04 36 00 `6.`6.h6.h6.

00360470 70 04 36 00 70 04 36 00 78 04 36 00 78 04 36 00 p6.p6.x6.x6.

00360480 80 04 36 00 80 04 36 00 88 04 36 00 88 04 36 00 €6.€6.?6.?6.

00360490 90 04 36 00 90 04 36 00 98 04 36 00 98 04 36 00 ?6.?6.?6.?6.

003604A0 A0 04 36 00 A0 04 36 00 A8 04 36 00 A8 04 36 00 ?6.?6.?6.?6.

003604B0 B0 04 36 00 B0 04 36 00 B8 04 36 00 B8 04 36 00 ?6.?6.?6.?6.

003604C0 C0 04 36 00 C0 04 36 00 C8 04 36 00 C8 04 36 00 ?6.?6.?6.?6.

003604D0 D0 04 36 00 D0 04 36 00 D8 04 36 00 D8 04 36 00 ?6.?6.?6.?6.

003604E0 E0 04 36 00 E0 04 36 00 E8 04 36 00 E8 04 36 00 ?6.?6.?6.?6.

003604F0 F0 04 36 00 F0 04 36 00 F8 04 36 00 F8 04 36 00 ?6.?6.?6.?6.

00360500 00 05 36 00 00 05 36 00 08 05 36 00 08 05 36 00 .6..6.6.6.

00360510 10 05 36 00 10 05 36 00 18 05 36 00 18 05 36 00 6.6.6.6.

00360520 20 05 36 00 20 05 36 00 28 05 36 00 28 05 36 00 6. 6.(6.(6.

00360530 30 05 36 00 30 05 36 00 38 05 36 00 38 05 36 00 06.06.86.86.

00360540 40 05 36 00 40 05 36 00 48 05 36 00 48 05 36 00 @6.@6.H6.H6.

00360550 50 05 36 00 50 05 36 00 58 05 36 00 58 05 36 00 P6.P6.X6.X6.

00360560 60 05 36 00 60 05 36 00 68 05 36 00 68 05 36 00 `6.`6.h6.h6.

00360570 70 05 36 00 70 05 36 00 08 06 36 00 00 00 00 00 p6.p6.6.....

00360580 88 06 36 00 00 00 01 00 00 00 00 00 00 30 36 00 ?6.........06.

00360590 00 D0 03 00 00 00 00 00 A8 05 36 00 00 00 00 00 .?.....?6.....

003605A0 00 00 00 00 00 00 00 00 B8 05 36 00 00 00 00 00 ........?6.....

003605B0 00 00 00 00 00 00 00 00 C8 05 36 00 00 00 00 00 ........?6.....

003605C0 00 00 00 00 00 00 00 00 D8 05 36 00 00 00 00 00 ........?6.....

003605D0 00 00 00 00 00 00 00 00 E8 05 36 00 00 00 00 00 ........?6.....

003605E0 00 00 00 00 00 00 00 00 F8 05 36 00 00 00 00 00 ........?6.....

003605F0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360600 00 00 00 00 00 00 00 00 C0 06 FD 77 FF FF FF FF ........?齱

00360610 00 00 00 00 00 00 00 00 2C 00 00 00 00 00 00 00 ........,.......

00360620 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360630 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360640 08 00 C8 00 00 01 00 00 EE FF EE FF 00 00 00 00 .?...??....

00360650 00 00 36 00 00 D0 03 00 00 00 36 00 40 00 00 00 ..6..?...6.@...

00360660 80 06 36 00 00 00 3A 00 3D 00 00 00 01 00 00 00 €6...:.=......

00360670 88 05 36 00 00 00 00 00 98 1E 36 00 00 00 00 00 ?6.....?6.....

00360680 01 03 08 00 00 01 08 00 00 00 00 00 00 00 00 00 ...........

00360690 04 00 00 01 00 00 00 00 00 00 00 00 00 00 00 00 ..............

003606A0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003606B0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003606C0 04 00 00 01 00 00 00 00 00 00 00 00 00 00 00 00 ..............

003606D0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003606E0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003606F0 04 00 00 01 01 00 00 00 01 00 00 00 00 00 00 00 ............

00360700 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360710 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

可以看到，0x0000022F变成了0x0000022D，减小了两个堆单位，16字节

0x00360020 00 02 00 00 00 20 00 00 2D 02 00 00 FF EF FD 7F

Freelist[0]由0x00361E90变成了0x00361EA0，因为尾块划分16个字节分配给了h1使用

0x00360170 00 00 00 00 00 00 00 00 A0 1E 36 00 A0 1E 36 00

第二次

h2 = HeapAlloc(hp,HEAP\_ZERO\_MEMORY,8);

00401025 |. 6A 08 push 8 ; /HeapSize = 8

00401027 |. 6A 08 push 8 ; |Flags = HEAP\_ZERO\_MEMORY

00401029 |. 56 push esi ; |hHeap

0040102A |. 8BD8 mov ebx, eax ; |

0040102C |. FFD7 call edi ; \HeapAlloc

可分配空间变成了0x0000022B个堆单位

00360020 00 02 00 00 00 20 00 00 2B 02 00 00 FF EF FD 7F

尾块的起始位置变成了0x00361EB0

00360170 00 00 00 00 00 00 00 00 B0 1E 36 00 B0 1E 36 00

第三次

h3 = HeapAlloc(hp,HEAP\_ZERO\_MEMORY,16);

0040102E |. 6A 10 push 10 ; /HeapSize = 10 (16.)

00401030 |. 6A 08 push 8 ; |Flags = HEAP\_ZERO\_MEMORY

00401032 |. 56 push esi ; |hHeap

00401033 |. 8945 FC mov dword ptr [ebp-4], eax ; |

00401036 |. FFD7 call edi ; \HeapAlloc

运行完的堆区

00360000 C8 00 00 00 00 01 00 00 FF EE FF EE 02 10 00 00 ?.....??..

00360010 00 00 00 00 00 FE 00 00 00 00 10 00 00 20 00 00 .....?..... ..

00360020 00 02 00 00 00 20 00 00 28 02 00 00 FF EF FD 7F .... ..(..稞

00360030 04 00 08 06 00 00 00 00 00 00 00 00 00 00 00 00 .............

00360040 00 00 00 00 98 05 36 00 0F 00 00 00 F8 FF FF FF ....?6....?

00360050 50 00 36 00 50 00 36 00 40 06 36 00 00 00 00 00 P.6.P.6.@6.....

00360060 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360070 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360080 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360090 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600A0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600B0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600C0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600D0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600E0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600F0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360100 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360110 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360120 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360130 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360140 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360150 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360160 00 00 00 00 00 00 00 00 00 00 00 00 01 00 00 00 ...............

00360170 00 00 00 00 00 00 00 00 C8 1E 36 00 C8 1E 36 00 ........?6.?6.

00360180 80 01 36 00 80 01 36 00 88 01 36 00 88 01 36 00 €6.€6.?6.?6.

00360190 90 01 36 00 90 01 36 00 98 01 36 00 98 01 36 00 ?6.?6.?6.?6.

003601A0 A0 01 36 00 A0 01 36 00 A8 01 36 00 A8 01 36 00 ?6.?6.?6.?6.

003601B0 B0 01 36 00 B0 01 36 00 B8 01 36 00 B8 01 36 00 ?6.?6.?6.?6.

003601C0 C0 01 36 00 C0 01 36 00 C8 01 36 00 C8 01 36 00 ?6.?6.?6.?6.

003601D0 D0 01 36 00 D0 01 36 00 D8 01 36 00 D8 01 36 00 ?6.?6.?6.?6.

003601E0 E0 01 36 00 E0 01 36 00 E8 01 36 00 E8 01 36 00 ?6.?6.?6.?6.

003601F0 F0 01 36 00 F0 01 36 00 F8 01 36 00 F8 01 36 00 ?6.?6.?6.?6.

00360200 00 02 36 00 00 02 36 00 08 02 36 00 08 02 36 00 .6..6.6.6.

00360210 10 02 36 00 10 02 36 00 18 02 36 00 18 02 36 00 6.6.6.6.

00360220 20 02 36 00 20 02 36 00 28 02 36 00 28 02 36 00 6. 6.(6.(6.

00360230 30 02 36 00 30 02 36 00 38 02 36 00 38 02 36 00 06.06.86.86.

00360240 40 02 36 00 40 02 36 00 48 02 36 00 48 02 36 00 @6.@6.H6.H6.

00360250 50 02 36 00 50 02 36 00 58 02 36 00 58 02 36 00 P6.P6.X6.X6.

00360260 60 02 36 00 60 02 36 00 68 02 36 00 68 02 36 00 `6.`6.h6.h6.

00360270 70 02 36 00 70 02 36 00 78 02 36 00 78 02 36 00 p6.p6.x6.x6.

00360280 80 02 36 00 80 02 36 00 88 02 36 00 88 02 36 00 €6.€6.?6.?6.

00360290 90 02 36 00 90 02 36 00 98 02 36 00 98 02 36 00 ?6.?6.?6.?6.

003602A0 A0 02 36 00 A0 02 36 00 A8 02 36 00 A8 02 36 00 ?6.?6.?6.?6.

003602B0 B0 02 36 00 B0 02 36 00 B8 02 36 00 B8 02 36 00 ?6.?6.?6.?6.

003602C0 C0 02 36 00 C0 02 36 00 C8 02 36 00 C8 02 36 00 ?6.?6.?6.?6.

003602D0 D0 02 36 00 D0 02 36 00 D8 02 36 00 D8 02 36 00 ?6.?6.?6.?6.

003602E0 E0 02 36 00 E0 02 36 00 E8 02 36 00 E8 02 36 00 ?6.?6.?6.?6.

003602F0 F0 02 36 00 F0 02 36 00 F8 02 36 00 F8 02 36 00 ?6.?6.?6.?6.

00360300 00 03 36 00 00 03 36 00 08 03 36 00 08 03 36 00 .6..6.6.6.

00360310 10 03 36 00 10 03 36 00 18 03 36 00 18 03 36 00 6.6.6.6.

00360320 20 03 36 00 20 03 36 00 28 03 36 00 28 03 36 00 6. 6.(6.(6.

00360330 30 03 36 00 30 03 36 00 38 03 36 00 38 03 36 00 06.06.86.86.

00360340 40 03 36 00 40 03 36 00 48 03 36 00 48 03 36 00 @6.@6.H6.H6.

00360350 50 03 36 00 50 03 36 00 58 03 36 00 58 03 36 00 P6.P6.X6.X6.

