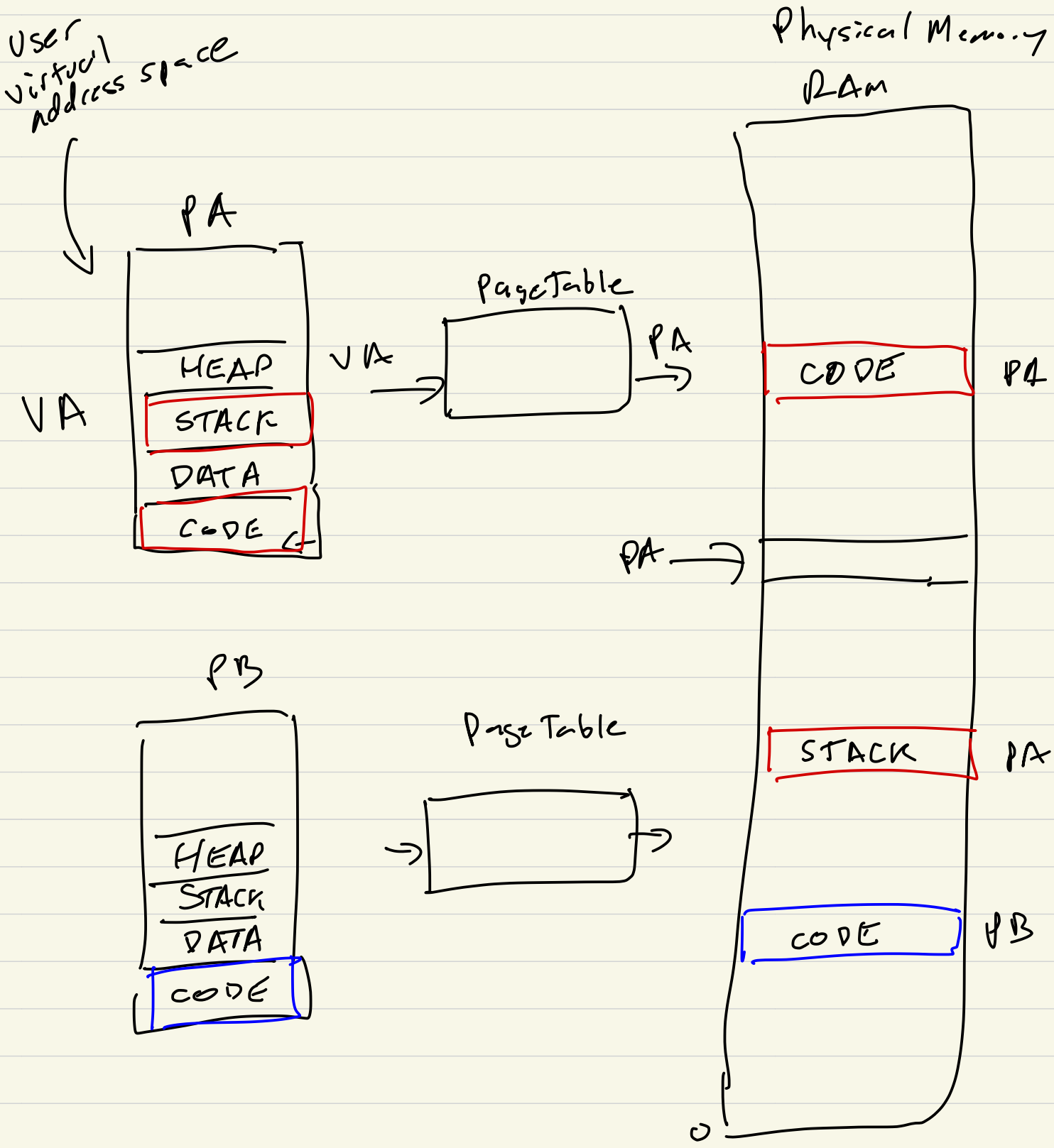
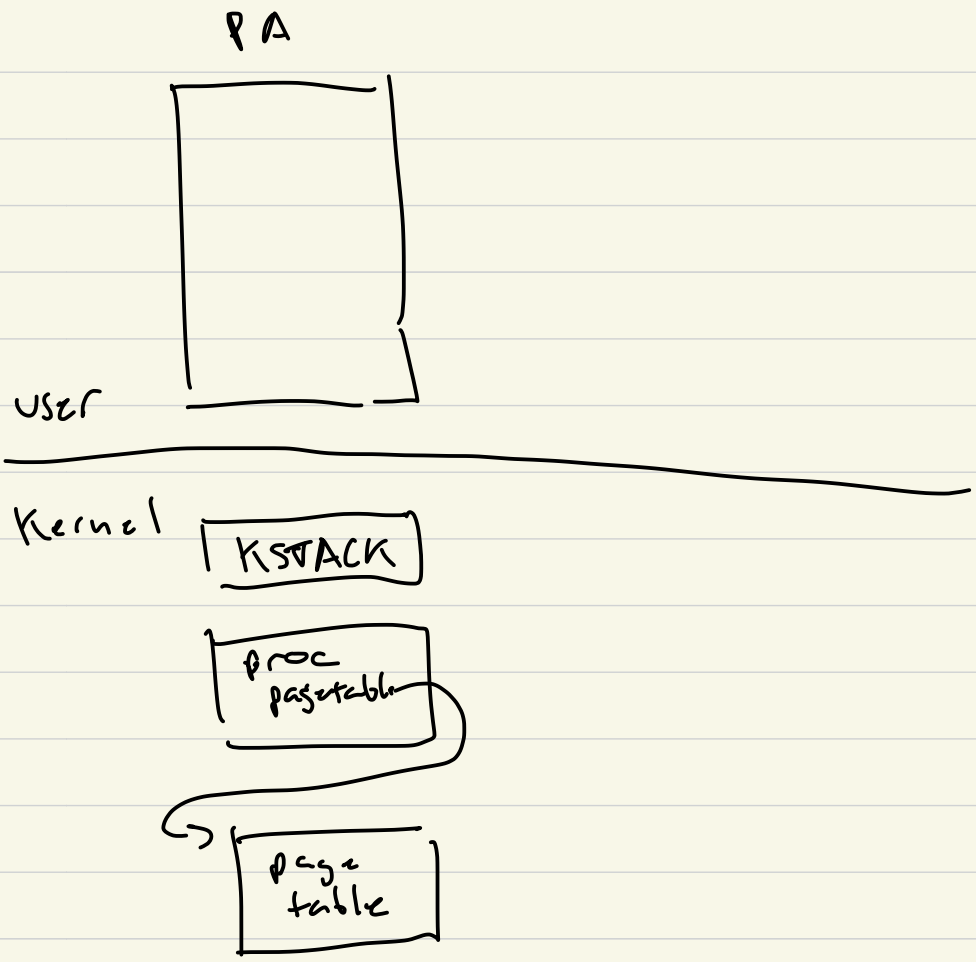
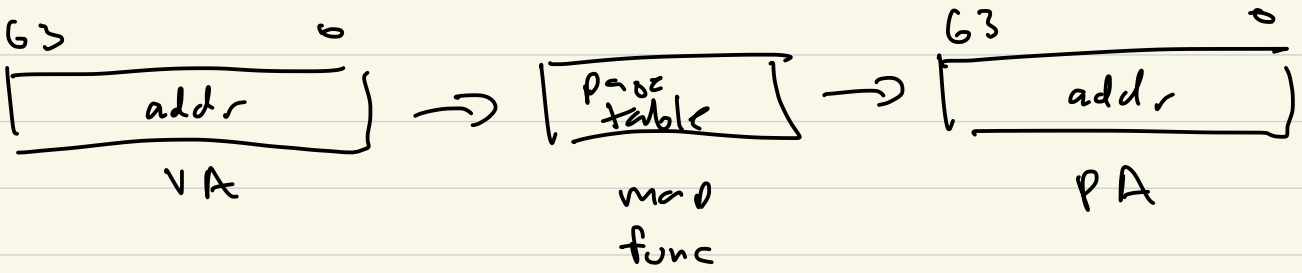
CS 326-02 Page Tables





