

Lecture 8

Wednesday Oct. 4

# Lab 1 marks

- Log in to [red.eecs.yorku.ca](http://red.eecs.yorku.ca)

- feedback 331 | lab |

- Issues? Thursday 13:30 ~ 15:30

# Lab test # 1

Wednesday Oct. 11

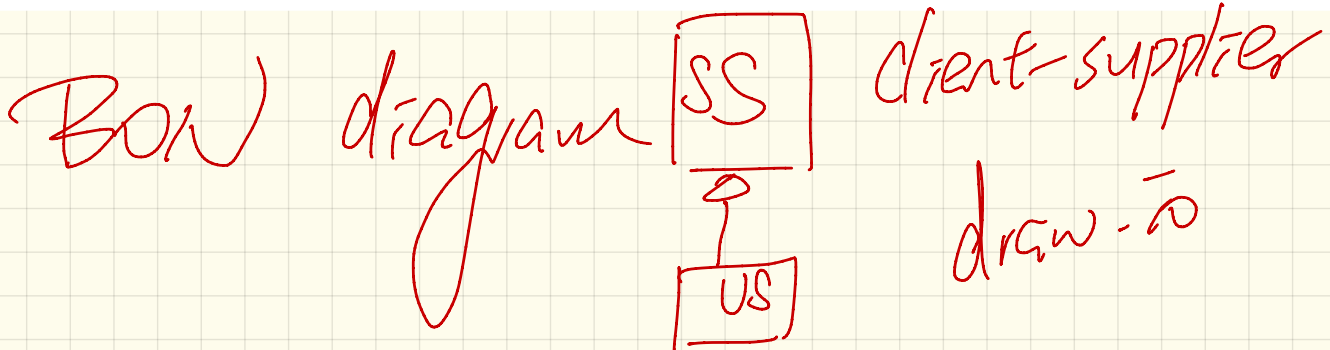
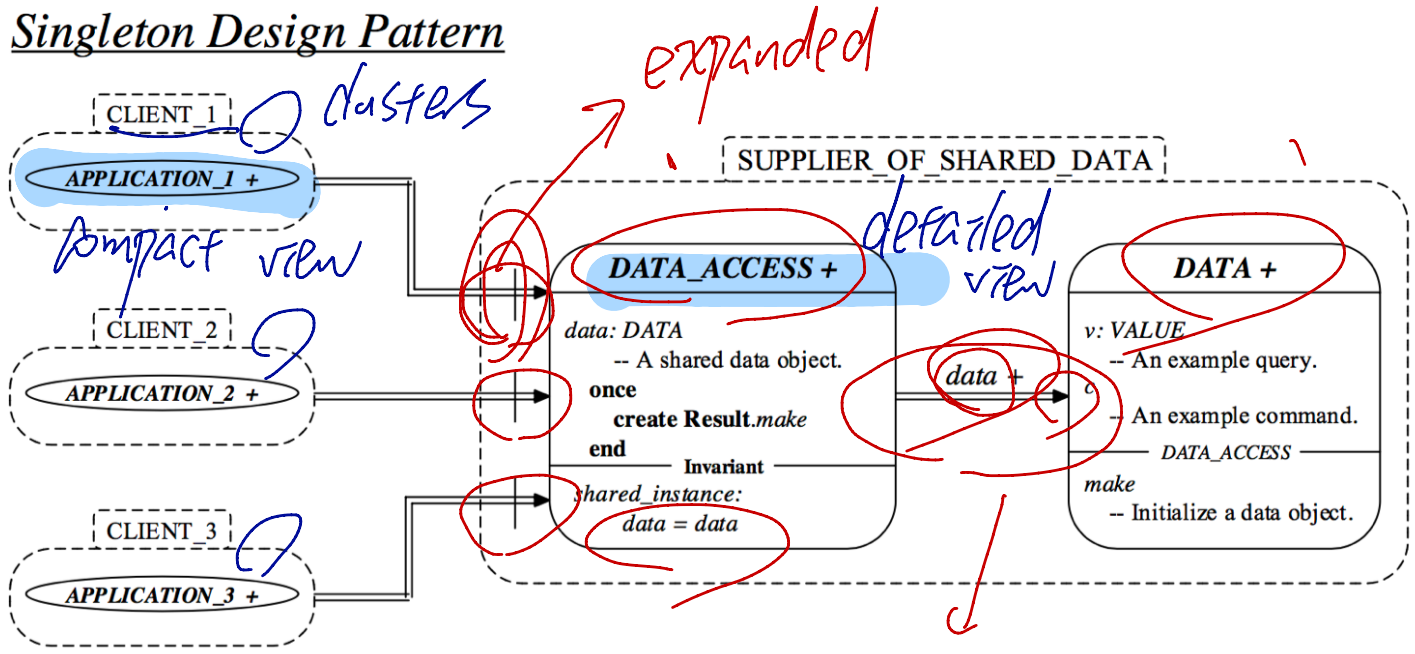
Prepare