00360360 60 03 36 00 60 03 36 00 68 03 36 00 68 03 36 00 `6.`6.h6.h6.

00360370 70 03 36 00 70 03 36 00 78 03 36 00 78 03 36 00 p6.p6.x6.x6.

00360380 80 03 36 00 80 03 36 00 88 03 36 00 88 03 36 00 €6.€6.?6.?6.

00360390 90 03 36 00 90 03 36 00 98 03 36 00 98 03 36 00 ?6.?6.?6.?6.

003603A0 A0 03 36 00 A0 03 36 00 A8 03 36 00 A8 03 36 00 ?6.?6.?6.?6.

003603B0 B0 03 36 00 B0 03 36 00 B8 03 36 00 B8 03 36 00 ?6.?6.?6.?6.

003603C0 C0 03 36 00 C0 03 36 00 C8 03 36 00 C8 03 36 00 ?6.?6.?6.?6.

003603D0 D0 03 36 00 D0 03 36 00 D8 03 36 00 D8 03 36 00 ?6.?6.?6.?6.

003603E0 E0 03 36 00 E0 03 36 00 E8 03 36 00 E8 03 36 00 ?6.?6.?6.?6.

003603F0 F0 03 36 00 F0 03 36 00 F8 03 36 00 F8 03 36 00 ?6.?6.?6.?6.

00360400 00 04 36 00 00 04 36 00 08 04 36 00 08 04 36 00 .6..6.6.6.

00360410 10 04 36 00 10 04 36 00 18 04 36 00 18 04 36 00 6.6.6.6.

00360420 20 04 36 00 20 04 36 00 28 04 36 00 28 04 36 00 6. 6.(6.(6.

00360430 30 04 36 00 30 04 36 00 38 04 36 00 38 04 36 00 06.06.86.86.

00360440 40 04 36 00 40 04 36 00 48 04 36 00 48 04 36 00 @6.@6.H6.H6.

00360450 50 04 36 00 50 04 36 00 58 04 36 00 58 04 36 00 P6.P6.X6.X6.

00360460 60 04 36 00 60 04 36 00 68 04 36 00 68 04 36 00 `6.`6.h6.h6.

00360470 70 04 36 00 70 04 36 00 78 04 36 00 78 04 36 00 p6.p6.x6.x6.

00360480 80 04 36 00 80 04 36 00 88 04 36 00 88 04 36 00 €6.€6.?6.?6.

00360490 90 04 36 00 90 04 36 00 98 04 36 00 98 04 36 00 ?6.?6.?6.?6.

003604A0 A0 04 36 00 A0 04 36 00 A8 04 36 00 A8 04 36 00 ?6.?6.?6.?6.

003604B0 B0 04 36 00 B0 04 36 00 B8 04 36 00 B8 04 36 00 ?6.?6.?6.?6.

003604C0 C0 04 36 00 C0 04 36 00 C8 04 36 00 C8 04 36 00 ?6.?6.?6.?6.

003604D0 D0 04 36 00 D0 04 36 00 D8 04 36 00 D8 04 36 00 ?6.?6.?6.?6.

003604E0 E0 04 36 00 E0 04 36 00 E8 04 36 00 E8 04 36 00 ?6.?6.?6.?6.

003604F0 F0 04 36 00 F0 04 36 00 F8 04 36 00 F8 04 36 00 ?6.?6.?6.?6.

00360500 00 05 36 00 00 05 36 00 08 05 36 00 08 05 36 00 .6..6.6.6.

00360510 10 05 36 00 10 05 36 00 18 05 36 00 18 05 36 00 6.6.6.6.

00360520 20 05 36 00 20 05 36 00 28 05 36 00 28 05 36 00 6. 6.(6.(6.

00360530 30 05 36 00 30 05 36 00 38 05 36 00 38 05 36 00 06.06.86.86.

00360540 40 05 36 00 40 05 36 00 48 05 36 00 48 05 36 00 @6.@6.H6.H6.

00360550 50 05 36 00 50 05 36 00 58 05 36 00 58 05 36 00 P6.P6.X6.X6.

00360560 60 05 36 00 60 05 36 00 68 05 36 00 68 05 36 00 `6.`6.h6.h6.

00360570 70 05 36 00 70 05 36 00 08 06 36 00 00 00 00 00 p6.p6.6.....

00360580 88 06 36 00 00 00 01 00 00 00 00 00 00 30 36 00 ?6.........06.

00360590 00 D0 03 00 00 00 00 00 A8 05 36 00 00 00 00 00 .?.....?6.....

003605A0 00 00 00 00 00 00 00 00 B8 05 36 00 00 00 00 00 ........?6.....

003605B0 00 00 00 00 00 00 00 00 C8 05 36 00 00 00 00 00 ........?6.....

003605C0 00 00 00 00 00 00 00 00 D8 05 36 00 00 00 00 00 ........?6.....

003605D0 00 00 00 00 00 00 00 00 E8 05 36 00 00 00 00 00 ........?6.....

003605E0 00 00 00 00 00 00 00 00 F8 05 36 00 00 00 00 00 ........?6.....

003605F0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360600 00 00 00 00 00 00 00 00 C0 06 FD 77 FF FF FF FF ........?齱

00360610 00 00 00 00 00 00 00 00 2C 00 00 00 00 00 00 00 ........,.......

00360620 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360630 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360640 08 00 C8 00 00 01 00 00 EE FF EE FF 00 00 00 00 .?...??....

00360650 00 00 36 00 00 D0 03 00 00 00 36 00 40 00 00 00 ..6..?...6.@...

00360660 80 06 36 00 00 00 3A 00 3D 00 00 00 01 00 00 00 €6...:.=......

00360670 88 05 36 00 00 00 00 00 C0 1E 36 00 00 00 00 00 ?6.....?6.....

00360680 01 03 08 00 00 01 08 00 00 00 00 00 00 00 00 00 ...........

00360690 04 00 00 01 00 00 00 00 00 00 00 00 00 00 00 00 ..............

003606A0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003606B0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003606C0 04 00 00 01 00 00 00 00 00 00 00 00 00 00 00 00 ..............

003606D0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003606E0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003606F0 04 00 00 01 02 00 00 00 02 00 00 00 00 00 00 00 ............

00360700 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

可分配的空间变成了0x00000228个堆单位，减小了3个堆单位也就是24个字节

00360020 00 02 00 00 00 20 00 00 28 02 00 00 FF EF FD 7F

尾块起始位置变成了0x00361EC8

00360170 00 00 00 00 00 00 00 00 C8 1E 36 00 C8 1E 36 00

第四次

h4 = HeapAlloc(hp,HEAP\_ZERO\_MEMORY,24);

00401038 |. 6A 18 push 18 ; /HeapSize = 18 (24.)

0040103A |. 6A 08 push 8 ; |Flags = HEAP\_ZERO\_MEMORY

0040103C |. 56 push esi ; |hHeap

0040103D |. 8945 F8 mov dword ptr [ebp-8], eax ; |

00401040 |. FFD7 call edi ; \HeapAlloc

运行完后的堆区

00360000 C8 00 00 00 00 01 00 00 FF EE FF EE 02 10 00 00 ?.....??..

00360010 00 00 00 00 00 FE 00 00 00 00 10 00 00 20 00 00 .....?..... ..

00360020 00 02 00 00 00 20 00 00 24 02 00 00 FF EF FD 7F .... ..$..稞

00360030 04 00 08 06 00 00 00 00 00 00 00 00 00 00 00 00 .............

00360040 00 00 00 00 98 05 36 00 0F 00 00 00 F8 FF FF FF ....?6....?

00360050 50 00 36 00 50 00 36 00 40 06 36 00 00 00 00 00 P.6.P.6.@6.....

00360060 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360070 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360080 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360090 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600A0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600B0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600C0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600D0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600E0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600F0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360100 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360110 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360120 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360130 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360140 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360150 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360160 00 00 00 00 00 00 00 00 00 00 00 00 01 00 00 00 ...............

00360170 00 00 00 00 00 00 00 00 E8 1E 36 00 E8 1E 36 00 ........?6.?6.

00360180 80 01 36 00 80 01 36 00 88 01 36 00 88 01 36 00 €6.€6.?6.?6.

00360190 90 01 36 00 90 01 36 00 98 01 36 00 98 01 36 00 ?6.?6.?6.?6.

003601A0 A0 01 36 00 A0 01 36 00 A8 01 36 00 A8 01 36 00 ?6.?6.?6.?6.

003601B0 B0 01 36 00 B0 01 36 00 B8 01 36 00 B8 01 36 00 ?6.?6.?6.?6.

003601C0 C0 01 36 00 C0 01 36 00 C8 01 36 00 C8 01 36 00 ?6.?6.?6.?6.

003601D0 D0 01 36 00 D0 01 36 00 D8 01 36 00 D8 01 36 00 ?6.?6.?6.?6.

003601E0 E0 01 36 00 E0 01 36 00 E8 01 36 00 E8 01 36 00 ?6.?6.?6.?6.

003601F0 F0 01 36 00 F0 01 36 00 F8 01 36 00 F8 01 36 00 ?6.?6.?6.?6.

00360200 00 02 36 00 00 02 36 00 08 02 36 00 08 02 36 00 .6..6.6.6.

00360210 10 02 36 00 10 02 36 00 18 02 36 00 18 02 36 00 6.6.6.6.

00360220 20 02 36 00 20 02 36 00 28 02 36 00 28 02 36 00 6. 6.(6.(6.

00360230 30 02 36 00 30 02 36 00 38 02 36 00 38 02 36 00 06.06.86.86.

00360240 40 02 36 00 40 02 36 00 48 02 36 00 48 02 36 00 @6.@6.H6.H6.

00360250 50 02 36 00 50 02 36 00 58 02 36 00 58 02 36 00 P6.P6.X6.X6.

00360260 60 02 36 00 60 02 36 00 68 02 36 00 68 02 36 00 `6.`6.h6.h6.

00360270 70 02 36 00 70 02 36 00 78 02 36 00 78 02 36 00 p6.p6.x6.x6.

00360280 80 02 36 00 80 02 36 00 88 02 36 00 88 02 36 00 €6.€6.?6.?6.

00360290 90 02 36 00 90 02 36 00 98 02 36 00 98 02 36 00 ?6.?6.?6.?6.

003602A0 A0 02 36 00 A0 02 36 00 A8 02 36 00 A8 02 36 00 ?6.?6.?6.?6.

003602B0 B0 02 36 00 B0 02 36 00 B8 02 36 00 B8 02 36 00 ?6.?6.?6.?6.

