

CS 326-02 Heap Allocation

Project 01

malloc() / free()

High

break

Size

↓ SZ

HEAP

STACK

GUARD

DATA

CODE

0

page size

4096 bytes

4KB

4×1024

$2^{12} = 4096$

$2^{11} = 2048$

$2^{10} = 1024$

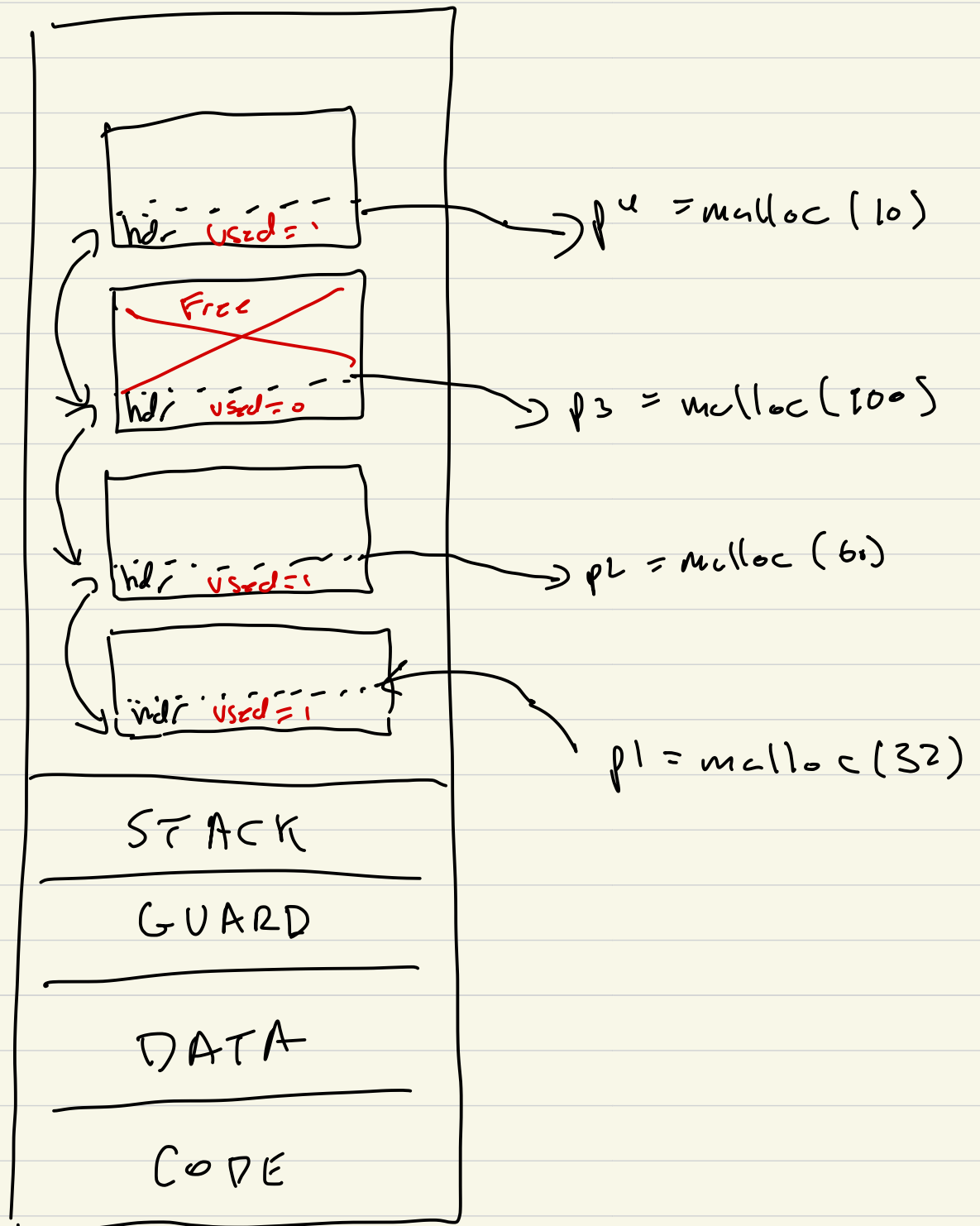
4k $p = \text{sbkr}(n \text{ bytes})$

4k

4k

4k

multiple of page size



struct block_hdr {

(16) struct list_elem elem;