Translations

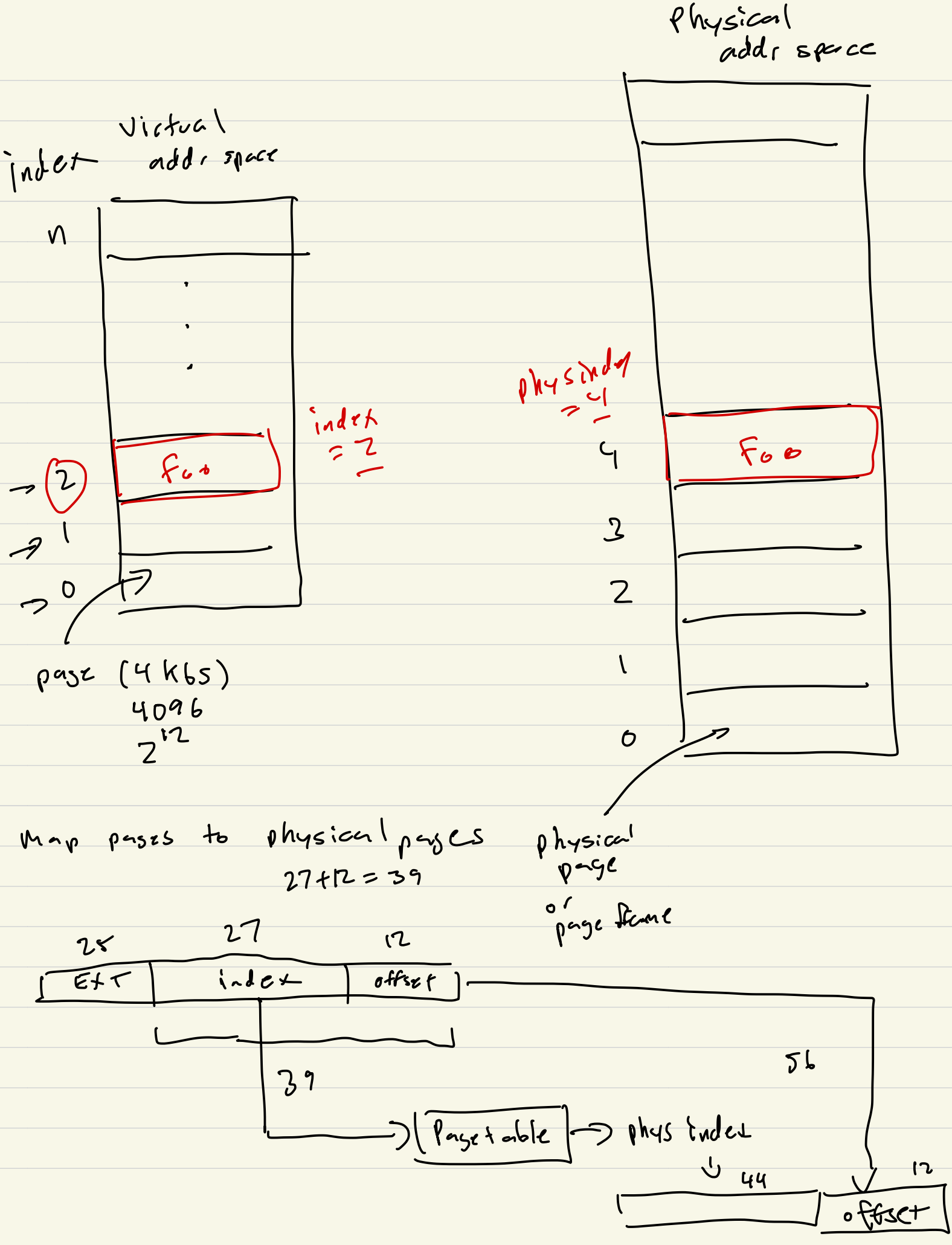
on address is 64 bits

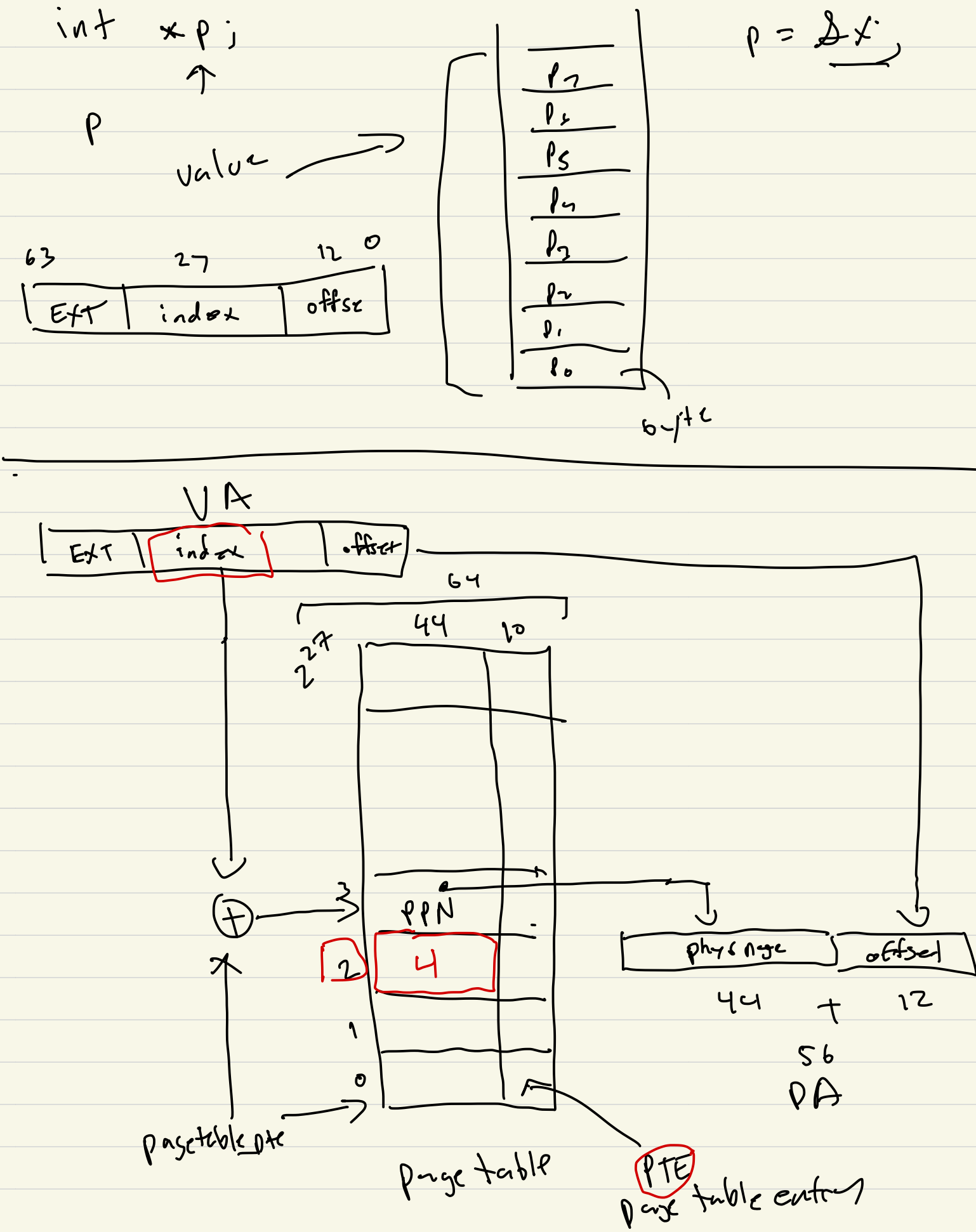


(VA_0, PA_0)

(VA_1, PA_0)

⋮


Physical addr space
Virtual addr space
index
n
2
1
0
Foo
index = 2
physindex = 4
4
3
2
1
0
Foo
page (4 kbs)
4096
2^{12}
map pages to physical pages
physical page or page frame
27+12 = 39
25
27
12
Ext
index
offset
39
56
Page table
phys index
44
12
offset


int *p;
p
value
p = &x;
63
27
12
0
Ext
index
offset
p7
p6
p5
p4
p3
p2
p1
p0
byte
VA
Ext
index
offset
64
44
10
2^27
3
PPN
2
4
1
0
pagetable_ptr
page table
PTE
page table entry
phys page
offset
44
+
12
56
PA

```
int *p;
uint64 up = (uint64) p;
```