003602C0 C0 02 36 00 C0 02 36 00 C8 02 36 00 C8 02 36 00 ?6.?6.?6.?6.

003602D0 D0 02 36 00 D0 02 36 00 D8 02 36 00 D8 02 36 00 ?6.?6.?6.?6.

003602E0 E0 02 36 00 E0 02 36 00 E8 02 36 00 E8 02 36 00 ?6.?6.?6.?6.

003602F0 F0 02 36 00 F0 02 36 00 F8 02 36 00 F8 02 36 00 ?6.?6.?6.?6.

00360300 00 03 36 00 00 03 36 00 08 03 36 00 08 03 36 00 .6..6.6.6.

00360310 10 03 36 00 10 03 36 00 18 03 36 00 18 03 36 00 6.6.6.6.

00360320 20 03 36 00 20 03 36 00 28 03 36 00 28 03 36 00 6. 6.(6.(6.

00360330 30 03 36 00 30 03 36 00 38 03 36 00 38 03 36 00 06.06.86.86.

00360340 40 03 36 00 40 03 36 00 48 03 36 00 48 03 36 00 @6.@6.H6.H6.

00360350 50 03 36 00 50 03 36 00 58 03 36 00 58 03 36 00 P6.P6.X6.X6.

00360360 60 03 36 00 60 03 36 00 68 03 36 00 68 03 36 00 `6.`6.h6.h6.

00360370 70 03 36 00 70 03 36 00 78 03 36 00 78 03 36 00 p6.p6.x6.x6.

00360380 80 03 36 00 80 03 36 00 88 03 36 00 88 03 36 00 €6.€6.?6.?6.

00360390 90 03 36 00 90 03 36 00 98 03 36 00 98 03 36 00 ?6.?6.?6.?6.

003603A0 A0 03 36 00 A0 03 36 00 A8 03 36 00 A8 03 36 00 ?6.?6.?6.?6.

003603B0 B0 03 36 00 B0 03 36 00 B8 03 36 00 B8 03 36 00 ?6.?6.?6.?6.

003603C0 C0 03 36 00 C0 03 36 00 C8 03 36 00 C8 03 36 00 ?6.?6.?6.?6.

003603D0 D0 03 36 00 D0 03 36 00 D8 03 36 00 D8 03 36 00 ?6.?6.?6.?6.

003603E0 E0 03 36 00 E0 03 36 00 E8 03 36 00 E8 03 36 00 ?6.?6.?6.?6.

003603F0 F0 03 36 00 F0 03 36 00 F8 03 36 00 F8 03 36 00 ?6.?6.?6.?6.

00360400 00 04 36 00 00 04 36 00 08 04 36 00 08 04 36 00 .6..6.6.6.

00360410 10 04 36 00 10 04 36 00 18 04 36 00 18 04 36 00 6.6.6.6.

00360420 20 04 36 00 20 04 36 00 28 04 36 00 28 04 36 00 6. 6.(6.(6.

00360430 30 04 36 00 30 04 36 00 38 04 36 00 38 04 36 00 06.06.86.86.

00360440 40 04 36 00 40 04 36 00 48 04 36 00 48 04 36 00 @6.@6.H6.H6.

00360450 50 04 36 00 50 04 36 00 58 04 36 00 58 04 36 00 P6.P6.X6.X6.

00360460 60 04 36 00 60 04 36 00 68 04 36 00 68 04 36 00 `6.`6.h6.h6.

00360470 70 04 36 00 70 04 36 00 78 04 36 00 78 04 36 00 p6.p6.x6.x6.

00360480 80 04 36 00 80 04 36 00 88 04 36 00 88 04 36 00 €6.€6.?6.?6.

00360490 90 04 36 00 90 04 36 00 98 04 36 00 98 04 36 00 ?6.?6.?6.?6.

003604A0 A0 04 36 00 A0 04 36 00 A8 04 36 00 A8 04 36 00 ?6.?6.?6.?6.

003604B0 B0 04 36 00 B0 04 36 00 B8 04 36 00 B8 04 36 00 ?6.?6.?6.?6.

003604C0 C0 04 36 00 C0 04 36 00 C8 04 36 00 C8 04 36 00 ?6.?6.?6.?6.

003604D0 D0 04 36 00 D0 04 36 00 D8 04 36 00 D8 04 36 00 ?6.?6.?6.?6.

003604E0 E0 04 36 00 E0 04 36 00 E8 04 36 00 E8 04 36 00 ?6.?6.?6.?6.

003604F0 F0 04 36 00 F0 04 36 00 F8 04 36 00 F8 04 36 00 ?6.?6.?6.?6.

00360500 00 05 36 00 00 05 36 00 08 05 36 00 08 05 36 00 .6..6.6.6.

00360510 10 05 36 00 10 05 36 00 18 05 36 00 18 05 36 00 6.6.6.6.

00360520 20 05 36 00 20 05 36 00 28 05 36 00 28 05 36 00 6. 6.(6.(6.

00360530 30 05 36 00 30 05 36 00 38 05 36 00 38 05 36 00 06.06.86.86.

00360540 40 05 36 00 40 05 36 00 48 05 36 00 48 05 36 00 @6.@6.H6.H6.

00360550 50 05 36 00 50 05 36 00 58 05 36 00 58 05 36 00 P6.P6.X6.X6.

00360560 60 05 36 00 60 05 36 00 68 05 36 00 68 05 36 00 `6.`6.h6.h6.

00360570 70 05 36 00 70 05 36 00 08 06 36 00 00 00 00 00 p6.p6.6.....

00360580 88 06 36 00 00 00 01 00 00 00 00 00 00 30 36 00 ?6.........06.

00360590 00 D0 03 00 00 00 00 00 A8 05 36 00 00 00 00 00 .?.....?6.....

003605A0 00 00 00 00 00 00 00 00 B8 05 36 00 00 00 00 00 ........?6.....

003605B0 00 00 00 00 00 00 00 00 C8 05 36 00 00 00 00 00 ........?6.....

003605C0 00 00 00 00 00 00 00 00 D8 05 36 00 00 00 00 00 ........?6.....

003605D0 00 00 00 00 00 00 00 00 E8 05 36 00 00 00 00 00 ........?6.....

003605E0 00 00 00 00 00 00 00 00 F8 05 36 00 00 00 00 00 ........?6.....

003605F0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360600 00 00 00 00 00 00 00 00 C0 06 FD 77 FF FF FF FF ........?齱

00360610 00 00 00 00 00 00 00 00 2C 00 00 00 00 00 00 00 ........,.......

00360620 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360630 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360640 08 00 C8 00 00 01 00 00 EE FF EE FF 00 00 00 00 .?...??....

00360650 00 00 36 00 00 D0 03 00 00 00 36 00 40 00 00 00 ..6..?...6.@...

00360660 80 06 36 00 00 00 3A 00 3D 00 00 00 01 00 00 00 €6...:.=......

00360670 88 05 36 00 00 00 00 00 E0 1E 36 00 00 00 00 00 ?6.....?6.....

00360680 01 03 08 00 00 01 08 00 00 00 00 00 00 00 00 00 ...........

00360690 04 00 00 01 00 00 00 00 00 00 00 00 00 00 00 00 ..............

003606A0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003606B0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003606C0 04 00 00 01 00 00 00 00 00 00 00 00 00 00 00 00 ..............

003606D0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003606E0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003606F0 04 00 00 01 02 00 00 00 02 00 00 00 00 00 00 00 ............

00360700 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360710 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

可分配空间变成了0x00000224个堆单位，减小了4个堆单位也就是32个字节

00360020 00 02 00 00 00 20 00 00 24 02 00 00 FF EF FD 7F

尾块起始位置变成了0x00361EE8

00360170 00 00 00 00 00 00 00 00 E8 1E 36 00 E8 1E 36 00

到此四次分配全部完成，来看看分配的四个堆块

00361E70 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00361E80 00 00 00 00 00 00 00 00 02 00 01 03 00 01 08 00 ...........

00361E90 00 00 00 00 00 00 00 00 02 00 02 00 00 01 08 00 ............

00361EA0 00 00 00 00 00 00 00 00 03 00 02 00 00 01 08 00 ............

00361EB0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00361EC0 04 00 03 00 00 01 08 00 00 00 00 00 00 00 00 00 ............

00361ED0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00361EE0 24 02 04 00 00 10 00 00 78 01 36 00 78 01 36 00 $....x6.x6.

00361EF0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00361F00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

接下来是释放

HeapFree(hp,0,h1);

00401042 |. 53 push ebx ; /pMemory = 00361E90

00401043 |. 8B1D 4C504000 mov ebx, dword ptr [<&KERNEL32.HeapF>; |ntdll.RtlFreeHeap

00401049 |. 6A 00 push 0 ; |Flags = 0

0040104B |. 56 push esi ; |hHeap

0040104C |. 8945 F4 mov dword ptr [ebp-C], eax ; |

0040104F |. FFD3 call ebx ; \HeapFree

释放完的堆区

00360000 C8 00 00 00 00 01 00 00 FF EE FF EE 02 10 00 00 ?.....??..

00360010 00 00 00 00 00 FE 00 00 00 00 10 00 00 20 00 00 .....?..... ..

00360020 00 02 00 00 00 20 00 00 24 02 00 00 FF EF FD 7F .... ..$..稞

00360030 04 00 08 06 00 00 00 00 00 00 00 00 00 00 00 00 .............

00360040 00 00 00 00 98 05 36 00 0F 00 00 00 F8 FF FF FF ....?6....?

00360050 50 00 36 00 50 00 36 00 40 06 36 00 00 00 00 00 P.6.P.6.@6.....

00360060 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360070 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360080 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360090 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600A0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600B0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600C0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600D0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600E0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600F0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360100 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360110 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360120 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360130 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360140 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360150 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360160 00 00 00 00 00 00 00 00 00 00 00 00 01 00 00 00 ...............

00360170 00 00 00 00 00 00 00 00 E8 1E 36 00 E8 1E 36 00 ........?6.?6.

00360180 80 01 36 00 80 01 36 00 88 01 36 00 88 01 36 00 €6.€6.?6.?6.

00360190 90 01 36 00 90 01 36 00 98 01 36 00 98 01 36 00 ?6.?6.?6.?6.

003601A0 A0 01 36 00 A0 01 36 00 A8 01 36 00 A8 01 36 00 ?6.?6.?6.?6.

003601B0 B0 01 36 00 B0 01 36 00 B8 01 36 00 B8 01 36 00 ?6.?6.?6.?6.

003601C0 C0 01 36 00 C0 01 36 00 C8 01 36 00 C8 01 36 00 ?6.?6.?6.?6.