1. slides
2. tutorial videos
3. sample codes
4. Lab 1

Format

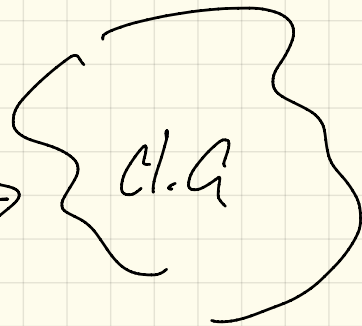
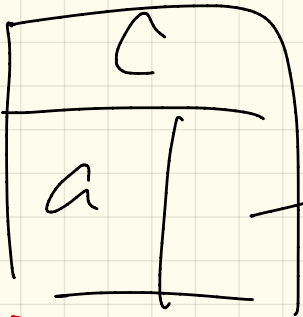
1. EStudio
2. Written

# Singleton Design Pattern



cl := c2. für

cl



after

c3

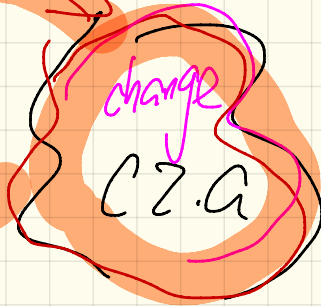
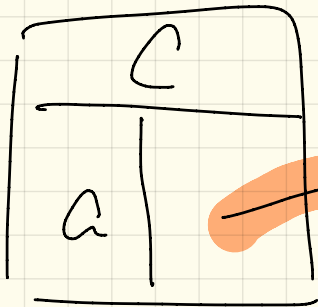
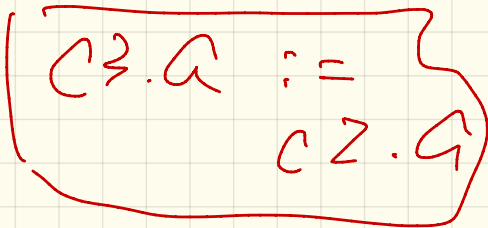
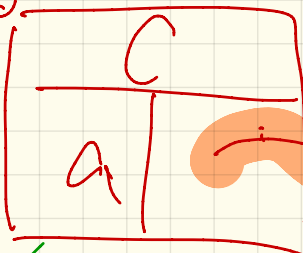
cl = c2