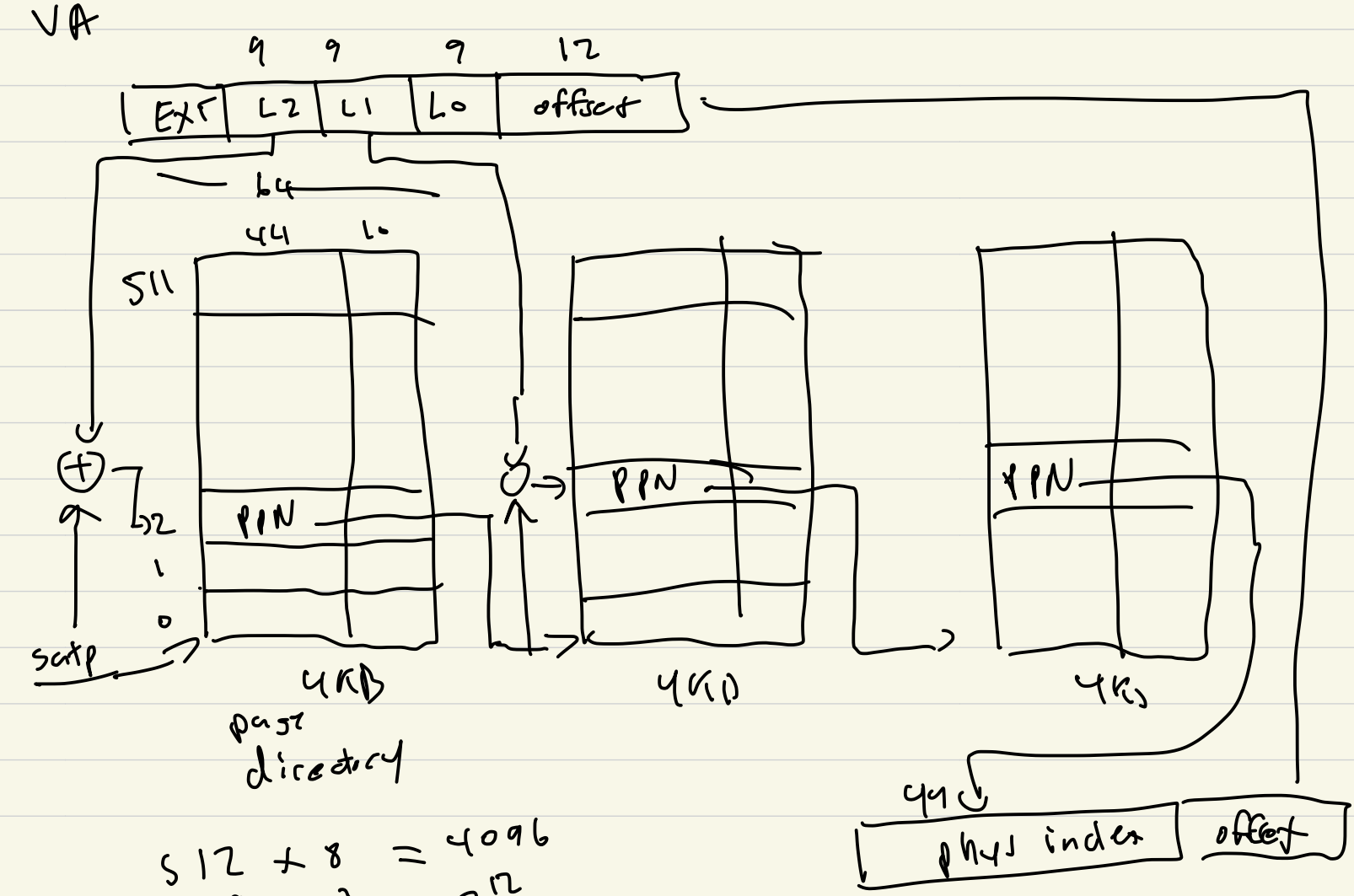
index = p / 4096

index = (p >> 12) & mask

If a PTE ⇒ 64 bits (8 bytes)

$2^{27} \times 8$

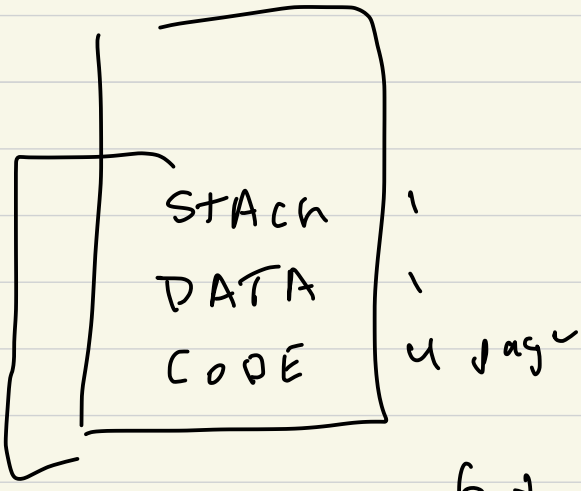
$2^{27} \times 2^3 = \boxed{2^{30}}$ 1 GB