003601D0 D0 01 36 00 D0 01 36 00 D8 01 36 00 D8 01 36 00 ?6.?6.?6.?6.

003601E0 E0 01 36 00 E0 01 36 00 E8 01 36 00 E8 01 36 00 ?6.?6.?6.?6.

003601F0 F0 01 36 00 F0 01 36 00 F8 01 36 00 F8 01 36 00 ?6.?6.?6.?6.

00360200 00 02 36 00 00 02 36 00 08 02 36 00 08 02 36 00 .6..6.6.6.

00360210 10 02 36 00 10 02 36 00 18 02 36 00 18 02 36 00 6.6.6.6.

00360220 20 02 36 00 20 02 36 00 28 02 36 00 28 02 36 00 6. 6.(6.(6.

00360230 30 02 36 00 30 02 36 00 38 02 36 00 38 02 36 00 06.06.86.86.

00360240 40 02 36 00 40 02 36 00 48 02 36 00 48 02 36 00 @6.@6.H6.H6.

00360250 50 02 36 00 50 02 36 00 58 02 36 00 58 02 36 00 P6.P6.X6.X6.

00360260 60 02 36 00 60 02 36 00 68 02 36 00 68 02 36 00 `6.`6.h6.h6.

00360270 70 02 36 00 70 02 36 00 78 02 36 00 78 02 36 00 p6.p6.x6.x6.

00360280 80 02 36 00 80 02 36 00 88 02 36 00 88 02 36 00 €6.€6.?6.?6.

00360290 90 02 36 00 90 02 36 00 98 02 36 00 98 02 36 00 ?6.?6.?6.?6.

003602A0 A0 02 36 00 A0 02 36 00 A8 02 36 00 A8 02 36 00 ?6.?6.?6.?6.

003602B0 B0 02 36 00 B0 02 36 00 B8 02 36 00 B8 02 36 00 ?6.?6.?6.?6.

003602C0 C0 02 36 00 C0 02 36 00 C8 02 36 00 C8 02 36 00 ?6.?6.?6.?6.

003602D0 D0 02 36 00 D0 02 36 00 D8 02 36 00 D8 02 36 00 ?6.?6.?6.?6.

003602E0 E0 02 36 00 E0 02 36 00 E8 02 36 00 E8 02 36 00 ?6.?6.?6.?6.

003602F0 F0 02 36 00 F0 02 36 00 F8 02 36 00 F8 02 36 00 ?6.?6.?6.?6.

00360300 00 03 36 00 00 03 36 00 08 03 36 00 08 03 36 00 .6..6.6.6.

00360310 10 03 36 00 10 03 36 00 18 03 36 00 18 03 36 00 6.6.6.6.

00360320 20 03 36 00 20 03 36 00 28 03 36 00 28 03 36 00 6. 6.(6.(6.

00360330 30 03 36 00 30 03 36 00 38 03 36 00 38 03 36 00 06.06.86.86.

00360340 40 03 36 00 40 03 36 00 48 03 36 00 48 03 36 00 @6.@6.H6.H6.

00360350 50 03 36 00 50 03 36 00 58 03 36 00 58 03 36 00 P6.P6.X6.X6.

00360360 60 03 36 00 60 03 36 00 68 03 36 00 68 03 36 00 `6.`6.h6.h6.

00360370 70 03 36 00 70 03 36 00 78 03 36 00 78 03 36 00 p6.p6.x6.x6.

00360380 80 03 36 00 80 03 36 00 88 03 36 00 88 03 36 00 €6.€6.?6.?6.

00360390 90 03 36 00 90 03 36 00 98 03 36 00 98 03 36 00 ?6.?6.?6.?6.

003603A0 A0 03 36 00 A0 03 36 00 A8 03 36 00 A8 03 36 00 ?6.?6.?6.?6.

003603B0 B0 03 36 00 B0 03 36 00 B8 03 36 00 B8 03 36 00 ?6.?6.?6.?6.

003603C0 C0 03 36 00 C0 03 36 00 C8 03 36 00 C8 03 36 00 ?6.?6.?6.?6.

003603D0 D0 03 36 00 D0 03 36 00 D8 03 36 00 D8 03 36 00 ?6.?6.?6.?6.

003603E0 E0 03 36 00 E0 03 36 00 E8 03 36 00 E8 03 36 00 ?6.?6.?6.?6.

003603F0 F0 03 36 00 F0 03 36 00 F8 03 36 00 F8 03 36 00 ?6.?6.?6.?6.

00360400 00 04 36 00 00 04 36 00 08 04 36 00 08 04 36 00 .6..6.6.6.

00360410 10 04 36 00 10 04 36 00 18 04 36 00 18 04 36 00 6.6.6.6.

00360420 20 04 36 00 20 04 36 00 28 04 36 00 28 04 36 00 6. 6.(6.(6.

00360430 30 04 36 00 30 04 36 00 38 04 36 00 38 04 36 00 06.06.86.86.

00360440 40 04 36 00 40 04 36 00 48 04 36 00 48 04 36 00 @6.@6.H6.H6.

00360450 50 04 36 00 50 04 36 00 58 04 36 00 58 04 36 00 P6.P6.X6.X6.

00360460 60 04 36 00 60 04 36 00 68 04 36 00 68 04 36 00 `6.`6.h6.h6.

00360470 70 04 36 00 70 04 36 00 78 04 36 00 78 04 36 00 p6.p6.x6.x6.

00360480 80 04 36 00 80 04 36 00 88 04 36 00 88 04 36 00 €6.€6.?6.?6.

00360490 90 04 36 00 90 04 36 00 98 04 36 00 98 04 36 00 ?6.?6.?6.?6.

003604A0 A0 04 36 00 A0 04 36 00 A8 04 36 00 A8 04 36 00 ?6.?6.?6.?6.

003604B0 B0 04 36 00 B0 04 36 00 B8 04 36 00 B8 04 36 00 ?6.?6.?6.?6.

003604C0 C0 04 36 00 C0 04 36 00 C8 04 36 00 C8 04 36 00 ?6.?6.?6.?6.

003604D0 D0 04 36 00 D0 04 36 00 D8 04 36 00 D8 04 36 00 ?6.?6.?6.?6.

003604E0 E0 04 36 00 E0 04 36 00 E8 04 36 00 E8 04 36 00 ?6.?6.?6.?6.

003604F0 F0 04 36 00 F0 04 36 00 F8 04 36 00 F8 04 36 00 ?6.?6.?6.?6.

00360500 00 05 36 00 00 05 36 00 08 05 36 00 08 05 36 00 .6..6.6.6.

00360510 10 05 36 00 10 05 36 00 18 05 36 00 18 05 36 00 6.6.6.6.

00360520 20 05 36 00 20 05 36 00 28 05 36 00 28 05 36 00 6. 6.(6.(6.

00360530 30 05 36 00 30 05 36 00 38 05 36 00 38 05 36 00 06.06.86.86.

00360540 40 05 36 00 40 05 36 00 48 05 36 00 48 05 36 00 @6.@6.H6.H6.

00360550 50 05 36 00 50 05 36 00 58 05 36 00 58 05 36 00 P6.P6.X6.X6.

00360560 60 05 36 00 60 05 36 00 68 05 36 00 68 05 36 00 `6.`6.h6.h6.

00360570 70 05 36 00 70 05 36 00 08 06 36 00 00 00 00 00 p6.p6.6.....

00360580 88 06 36 00 00 00 01 00 00 00 00 00 00 30 36 00 ?6.........06.

00360590 00 D0 03 00 00 00 00 00 A8 05 36 00 00 00 00 00 .?.....?6.....

003605A0 00 00 00 00 00 00 00 00 B8 05 36 00 00 00 00 00 ........?6.....

003605B0 00 00 00 00 00 00 00 00 C8 05 36 00 00 00 00 00 ........?6.....

003605C0 00 00 00 00 00 00 00 00 D8 05 36 00 00 00 00 00 ........?6.....

003605D0 00 00 00 00 00 00 00 00 E8 05 36 00 00 00 00 00 ........?6.....

003605E0 00 00 00 00 00 00 00 00 F8 05 36 00 00 00 00 00 ........?6.....

003605F0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360600 00 00 00 00 00 00 00 00 C0 06 FD 77 FF FF FF FF ........?齱

00360610 00 00 00 00 00 00 00 00 2C 00 00 00 00 00 00 00 ........,.......

00360620 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360630 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360640 08 00 C8 00 00 01 00 00 EE FF EE FF 00 00 00 00 .?...??....

00360650 00 00 36 00 00 D0 03 00 00 00 36 00 40 00 00 00 ..6..?...6.@...

00360660 80 06 36 00 00 00 3A 00 3D 00 00 00 01 00 00 00 €6...:.=......

00360670 88 05 36 00 00 00 00 00 E0 1E 36 00 00 00 00 00 ?6.....?6.....

00360680 01 03 08 00 00 01 08 00 00 00 00 00 00 00 00 00 ...........

00360690 04 00 00 01 00 00 00 00 00 00 00 00 00 00 00 00 ..............

003606A0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003606B0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003606C0 04 00 00 01 00 00 00 00 00 00 00 00 00 00 00 00 ..............

003606D0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003606E0 00 00 00 00 00 00 00 00 90 1E 36 00 01 00 01 00 ........?6...

003606F0 04 00 00 01 02 00 00 00 02 00 00 00 01 00 00 00 ...........

00360700 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360710 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

可分配空间为0x00000224个堆单位，没有变化，因为释放刚好16个字节，优先放入快表

00360020 00 02 00 00 00 20 00 00 24 02 00 00 FF EF FD 7F

尾块起始位置没有变化

00360170 00 00 00 00 00 00 00 00 E8 1E 36 00 E8 1E 36 00

来看看快表区，这是Lookaside[1]，这里有个问题，空表中申请的灰加上8字节块首，也就是申请8字节的空间会自动加上8字节块首也就是申请16个字节的空间，使用的是Freelist[2]，而快表申请8字节的空间却直接使用Lookaside[1]，这里是个疑问

003606E0 00 00 00 00 00 00 00 00 90 1E 36 00 01 00 01 00

接着来看看分配的空间0x00361E90

00361E70 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00361E80 00 00 00 00 00 00 00 00 02 00 01 03 00 01 08 00 ...........

00361E90 00 00 00 00 00 00 00 00 02 00 02 00 00 01 08 00 ............

00361EA0 00 00 00 00 00 00 00 00 03 00 02 00 00 01 08 00 ............