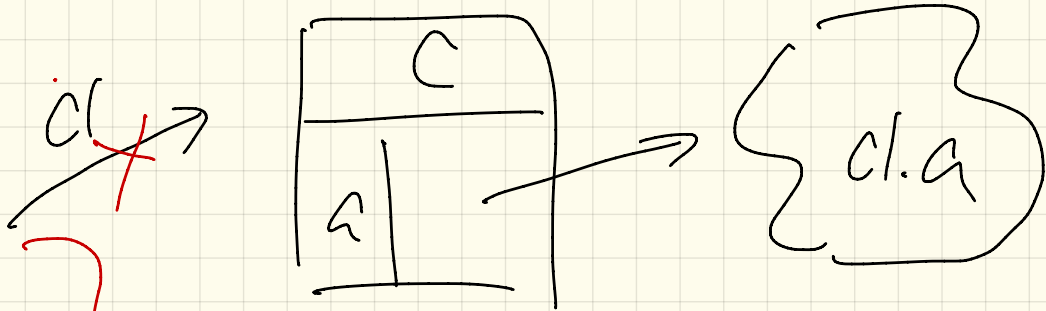
X

cl.a = c2.a

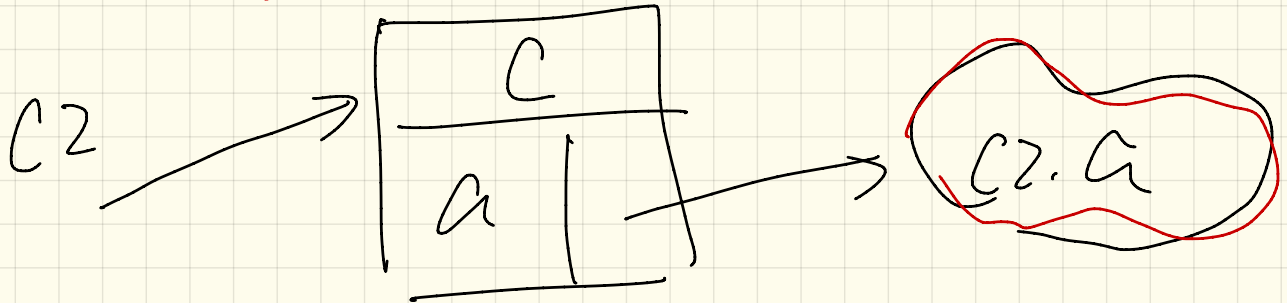
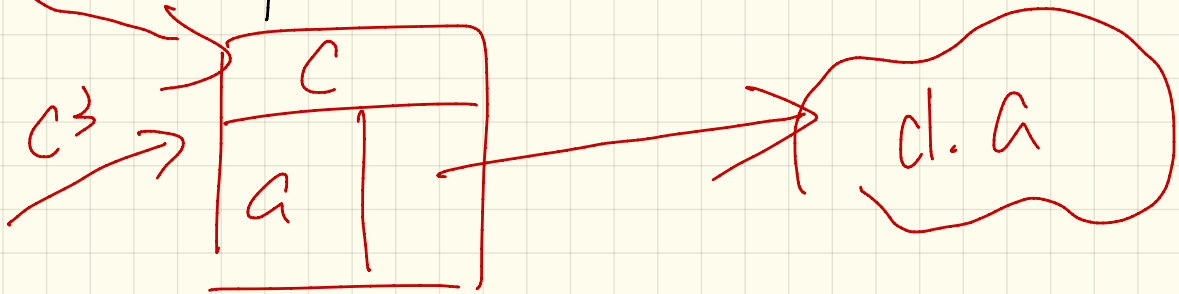
cl = c3