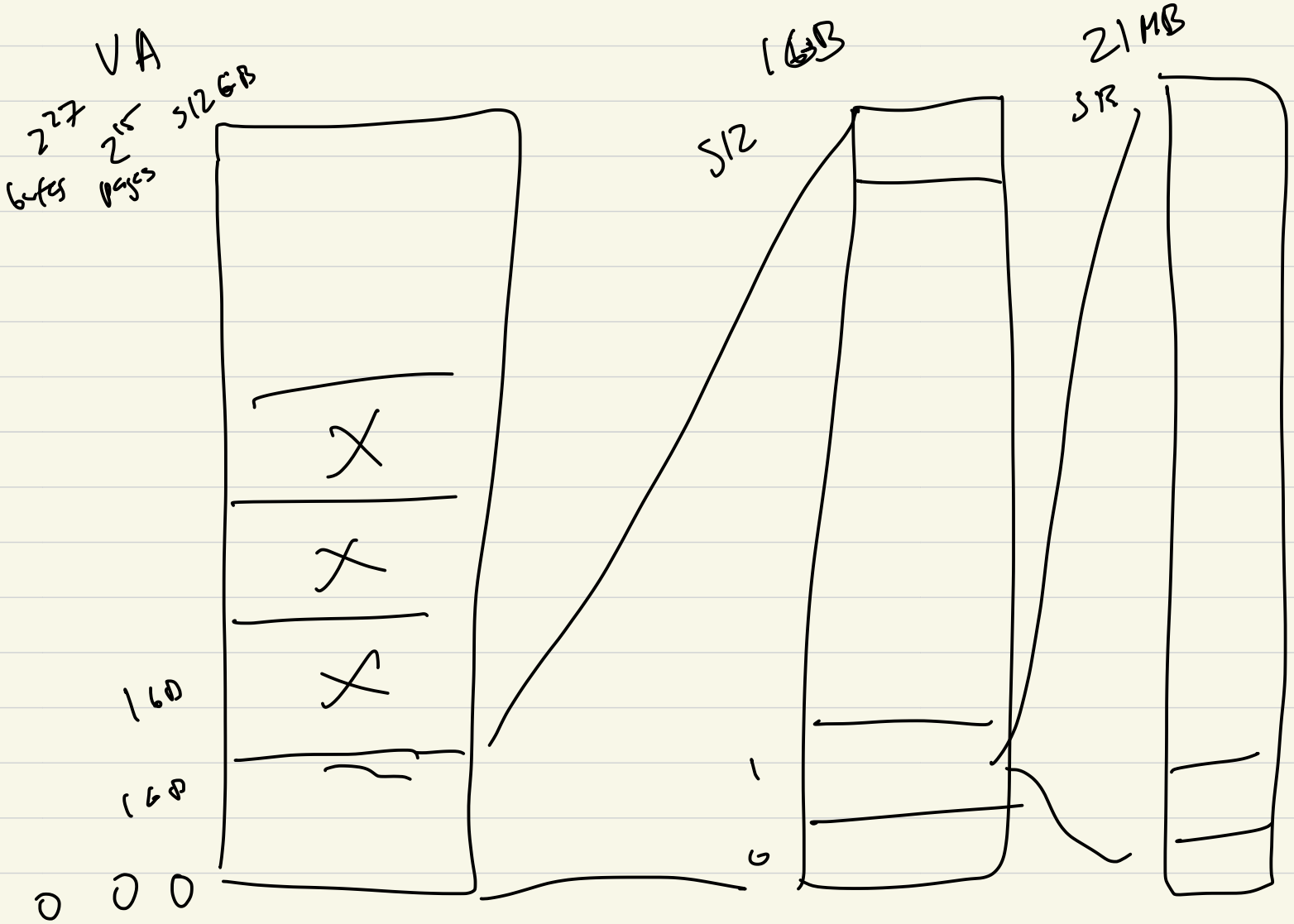
$512 \times 8 = 4096$

$2^9 \times 2^3 = 2^{12}$

21 MB


STACK
DATA
CODE
4 page

6 + 4096


VA
2^{27} bytes
2^{15} pages
512GB
X
X
X
160
168
0
0
0
16GB
512
1
0
21MB
3R