00361EB0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00361EC0 04 00 03 00 00 01 08 00 00 00 00 00 00 00 00 00 ............

00361ED0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00361EE0 24 02 04 00 00 10 00 00 78 01 36 00 78 01 36 00 $....x6.x6.

00361EF0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

第二次释放

HeapFree(hp,0,h2);

00401051 |. 8B45 FC mov eax, dword ptr [ebp-4]

00401054 |. 50 push eax ; /pMemory

00401055 |. 6A 00 push 0 ; |Flags = 0

00401057 |. 56 push esi ; |hHeap

00401058 |. FFD3 call ebx

释放完的堆区

00360000 C8 00 00 00 00 01 00 00 FF EE FF EE 02 10 00 00 ?.....??..

00360010 00 00 00 00 00 FE 00 00 00 00 10 00 00 20 00 00 .....?..... ..

00360020 00 02 00 00 00 20 00 00 24 02 00 00 FF EF FD 7F .... ..$..稞

00360030 04 00 08 06 00 00 00 00 00 00 00 00 00 00 00 00 .............

00360040 00 00 00 00 98 05 36 00 0F 00 00 00 F8 FF FF FF ....?6....?

00360050 50 00 36 00 50 00 36 00 40 06 36 00 00 00 00 00 P.6.P.6.@6.....

00360060 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360070 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360080 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360090 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600A0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600B0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600C0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600D0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600E0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600F0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360100 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360110 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360120 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360130 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360140 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360150 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360160 00 00 00 00 00 00 00 00 00 00 00 00 01 00 00 00 ...............

00360170 00 00 00 00 00 00 00 00 E8 1E 36 00 E8 1E 36 00 ........?6.?6.

00360180 80 01 36 00 80 01 36 00 88 01 36 00 88 01 36 00 €6.€6.?6.?6.

00360190 90 01 36 00 90 01 36 00 98 01 36 00 98 01 36 00 ?6.?6.?6.?6.

003601A0 A0 01 36 00 A0 01 36 00 A8 01 36 00 A8 01 36 00 ?6.?6.?6.?6.

003601B0 B0 01 36 00 B0 01 36 00 B8 01 36 00 B8 01 36 00 ?6.?6.?6.?6.

003601C0 C0 01 36 00 C0 01 36 00 C8 01 36 00 C8 01 36 00 ?6.?6.?6.?6.

003601D0 D0 01 36 00 D0 01 36 00 D8 01 36 00 D8 01 36 00 ?6.?6.?6.?6.

003601E0 E0 01 36 00 E0 01 36 00 E8 01 36 00 E8 01 36 00 ?6.?6.?6.?6.

003601F0 F0 01 36 00 F0 01 36 00 F8 01 36 00 F8 01 36 00 ?6.?6.?6.?6.

00360200 00 02 36 00 00 02 36 00 08 02 36 00 08 02 36 00 .6..6.6.6.

00360210 10 02 36 00 10 02 36 00 18 02 36 00 18 02 36 00 6.6.6.6.

00360220 20 02 36 00 20 02 36 00 28 02 36 00 28 02 36 00 6. 6.(6.(6.

00360230 30 02 36 00 30 02 36 00 38 02 36 00 38 02 36 00 06.06.86.86.

00360240 40 02 36 00 40 02 36 00 48 02 36 00 48 02 36 00 @6.@6.H6.H6.

00360250 50 02 36 00 50 02 36 00 58 02 36 00 58 02 36 00 P6.P6.X6.X6.

00360260 60 02 36 00 60 02 36 00 68 02 36 00 68 02 36 00 `6.`6.h6.h6.

00360270 70 02 36 00 70 02 36 00 78 02 36 00 78 02 36 00 p6.p6.x6.x6.

00360280 80 02 36 00 80 02 36 00 88 02 36 00 88 02 36 00 €6.€6.?6.?6.

00360290 90 02 36 00 90 02 36 00 98 02 36 00 98 02 36 00 ?6.?6.?6.?6.

003602A0 A0 02 36 00 A0 02 36 00 A8 02 36 00 A8 02 36 00 ?6.?6.?6.?6.

003602B0 B0 02 36 00 B0 02 36 00 B8 02 36 00 B8 02 36 00 ?6.?6.?6.?6.

003602C0 C0 02 36 00 C0 02 36 00 C8 02 36 00 C8 02 36 00 ?6.?6.?6.?6.

003602D0 D0 02 36 00 D0 02 36 00 D8 02 36 00 D8 02 36 00 ?6.?6.?6.?6.

003602E0 E0 02 36 00 E0 02 36 00 E8 02 36 00 E8 02 36 00 ?6.?6.?6.?6.

003602F0 F0 02 36 00 F0 02 36 00 F8 02 36 00 F8 02 36 00 ?6.?6.?6.?6.

00360300 00 03 36 00 00 03 36 00 08 03 36 00 08 03 36 00 .6..6.6.6.

00360310 10 03 36 00 10 03 36 00 18 03 36 00 18 03 36 00 6.6.6.6.

00360320 20 03 36 00 20 03 36 00 28 03 36 00 28 03 36 00 6. 6.(6.(6.

00360330 30 03 36 00 30 03 36 00 38 03 36 00 38 03 36 00 06.06.86.86.

00360340 40 03 36 00 40 03 36 00 48 03 36 00 48 03 36 00 @6.@6.H6.H6.

00360350 50 03 36 00 50 03 36 00 58 03 36 00 58 03 36 00 P6.P6.X6.X6.

00360360 60 03 36 00 60 03 36 00 68 03 36 00 68 03 36 00 `6.`6.h6.h6.

00360370 70 03 36 00 70 03 36 00 78 03 36 00 78 03 36 00 p6.p6.x6.x6.

00360380 80 03 36 00 80 03 36 00 88 03 36 00 88 03 36 00 €6.€6.?6.?6.

00360390 90 03 36 00 90 03 36 00 98 03 36 00 98 03 36 00 ?6.?6.?6.?6.

003603A0 A0 03 36 00 A0 03 36 00 A8 03 36 00 A8 03 36 00 ?6.?6.?6.?6.

003603B0 B0 03 36 00 B0 03 36 00 B8 03 36 00 B8 03 36 00 ?6.?6.?6.?6.

003603C0 C0 03 36 00 C0 03 36 00 C8 03 36 00 C8 03 36 00 ?6.?6.?6.?6.

003603D0 D0 03 36 00 D0 03 36 00 D8 03 36 00 D8 03 36 00 ?6.?6.?6.?6.

003603E0 E0 03 36 00 E0 03 36 00 E8 03 36 00 E8 03 36 00 ?6.?6.?6.?6.

003603F0 F0 03 36 00 F0 03 36 00 F8 03 36 00 F8 03 36 00 ?6.?6.?6.?6.

00360400 00 04 36 00 00 04 36 00 08 04 36 00 08 04 36 00 .6..6.6.6.

00360410 10 04 36 00 10 04 36 00 18 04 36 00 18 04 36 00 6.6.6.6.

00360420 20 04 36 00 20 04 36 00 28 04 36 00 28 04 36 00 6. 6.(6.(6.

00360430 30 04 36 00 30 04 36 00 38 04 36 00 38 04 36 00 06.06.86.86.

00360440 40 04 36 00 40 04 36 00 48 04 36 00 48 04 36 00 @6.@6.H6.H6.

00360450 50 04 36 00 50 04 36 00 58 04 36 00 58 04 36 00 P6.P6.X6.X6.

00360460 60 04 36 00 60 04 36 00 68 04 36 00 68 04 36 00 `6.`6.h6.h6.

00360470 70 04 36 00 70 04 36 00 78 04 36 00 78 04 36 00 p6.p6.x6.x6.

00360480 80 04 36 00 80 04 36 00 88 04 36 00 88 04 36 00 €6.€6.?6.?6.

00360490 90 04 36 00 90 04 36 00 98 04 36 00 98 04 36 00 ?6.?6.?6.?6.

003604A0 A0 04 36 00 A0 04 36 00 A8 04 36 00 A8 04 36 00 ?6.?6.?6.?6.

003604B0 B0 04 36 00 B0 04 36 00 B8 04 36 00 B8 04 36 00 ?6.?6.?6.?6.

003604C0 C0 04 36 00 C0 04 36 00 C8 04 36 00 C8 04 36 00 ?6.?6.?6.?6.

003604D0 D0 04 36 00 D0 04 36 00 D8 04 36 00 D8 04 36 00 ?6.?6.?6.?6.

003604E0 E0 04 36 00 E0 04 36 00 E8 04 36 00 E8 04 36 00 ?6.?6.?6.?6.

003604F0 F0 04 36 00 F0 04 36 00 F8 04 36 00 F8 04 36 00 ?6.?6.?6.?6.

00360500 00 05 36 00 00 05 36 00 08 05 36 00 08 05 36 00 .6..6.6.6.

00360510 10 05 36 00 10 05 36 00 18 05 36 00 18 05 36 00 6.6.6.6.

00360520 20 05 36 00 20 05 36 00 28 05 36 00 28 05 36 00 6. 6.(6.(6.

00360530 30 05 36 00 30 05 36 00 38 05 36 00 38 05 36 00 06.06.86.86.

00360540 40 05 36 00 40 05 36 00 48 05 36 00 48 05 36 00 @6.@6.H6.H6.

00360550 50 05 36 00 50 05 36 00 58 05 36 00 58 05 36 00 P6.P6.X6.X6.

00360560 60 05 36 00 60 05 36 00 68 05 36 00 68 05 36 00 `6.`6.h6.h6.

00360570 70 05 36 00 70 05 36 00 08 06 36 00 00 00 00 00 p6.p6.6.....

00360580 88 06 36 00 00 00 01 00 00 00 00 00 00 30 36 00 ?6.........06.

00360590 00 D0 03 00 00 00 00 00 A8 05 36 00 00 00 00 00 .?.....?6.....

003605A0 00 00 00 00 00 00 00 00 B8 05 36 00 00 00 00 00 ........?6.....

003605B0 00 00 00 00 00 00 00 00 C8 05 36 00 00 00 00 00 ........?6.....

003605C0 00 00 00 00 00 00 00 00 D8 05 36 00 00 00 00 00 ........?6.....

003605D0 00 00 00 00 00 00 00 00 E8 05 36 00 00 00 00 00 ........?6.....

003605E0 00 00 00 00 00 00 00 00 F8 05 36 00 00 00 00 00 ........?6.....

003605F0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360600 00 00 00 00 00 00 00 00 C0 06 FD 77 FF FF FF FF ........?齱

00360610 00 00 00 00 00 00 00 00 2C 00 00 00 00 00 00 00 ........,.......

