

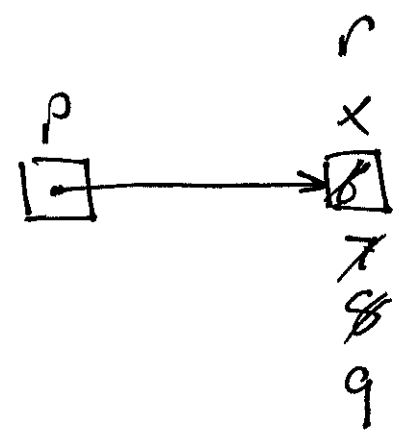
& - reference operator in C++ typed

Ex.

```
int x;
int* p = &x;
int& r = x;
```

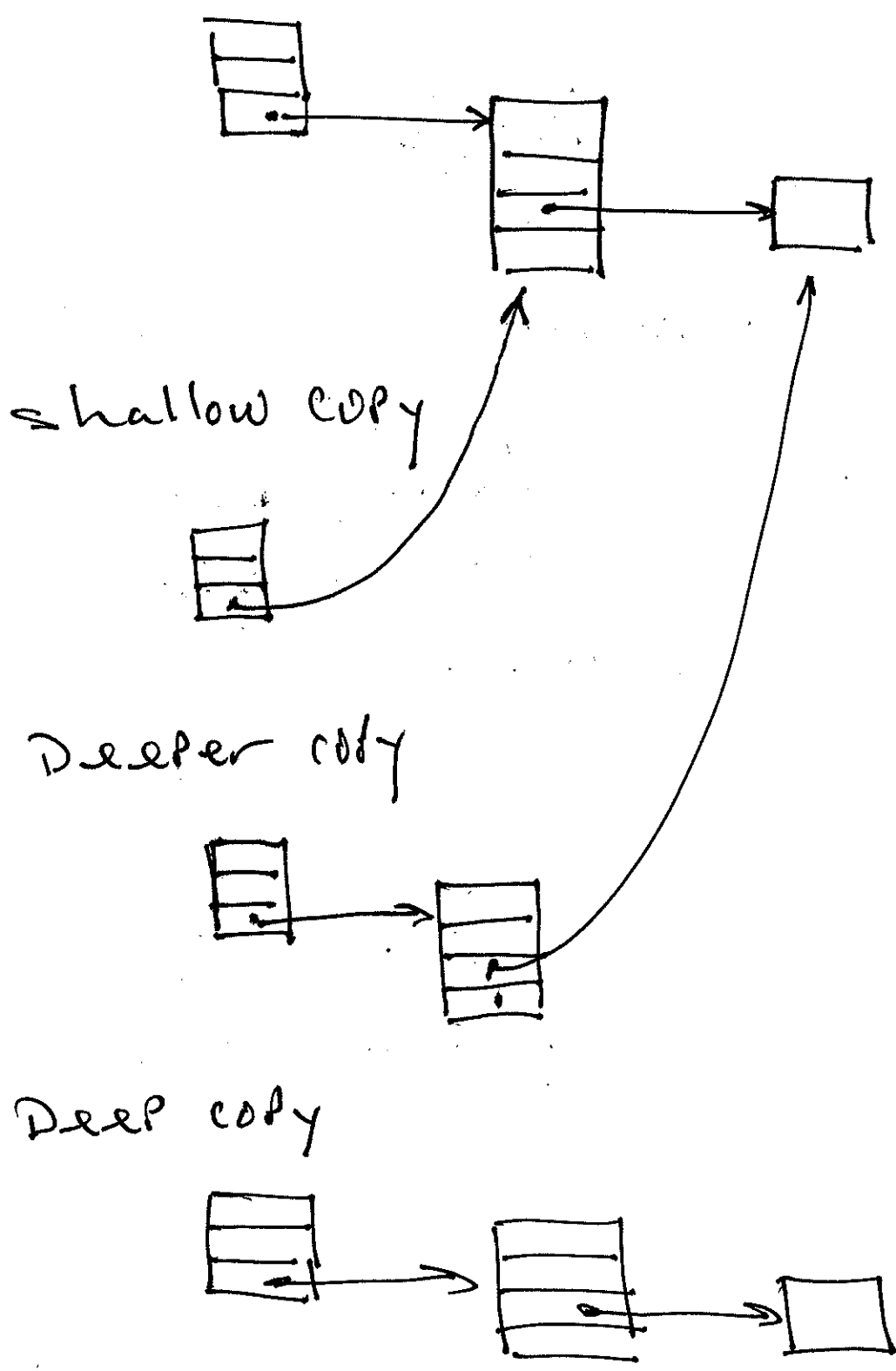
address-of

reference



```
x = 6;
x++; // x = 7
(*p)++; // x = 8
r++; // x = 9
```

Deep vs. shallow copies



Assignment operator =

Ex.