(8) char name[8];

(4) int used;

(4) int size;

sizeof (struct block_hdr)

32 bytes

4096

p = malloc(40)

sz + 4096

sbrk(4096)

32

used = 0 size = 3992

40

used = 1 size = 40

32

40

sz

STACK

G

DATA

CODE

$$40 + 32 = 72 \text{ byte}$$

$$4096 - (72 + 32)$$

$$4096 - 104$$

$$= 3992$$

$f = \text{malloc}(\underbrace{10000}_{\text{nb-ites}});$

$$n = \text{nb_bytes} + \text{sizeof}(\text{struct bl_ch_hdr});$$

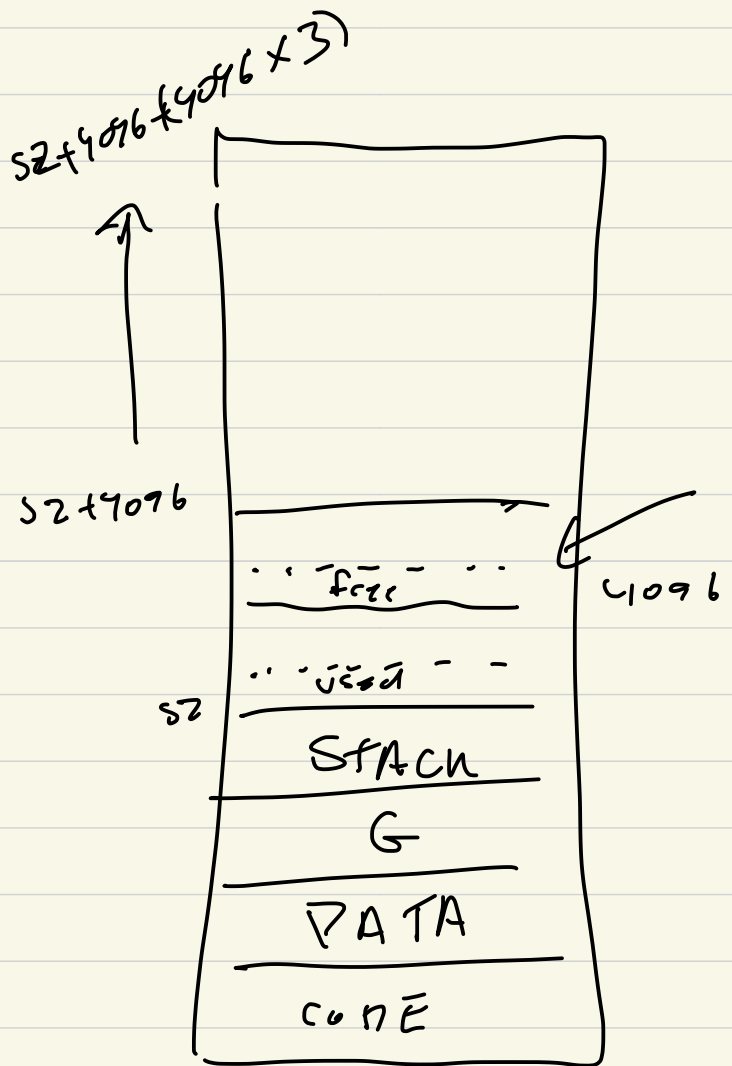
Strk(\downarrow) $3 * 4096$

$$f = \text{nbytes} / 4096$$

srk (f*4096)

$$10000 / 4096$$
$$= 2$$
$$r \approx n^{1/6} 4096$$
$$: f(r > 0) \xi$$
$$f(x) = 1;$$

3



↓
free(p)

{

struct block_hdr *hp;

char*
void*

hp = (struct block_hdr*) (p - sizeof(struct block_hdr));

hp->used = 0;

}