00360620 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360630 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360640 08 00 C8 00 00 01 00 00 EE FF EE FF 00 00 00 00 .?...??....

00360650 00 00 36 00 00 D0 03 00 00 00 36 00 40 00 00 00 ..6..?...6.@...

00360660 80 06 36 00 00 00 3A 00 3D 00 00 00 01 00 00 00 €6...:.=......

00360670 88 05 36 00 00 00 00 00 E0 1E 36 00 00 00 00 00 ?6.....?6.....

00360680 01 03 08 00 00 01 08 00 00 00 00 00 00 00 00 00 ...........

00360690 04 00 00 01 00 00 00 00 00 00 00 00 00 00 00 00 ..............

003606A0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003606B0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003606C0 04 00 00 01 00 00 00 00 00 00 00 00 00 00 00 00 ..............

003606D0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003606E0 00 00 00 00 00 00 00 00 A0 1E 36 00 02 00 02 00 ........?6...

003606F0 04 00 00 01 02 00 00 00 02 00 00 00 02 00 00 00 ...........

00360700 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360710 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

可分配空间大小没有变化

0x00360020 00 02 00 00 00 20 00 00 24 02 00 00 FF EF FD 7F

尾块起始位置没有变化

0x00360170 00 00 00 00 00 00 00 00 E8 1E 36 00 E8 1E 36 00

Lookaside[1]变成了0x00361EA0

0x003606E0 00 00 00 00 00 00 00 00 A0 1E 36 00 02 00 02 00

跳到0x00361EA0看看

00361E70 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00361E80 00 00 00 00 00 00 00 00 02 00 01 03 00 01 08 00 ...........

00361E90 00 00 00 00 00 00 00 00 02 00 02 00 00 01 08 00 ............

00361EA0 90 1E 36 00 00 00 00 00 03 00 02 00 00 01 08 00 ?6.........

00361EB0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00361EC0 04 00 03 00 00 01 08 00 00 00 00 00 00 00 00 00 ............

00361ED0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00361EE0 24 02 04 00 00 10 00 00 78 01 36 00 78 01 36 00 $....x6.x6.

00361EF0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

0x00361EA0指向了0x00361E90，相当于Lookaside[1]串着h2，h2后面串着h1

第三次

HeapFree(hp,0,h3);

0040105A |. 8B4D F8 mov ecx, dword ptr [ebp-8]

0040105D |. 51 push ecx ; /pMemory

0040105E |. 6A 00 push 0 ; |Flags = 0

00401060 |. 56 push esi ; |hHeap

00401061 |. FFD3 call ebx ; \HeapFree

释放完的堆区

00360000 C8 00 00 00 00 01 00 00 FF EE FF EE 02 10 00 00 ?.....??..

00360010 00 00 00 00 00 FE 00 00 00 00 10 00 00 20 00 00 .....?..... ..

00360020 00 02 00 00 00 20 00 00 24 02 00 00 FF EF FD 7F .... ..$..稞

00360030 04 00 08 06 00 00 00 00 00 00 00 00 00 00 00 00 .............

00360040 00 00 00 00 98 05 36 00 0F 00 00 00 F8 FF FF FF ....?6....?

00360050 50 00 36 00 50 00 36 00 40 06 36 00 00 00 00 00 P.6.P.6.@6.....

00360060 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360070 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360080 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360090 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600A0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600B0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600C0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600D0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600E0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600F0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360100 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360110 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360120 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360130 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360140 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360150 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360160 00 00 00 00 00 00 00 00 00 00 00 00 01 00 00 00 ...............

00360170 00 00 00 00 00 00 00 00 E8 1E 36 00 E8 1E 36 00 ........?6.?6.

00360180 80 01 36 00 80 01 36 00 88 01 36 00 88 01 36 00 €6.€6.?6.?6.

00360190 90 01 36 00 90 01 36 00 98 01 36 00 98 01 36 00 ?6.?6.?6.?6.

003601A0 A0 01 36 00 A0 01 36 00 A8 01 36 00 A8 01 36 00 ?6.?6.?6.?6.

003601B0 B0 01 36 00 B0 01 36 00 B8 01 36 00 B8 01 36 00 ?6.?6.?6.?6.

003601C0 C0 01 36 00 C0 01 36 00 C8 01 36 00 C8 01 36 00 ?6.?6.?6.?6.

003601D0 D0 01 36 00 D0 01 36 00 D8 01 36 00 D8 01 36 00 ?6.?6.?6.?6.

003601E0 E0 01 36 00 E0 01 36 00 E8 01 36 00 E8 01 36 00 ?6.?6.?6.?6.

003601F0 F0 01 36 00 F0 01 36 00 F8 01 36 00 F8 01 36 00 ?6.?6.?6.?6.

00360200 00 02 36 00 00 02 36 00 08 02 36 00 08 02 36 00 .6..6.6.6.

00360210 10 02 36 00 10 02 36 00 18 02 36 00 18 02 36 00 6.6.6.6.

00360220 20 02 36 00 20 02 36 00 28 02 36 00 28 02 36 00 6. 6.(6.(6.

00360230 30 02 36 00 30 02 36 00 38 02 36 00 38 02 36 00 06.06.86.86.

00360240 40 02 36 00 40 02 36 00 48 02 36 00 48 02 36 00 @6.@6.H6.H6.

00360250 50 02 36 00 50 02 36 00 58 02 36 00 58 02 36 00 P6.P6.X6.X6.

00360260 60 02 36 00 60 02 36 00 68 02 36 00 68 02 36 00 `6.`6.h6.h6.

00360270 70 02 36 00 70 02 36 00 78 02 36 00 78 02 36 00 p6.p6.x6.x6.

00360280 80 02 36 00 80 02 36 00 88 02 36 00 88 02 36 00 €6.€6.?6.?6.

00360290 90 02 36 00 90 02 36 00 98 02 36 00 98 02 36 00 ?6.?6.?6.?6.

003602A0 A0 02 36 00 A0 02 36 00 A8 02 36 00 A8 02 36 00 ?6.?6.?6.?6.

003602B0 B0 02 36 00 B0 02 36 00 B8 02 36 00 B8 02 36 00 ?6.?6.?6.?6.

003602C0 C0 02 36 00 C0 02 36 00 C8 02 36 00 C8 02 36 00 ?6.?6.?6.?6.

003602D0 D0 02 36 00 D0 02 36 00 D8 02 36 00 D8 02 36 00 ?6.?6.?6.?6.

003602E0 E0 02 36 00 E0 02 36 00 E8 02 36 00 E8 02 36 00 ?6.?6.?6.?6.

003602F0 F0 02 36 00 F0 02 36 00 F8 02 36 00 F8 02 36 00 ?6.?6.?6.?6.

00360300 00 03 36 00 00 03 36 00 08 03 36 00 08 03 36 00 .6..6.6.6.

00360310 10 03 36 00 10 03 36 00 18 03 36 00 18 03 36 00 6.6.6.6.

00360320 20 03 36 00 20 03 36 00 28 03 36 00 28 03 36 00 6. 6.(6.(6.

00360330 30 03 36 00 30 03 36 00 38 03 36 00 38 03 36 00 06.06.86.86.

00360340 40 03 36 00 40 03 36 00 48 03 36 00 48 03 36 00 @6.@6.H6.H6.

00360350 50 03 36 00 50 03 36 00 58 03 36 00 58 03 36 00 P6.P6.X6.X6.

00360360 60 03 36 00 60 03 36 00 68 03 36 00 68 03 36 00 `6.`6.h6.h6.

00360370 70 03 36 00 70 03 36 00 78 03 36 00 78 03 36 00 p6.p6.x6.x6.

00360380 80 03 36 00 80 03 36 00 88 03 36 00 88 03 36 00 €6.€6.?6.?6.

00360390 90 03 36 00 90 03 36 00 98 03 36 00 98 03 36 00 ?6.?6.?6.?6.

003603A0 A0 03 36 00 A0 03 36 00 A8 03 36 00 A8 03 36 00 ?6.?6.?6.?6.

003603B0 B0 03 36 00 B0 03 36 00 B8 03 36 00 B8 03 36 00 ?6.?6.?6.?6.

003603C0 C0 03 36 00 C0 03 36 00 C8 03 36 00 C8 03 36 00 ?6.?6.?6.?6.

003603D0 D0 03 36 00 D0 03 36 00 D8 03 36 00 D8 03 36 00 ?6.?6.?6.?6.

003603E0 E0 03 36 00 E0 03 36 00 E8 03 36 00 E8 03 36 00 ?6.?6.?6.?6.

003603F0 F0 03 36 00 F0 03 36 00 F8 03 36 00 F8 03 36 00 ?6.?6.?6.?6.

00360400 00 04 36 00 00 04 36 00 08 04 36 00 08 04 36 00 .6..6.6.6.

00360410 10 04 36 00 10 04 36 00 18 04 36 00 18 04 36 00 6.6.6.6.

00360420 20 04 36 00 20 04 36 00 28 04 36 00 28 04 36 00 6. 6.(6.(6.

00360430 30 04 36 00 30 04 36 00 38 04 36 00 38 04 36 00 06.06.86.86.

00360440 40 04 36 00 40 04 36 00 48 04 36 00 48 04 36 00 @6.@6.H6.H6.

00360450 50 04 36 00 50 04 36 00 58 04 36 00 58 04 36 00 P6.P6.X6.X6.

00360460 60 04 36 00 60 04 36 00 68 04 36 00 68 04 36 00 `6.`6.h6.h6.

00360470 70 04 36 00 70 04 36 00 78 04 36 00 78 04 36 00 p6.p6.x6.x6.

00360480 80 04 36 00 80 04 36 00 88 04 36 00 88 04 36 00 €6.€6.?6.?6.

00360490 90 04 36 00 90 04 36 00 98 04 36 00 98 04 36 00 ?6.?6.?6.?6.

003604A0 A0 04 36 00 A0 04 36 00 A8 04 36 00 A8 04 36 00 ?6.?6.?6.?6.

003604B0 B0 04 36 00 B0 04 36 00 B8 04 36 00 B8 04 36 00 ?6.?6.?6.?6.

003604C0 C0 04 36 00 C0 04 36 00 C8 04 36 00 C8 04 36 00 ?6.?6.?6.?6.

003604D0 D0 04 36 00 D0 04 36 00 D8 04 36 00 D8 04 36 00 ?6.?6.?6.?6.

003604E0 E0 04 36 00 E0 04 36 00 E8 04 36 00 E8 04 36 00 ?6.?6.?6.?6.