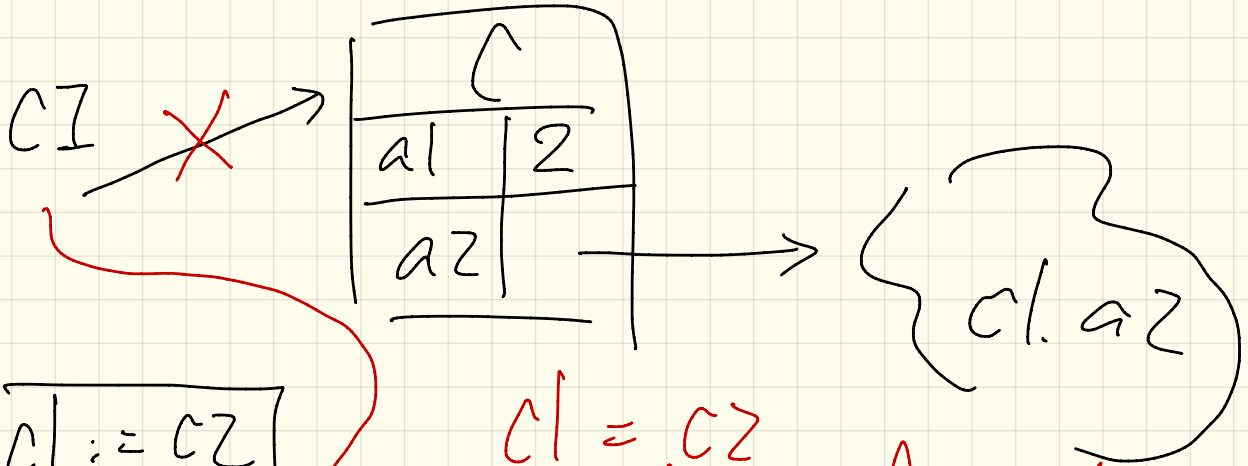
c2





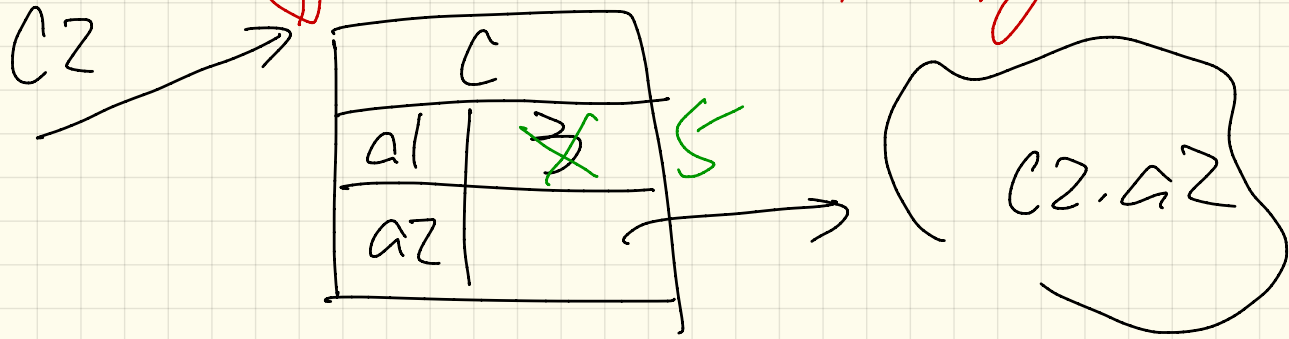
`c1 := c2.deep_form`





C1 := C2

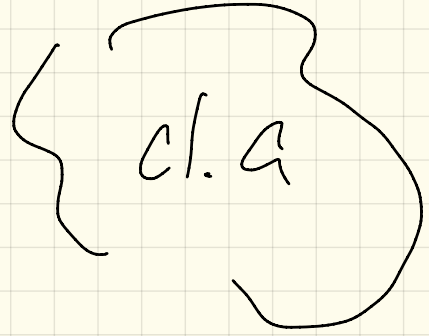
C1 = C2  
after ref copy.



C1



C	
a1	z
a2	



C1 := C2. form

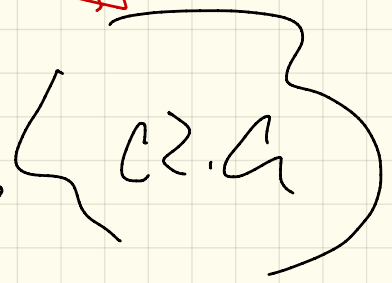
C	
a1	3
a2	

C2



C	
a1	<del>3</del>
a2	

5





Reference copy:  $b := a$

a

name

landlord

loved\_one

"Almaviva"

O1

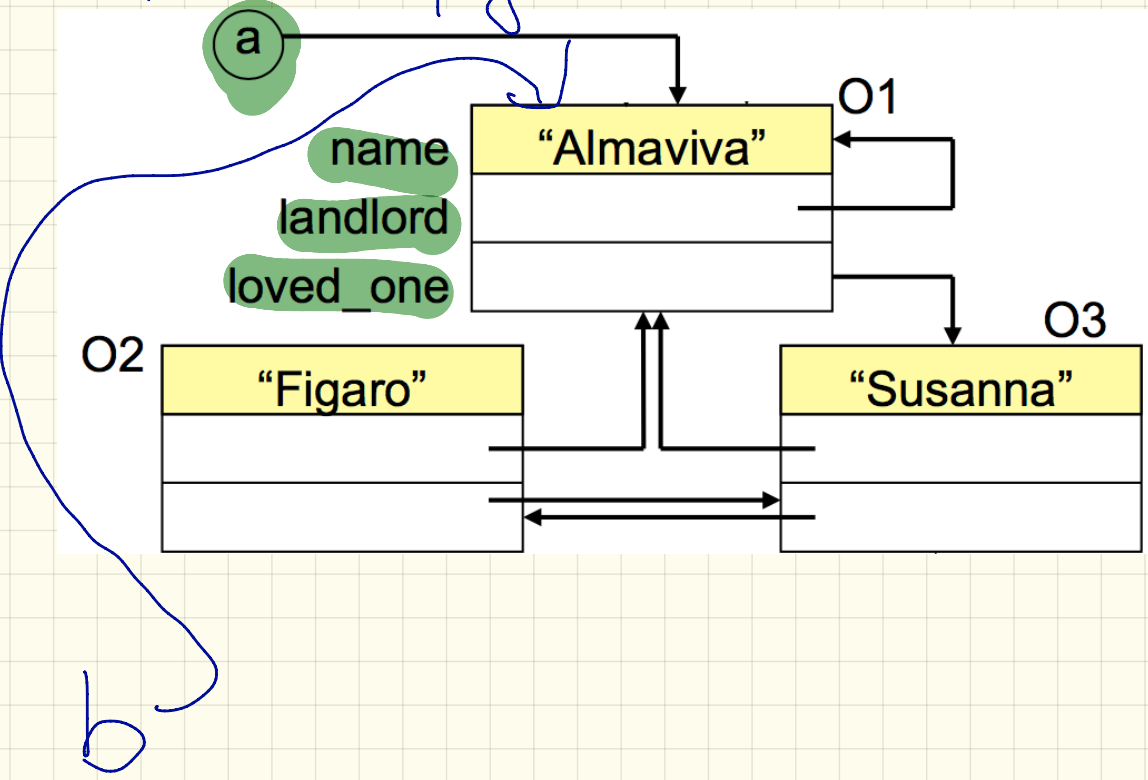
O2

"Figaro"