int x, y, z;

x = 6;

y = 7;

y = x;

x = 8;

z = (y = x);

x
6
8

y
7
8

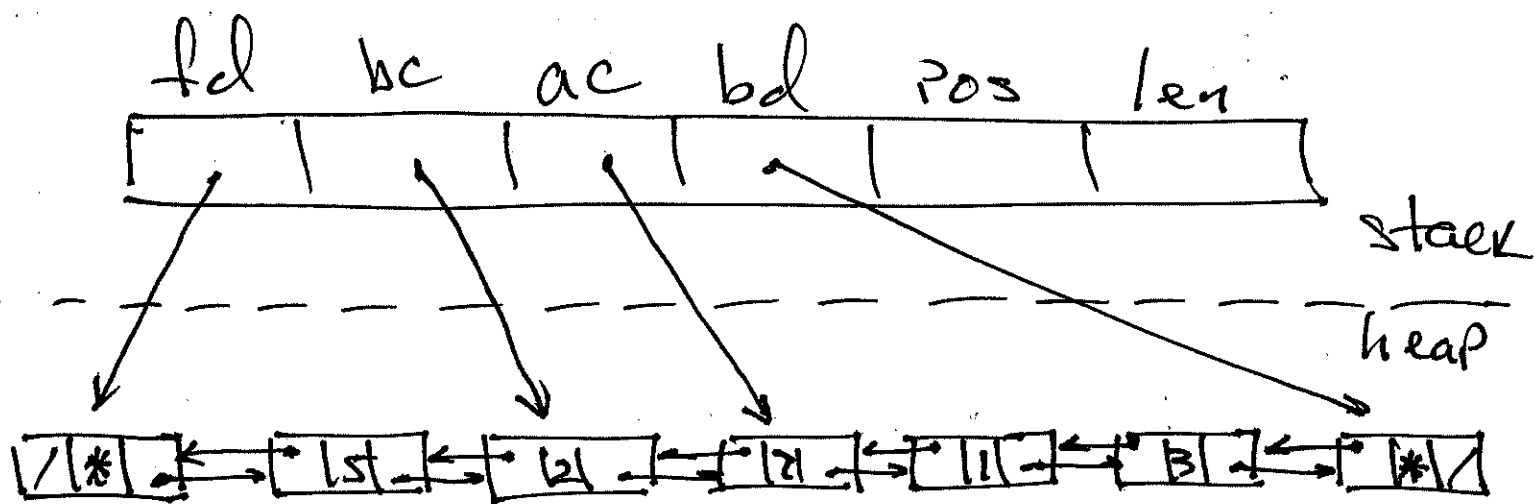
z
8

Pos: list ADT in C++

client view:

L [5 | 2 | 7 | 1 | 3]
 0 1 2 3 4 5

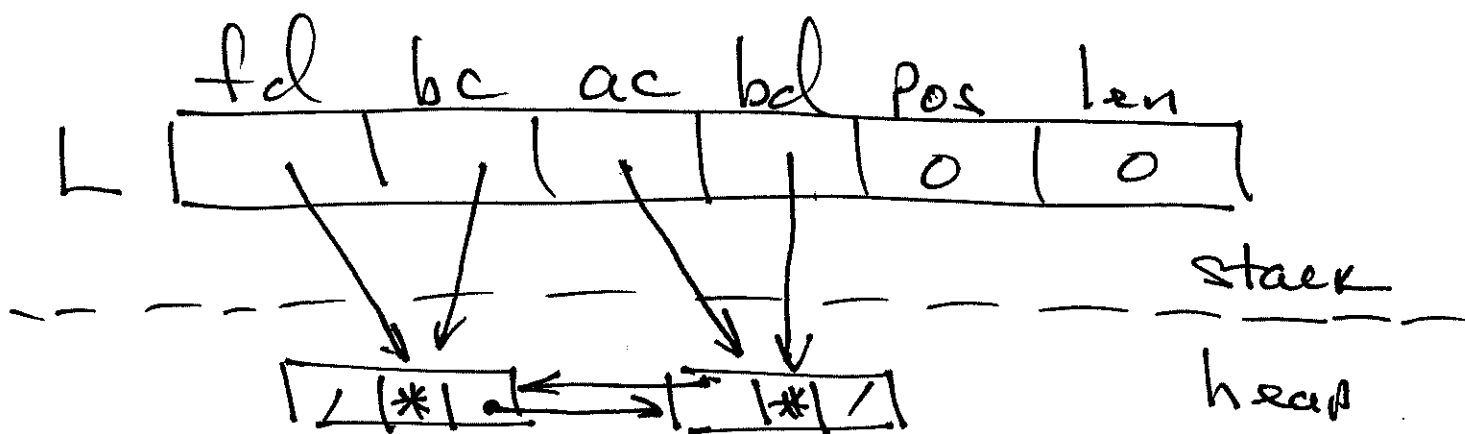
inside view:



empty state:

client: L [|]
 0

inside:



Ex.

$$L = [1 \ 2 \mid 3 \ 4]$$

$L.\text{insertBefore}(9);$

$$L = [1 \ 2 \ 9 \mid 3 \ 4]$$

$L.\text{insertAfter}(8);$

$$L = [1 \ 2 \ 9 \mid 8 \ 3 \ 4]$$

cleanup()

$$L = [\textcircled{1} \ 1 \ 1 \ \textcircled{2} \ 1 \ 1 \mid 2 \ 1 \ 2 \ \textcircled{3} \ 1 \ 2 \ 3 \ 3 \ 3]$$

L.cleanup()

$$L = [1 \ 2 \mid 3]$$