003604F0 F0 04 36 00 F0 04 36 00 F8 04 36 00 F8 04 36 00 ?6.?6.?6.?6.

00360500 00 05 36 00 00 05 36 00 08 05 36 00 08 05 36 00 .6..6.6.6.

00360510 10 05 36 00 10 05 36 00 18 05 36 00 18 05 36 00 6.6.6.6.

00360520 20 05 36 00 20 05 36 00 28 05 36 00 28 05 36 00 6. 6.(6.(6.

00360530 30 05 36 00 30 05 36 00 38 05 36 00 38 05 36 00 06.06.86.86.

00360540 40 05 36 00 40 05 36 00 48 05 36 00 48 05 36 00 @6.@6.H6.H6.

00360550 50 05 36 00 50 05 36 00 58 05 36 00 58 05 36 00 P6.P6.X6.X6.

00360560 60 05 36 00 60 05 36 00 68 05 36 00 68 05 36 00 `6.`6.h6.h6.

00360570 70 05 36 00 70 05 36 00 08 06 36 00 00 00 00 00 p6.p6.6.....

00360580 88 06 36 00 00 00 01 00 00 00 00 00 00 30 36 00 ?6.........06.

00360590 00 D0 03 00 00 00 00 00 A8 05 36 00 00 00 00 00 .?.....?6.....

003605A0 00 00 00 00 00 00 00 00 B8 05 36 00 00 00 00 00 ........?6.....

003605B0 00 00 00 00 00 00 00 00 C8 05 36 00 00 00 00 00 ........?6.....

003605C0 00 00 00 00 00 00 00 00 D8 05 36 00 00 00 00 00 ........?6.....

003605D0 00 00 00 00 00 00 00 00 E8 05 36 00 00 00 00 00 ........?6.....

003605E0 00 00 00 00 00 00 00 00 F8 05 36 00 00 00 00 00 ........?6.....

003605F0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360600 00 00 00 00 00 00 00 00 C0 06 FD 77 FF FF FF FF ........?齱

00360610 00 00 00 00 00 00 00 00 2C 00 00 00 00 00 00 00 ........,.......

00360620 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360630 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360640 08 00 C8 00 00 01 00 00 EE FF EE FF 00 00 00 00 .?...??....

00360650 00 00 36 00 00 D0 03 00 00 00 36 00 40 00 00 00 ..6..?...6.@...

00360660 80 06 36 00 00 00 3A 00 3D 00 00 00 01 00 00 00 €6...:.=......

00360670 88 05 36 00 00 00 00 00 E0 1E 36 00 00 00 00 00 ?6.....?6.....

00360680 01 03 08 00 00 01 08 00 00 00 00 00 00 00 00 00 ...........

00360690 04 00 00 01 00 00 00 00 00 00 00 00 00 00 00 00 ..............

003606A0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003606B0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003606C0 04 00 00 01 00 00 00 00 00 00 00 00 00 00 00 00 ..............

003606D0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003606E0 00 00 00 00 00 00 00 00 A0 1E 36 00 02 00 02 00 ........?6...

003606F0 04 00 00 01 02 00 00 00 02 00 00 00 02 00 00 00 ...........

00360700 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360710 00 00 00 00 00 00 00 00 B0 1E 36 00 01 00 01 00 ........?6...

可分配空间大小没有变化

0x00360020 00 02 00 00 00 20 00 00 24 02 00 00 FF EF FD 7F

尾块起始位置没有变化

0x00360170 00 00 00 00 00 00 00 00 E8 1E 36 00 E8 1E 36 00

Lookaside[1]没有变化，因为释放的是16字节的堆块，不会串在指向8字节的单向链上

0x003606E0 00 00 00 00 00 00 00 00 A0 1E 36 00 02 00 02 00

Lookaside[2]变成了0x00361EB0

0x00360710 00 00 00 00 00 00 00 00 B0 1E 36 00 01 00 01 00

所以应该是h3释放后串在了lookaside[2]上，看看分配的堆块区

00361E70 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00361E80 00 00 00 00 00 00 00 00 02 00 01 03 00 01 08 00 ...........

00361E90 00 00 00 00 00 00 00 00 02 00 02 00 00 01 08 00 ............

00361EA0 90 1E 36 00 00 00 00 00 03 00 02 00 00 01 08 00 ?6.........

00361EB0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00361EC0 04 00 03 00 00 01 08 00 00 00 00 00 00 00 00 00 ............

00361ED0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00361EE0 24 02 04 00 00 10 00 00 78 01 36 00 78 01 36 00 $....x6.x6.

00361EF0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

第四次

可分配空间大小没有变化

0x00360020 00 02 00 00 00 20 00 00 24 02 00 00 FF EF FD 7F

尾块起始位置没有变化

0x00360170 00 00 00 00 00 00 00 00 E8 1E 36 00 E8 1E 36 00

Lookaside[4]变成了0x00361EC8，刚好是h4分配的堆块

0x00360740 00 00 00 00 00 00 00 00 C8 1E 36 00 01 00 01 00

四次释放后的堆区

00361E70 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00361E80 00 00 00 00 00 00 00 00 02 00 01 03 00 01 08 00 ...........

00361E90 00 00 00 00 00 00 00 00 02 00 02 00 00 01 08 00 ............

00361EA0 90 1E 36 00 00 00 00 00 03 00 02 00 00 01 08 00 ?6.........

00361EB0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00361EC0 04 00 03 00 00 01 08 00 00 00 00 00 00 00 00 00 ............

00361ED0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00361EE0 24 02 04 00 00 10 00 00 78 01 36 00 78 01 36 00 $....x6.x6.

00361EF0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

然后又是申请空间，

h2 = HeapAlloc(hp,HEAP\_ZERO\_MEMORY,16);

0040106C |. 6A 10 push 10 ; /HeapSize = 10 (16.)

0040106E |. 6A 08 push 8 ; |Flags = HEAP\_ZERO\_MEMORY

00401070 |. 56 push esi ; |hHeap

00401071 |. FFD7 call edi ; \HeapAlloc

16字节的空间那么应该是Lookaside[2]

先来看看堆区

00360000 C8 00 00 00 00 01 00 00 FF EE FF EE 02 10 00 00 ?.....??..

00360010 00 00 00 00 00 FE 00 00 00 00 10 00 00 20 00 00 .....?..... ..

00360020 00 02 00 00 00 20 00 00 24 02 00 00 FF EF FD 7F .... ..$..稞

00360030 04 00 08 06 00 00 00 00 00 00 00 00 00 00 00 00 .............

00360040 00 00 00 00 98 05 36 00 0F 00 00 00 F8 FF FF FF ....?6....?

00360050 50 00 36 00 50 00 36 00 40 06 36 00 00 00 00 00 P.6.P.6.@6.....

00360060 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360070 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360080 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360090 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600A0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600B0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600C0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600D0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600E0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600F0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360100 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360110 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360120 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360130 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360140 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360150 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360160 00 00 00 00 00 00 00 00 00 00 00 00 01 00 00 00 ...............

00360170 00 00 00 00 00 00 00 00 E8 1E 36 00 E8 1E 36 00 ........?6.?6.

00360180 80 01 36 00 80 01 36 00 88 01 36 00 88 01 36 00 €6.€6.?6.?6.

00360190 90 01 36 00 90 01 36 00 98 01 36 00 98 01 36 00 ?6.?6.?6.?6.

003601A0 A0 01 36 00 A0 01 36 00 A8 01 36 00 A8 01 36 00 ?6.?6.?6.?6.

003601B0 B0 01 36 00 B0 01 36 00 B8 01 36 00 B8 01 36 00 ?6.?6.?6.?6.

003601C0 C0 01 36 00 C0 01 36 00 C8 01 36 00 C8 01 36 00 ?6.?6.?6.?6.

003601D0 D0 01 36 00 D0 01 36 00 D8 01 36 00 D8 01 36 00 ?6.?6.?6.?6.

003601E0 E0 01 36 00 E0 01 36 00 E8 01 36 00 E8 01 36 00 ?6.?6.?6.?6.

003601F0 F0 01 36 00 F0 01 36 00 F8 01 36 00 F8 01 36 00 ?6.?6.?6.?6.

00360200 00 02 36 00 00 02 36 00 08 02 36 00 08 02 36 00 .6..6.6.6.

00360210 10 02 36 00 10 02 36 00 18 02 36 00 18 02 36 00 6.6.6.6.

00360220 20 02 36 00 20 02 36 00 28 02 36 00 28 02 36 00 6. 6.(6.(6.

00360230 30 02 36 00 30 02 36 00 38 02 36 00 38 02 36 00 06.06.86.86.

00360240 40 02 36 00 40 02 36 00 48 02 36 00 48 02 36 00 @6.@6.H6.H6.

00360250 50 02 36 00 50 02 36 00 58 02 36 00 58 02 36 00 P6.P6.X6.X6.

00360260 60 02 36 00 60 02 36 00 68 02 36 00 68 02 36 00 `6.`6.h6.h6.

00360270 70 02 36 00 70 02 36 00 78 02 36 00 78 02 36 00 p6.p6.x6.x6.

00360280 80 02 36 00 80 02 36 00 88 02 36 00 88 02 36 00 €6.€6.?6.?6.

00360290 90 02 36 00 90 02 36 00 98 02 36 00 98 02 36 00 ?6.?6.?6.?6.

003602A0 A0 02 36 00 A0 02 36 00 A8 02 36 00 A8 02 36 00 ?6.?6.?6.?6.

003602B0 B0 02 36 00 B0 02 36 00 B8 02 36 00 B8 02 36 00 ?6.?6.?6.?6.

003602C0 C0 02 36 00 C0 02 36 00 C8 02 36 00 C8 02 36 00 ?6.?6.?6.?6.

003602D0 D0 02 36 00 D0 02 36 00 D8 02 36 00 D8 02 36 00 ?6.?6.?6.?6.

003602E0 E0 02 36 00 E0 02 36 00 E8 02 36 00 E8 02 36 00 ?6.?6.?6.?6.

003602F0 F0 02 36 00 F0 02 36 00 F8 02 36 00 F8 02 36 00 ?6.?6.?6.?6.

00360300 00 03 36 00 00 03 36 00 08 03 36 00 08 03 36 00 .6..6.6.6.

00360310 10 03 36 00 10 03 36 00 18 03 36 00 18 03 36 00 6.6.6.6.

00360320 20 03 36 00 20 03 36 00 28 03 36 00 28 03 36 00 6. 6.(6.(6.

00360330 30 03 36 00 30 03 36 00 38 03 36 00 38 03 36 00 06.06.86.86.

00360340 40 03 36 00 40 03 36 00 48 03 36 00 48 03 36 00 @6.@6.H6.H6.

00360350 50 03 36 00 50 03 36 00 58 03 36 00 58 03 36 00 P6.P6.X6.X6.

00360360 60 03 36 00 60 03 36 00 68 03 36 00 68 03 36 00 `6.`6.h6.h6.

00360370 70 03 36 00 70 03 36 00 78 03 36 00 78 03 36 00 p6.p6.x6.x6.

00360380 80 03 36 00 80 03 36 00 88 03 36 00 88 03 36 00 €6.€6.?6.?6.

00360390 90 03 36 00 90 03 36 00 98 03 36 00 98 03 36 00 ?6.?6.?6.?6.

003603A0 A0 03 36 00 A0 03 36 00 A8 03 36 00 A8 03 36 00 ?6.?6.?6.?6.

003603B0 B0 03 36 00 B0 03 36 00 B8 03 36 00 B8 03 36 00 ?6.?6.?6.?6.

003603C0 C0 03 36 00 C0 03 36 00 C8 03 36 00 C8 03 36 00 ?6.?6.?6.?6.

003603D0 D0 03 36 00 D0 03 36 00 D8 03 36 00 D8 03 36 00 ?6.?6.?6.?6.

003603E0 E0 03 36 00 E0 03 36 00 E8 03 36 00 E8 03 36 00 ?6.?6.?6.?6.

003603F0 F0 03 36 00 F0 03 36 00 F8 03 36 00 F8 03 36 00 ?6.?6.?6.?6.

00360400 00 04 36 00 00 04 36 00 08 04 36 00 08 04 36 00 .6..6.6.6.

00360410 10 04 36 00 10 04 36 00 18 04 36 00 18 04 36 00 6.6.6.6.

00360420 20 04 36 00 20 04 36 00 28 04 36 00 28 04 36 00 6. 6.(6.(6.

00360430 30 04 36 00 30 04 36 00 38 04 36 00 38 04 36 00 06.06.86.86.

00360440 40 04 36 00 40 04 36 00 48 04 36 00 48 04 36 00 @6.@6.H6.H6.

00360450 50 04 36 00 50 04 36 00 58 04 36 00 58 04 36 00 P6.P6.X6.X6.

00360460 60 04 36 00 60 04 36 00 68 04 36 00 68 04 36 00 `6.`6.h6.h6.

00360470 70 04 36 00 70 04 36 00 78 04 36 00 78 04 36 00 p6.p6.x6.x6.

00360480 80 04 36 00 80 04 36 00 88 04 36 00 88 04 36 00 €6.€6.?6.?6.

00360490 90 04 36 00 90 04 36 00 98 04 36 00 98 04 36 00 ?6.?6.?6.?6.

003604A0 A0 04 36 00 A0 04 36 00 A8 04 36 00 A8 04 36 00 ?6.?6.?6.?6.

003604B0 B0 04 36 00 B0 04 36 00 B8 04 36 00 B8 04 36 00 ?6.?6.?6.?6.

003604C0 C0 04 36 00 C0 04 36 00 C8 04 36 00 C8 04 36 00 ?6.?6.?6.?6.

003604D0 D0 04 36 00 D0 04 36 00 D8 04 36 00 D8 04 36 00 ?6.?6.?6.?6.

003604E0 E0 04 36 00 E0 04 36 00 E8 04 36 00 E8 04 36 00 ?6.?6.?6.?6.

003604F0 F0 04 36 00 F0 04 36 00 F8 04 36 00 F8 04 36 00 ?6.?6.?6.?6.

00360500 00 05 36 00 00 05 36 00 08 05 36 00 08 05 36 00 .6..6.6.6.

00360510 10 05 36 00 10 05 36 00 18 05 36 00 18 05 36 00 6.6.6.6.

00360520 20 05 36 00 20 05 36 00 28 05 36 00 28 05 36 00 6. 6.(6.(6.

00360530 30 05 36 00 30 05 36 00 38 05 36 00 38 05 36 00 06.06.86.86.

00360540 40 05 36 00 40 05 36 00 48 05 36 00 48 05 36 00 @6.@6.H6.H6.

00360550 50 05 36 00 50 05 36 00 58 05 36 00 58 05 36 00 P6.P6.X6.X6.

00360560 60 05 36 00 60 05 36 00 68 05 36 00 68 05 36 00 `6.`6.h6.h6.

00360570 70 05 36 00 70 05 36 00 08 06 36 00 00 00 00 00 p6.p6.6.....

00360580 88 06 36 00 00 00 01 00 00 00 00 00 00 30 36 00 ?6.........06.

00360590 00 D0 03 00 00 00 00 00 A8 05 36 00 00 00 00 00 .?.....?6.....

003605A0 00 00 00 00 00 00 00 00 B8 05 36 00 00 00 00 00 ........?6.....

003605B0 00 00 00 00 00 00 00 00 C8 05 36 00 00 00 00 00 ........?6.....

003605C0 00 00 00 00 00 00 00 00 D8 05 36 00 00 00 00 00 ........?6.....

003605D0 00 00 00 00 00 00 00 00 E8 05 36 00 00 00 00 00 ........?6.....

003605E0 00 00 00 00 00 00 00 00 F8 05 36 00 00 00 00 00 ........?6.....

003605F0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360600 00 00 00 00 00 00 00 00 C0 06 FD 77 FF FF FF FF ........?齱

00360610 00 00 00 00 00 00 00 00 2C 00 00 00 00 00 00 00 ........,.......

00360620 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360630 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360640 08 00 C8 00 00 01 00 00 EE FF EE FF 00 00 00 00 .?...??....

00360650 00 00 36 00 00 D0 03 00 00 00 36 00 40 00 00 00 ..6..?...6.@...

00360660 80 06 36 00 00 00 3A 00 3D 00 00 00 01 00 00 00 €6...:.=......

00360670 88 05 36 00 00 00 00 00 E0 1E 36 00 00 00 00 00 ?6.....?6.....

00360680 01 03 08 00 00 01 08 00 00 00 00 00 00 00 00 00 ...........

00360690 04 00 00 01 00 00 00 00 00 00 00 00 00 00 00 00 ..............

003606A0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003606B0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003606C0 04 00 00 01 00 00 00 00 00 00 00 00 00 00 00 00 ..............

003606D0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003606E0 00 00 00 00 00 00 00 00 A0 1E 36 00 02 00 02 00 ........?6...

003606F0 04 00 00 01 02 00 00 00 02 00 00 00 02 00 00 00 ...........

00360700 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360710 00 00 00 00 00 00 00 00 00 00 00 00 00 00 02 00 ...............

00360720 04 00 00 01 02 00 00 00 01 00 00 00 01 00 00 00 ...........

00360730 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360740 00 00 00 00 00 00 00 00 C8 1E 36 00 01 00 01 00 ........?6...

00360750 04 00 00 01 01 00 00 00 01 00 00 00 01 00 00 00 ...........

00360760 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

可以看到Lookaside[2]后面串着的堆块已经不见了，因为如果是8的整数倍的空间申请，优先使用快表

0x00360710 00 00 00 00 00 00 00 00 00 00 00 00 00 00 02 00

再把它释放掉

HeapFree(hp,0,h2);

00401073 |. 50 push eax ; /pMemory = 00361EB0

00401074 |. 6A 00 push 0 ; |Flags = 0

00401076 |. 56 push esi ; |hHeap

00401077 |. FFD3 call ebx ; \HeapFree

释放完的堆区

00360000 C8 00 00 00 00 01 00 00 FF EE FF EE 02 10 00 00 ?.....??..

00360010 00 00 00 00 00 FE 00 00 00 00 10 00 00 20 00 00 .....?..... ..

00360020 00 02 00 00 00 20 00 00 24 02 00 00 FF EF FD 7F .... ..$..稞

00360030 04 00 08 06 00 00 00 00 00 00 00 00 00 00 00 00 .............

00360040 00 00 00 00 98 05 36 00 0F 00 00 00 F8 FF FF FF ....?6....?

00360050 50 00 36 00 50 00 36 00 40 06 36 00 00 00 00 00 P.6.P.6.@6.....

00360060 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360070 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360080 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360090 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600A0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600B0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600C0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600D0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600E0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

003600F0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360100 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360110 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360120 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360130 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360140 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360150 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................

00360160 00 00 00 00 00 00 00 00 00 00 00 00 01 00 00 00 ...............

00360170 00 00 00 00 00 00 00 00 E8 1E 36 00 E8 1E 36 00 ........?6.?6.

00360180 80 01 36 00 80 01 36 00 88 01 36 00 88 01 36 00 €6.€6.?6.?6.

00360190 90 01 36 00 90 01 36 00 98 01 36 00 98 01 36 00 ?6.?6.?6.?6.

003601A0 A0 01 36 00 A0 01 36 00 A8 01 36 00 A8 01 36 00 ?6.?6.?6.?6.

003601B0 B0 01 36 00 B0 01 36 00 B8 01 36 00 B8 01 36 00 ?6.?6.?6.?6.

003601C0 C0 01 36 00 C0 01 36 00 C8 01 36 00 C8 01 36 00 ?6.?6.?6.?6.

003601D0 D0 01 36 00 D0 01 36 00 D8 01 36 00 D8 01 36 00 ?6.?6.?6.?6.

003601E0 E0 01 36 00 E0 01 36 00 E8 01 36 00 E8 01 36 00 ?6.?6.?6.?6.

003601F0 F0 01 36 00 F0 01 36 00 F8 01 36 00 F8 01 36 00 ?6.?6.?6.?6.

00360200 00 02 36 00 00 02 36 00 08 02 36 00 08 02 36 00 .6..6.6.6.

00360210 10 02 36 00 10 02 36 00 18 02 36 00 18 02 36 00 6.6.6.6.

00360220 20 02 36 00 20 02 36 00 28 02 36 00 28 02 36 00 6. 6.(6.(6.

00360230 30 02 36 00 30 02 36 00 38 02 36 00 38 02 36 00 06.06.86.86.

00360240 40 02 36 00 40 02 36 00 48 02 36 00 48 02 36 00 @6.@6.H6.H6.

00360250 50 02 36 00 50 02 36 00 58 02 36 00 58 02 36 00 P6.P6.X6.X6.

00360260 60 02 36 00 60 02 36 00 68 02 36 00 68 02 36 00 `6.`6.h6.h6.

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可以看到释放的16字节堆块又串在了Lookaside[2]上

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以上就是快表的使用