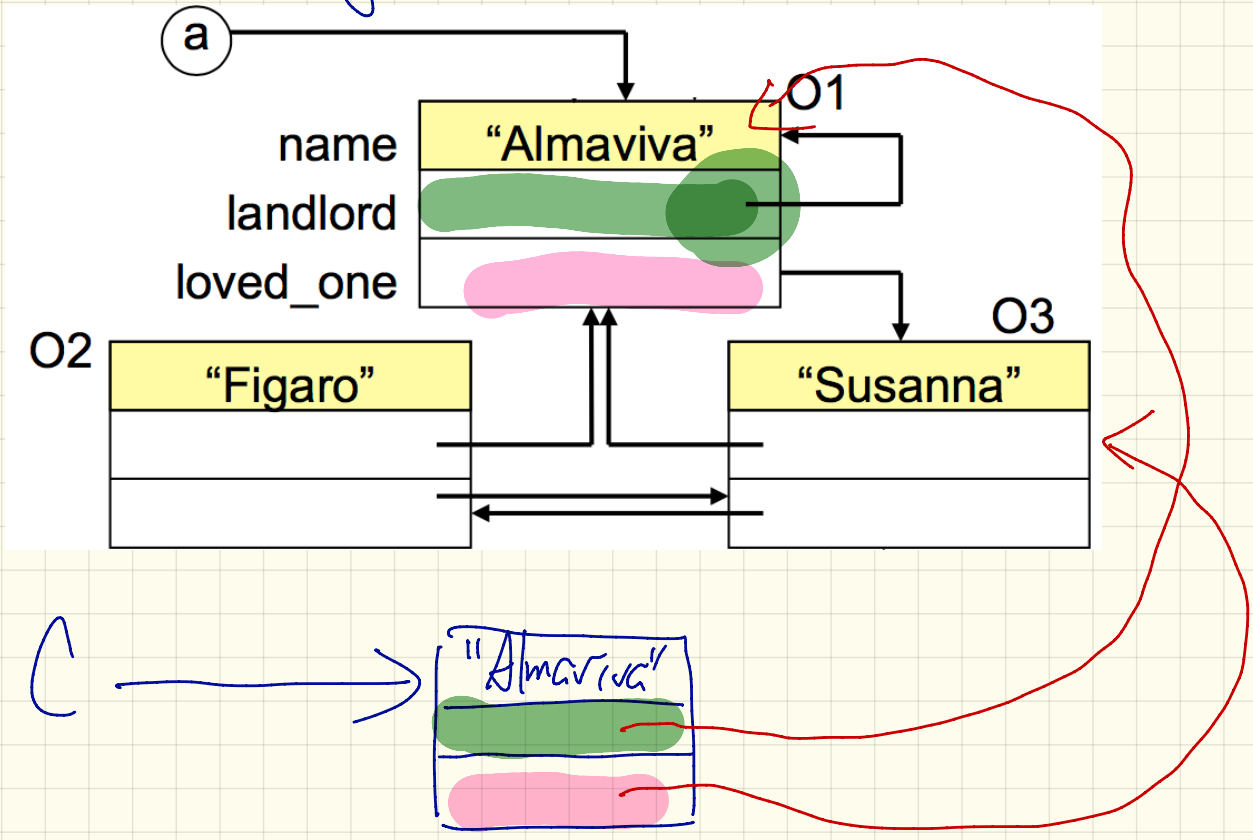
O3

"Susanna"

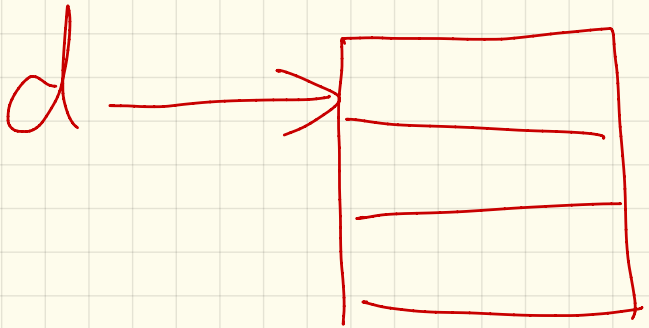
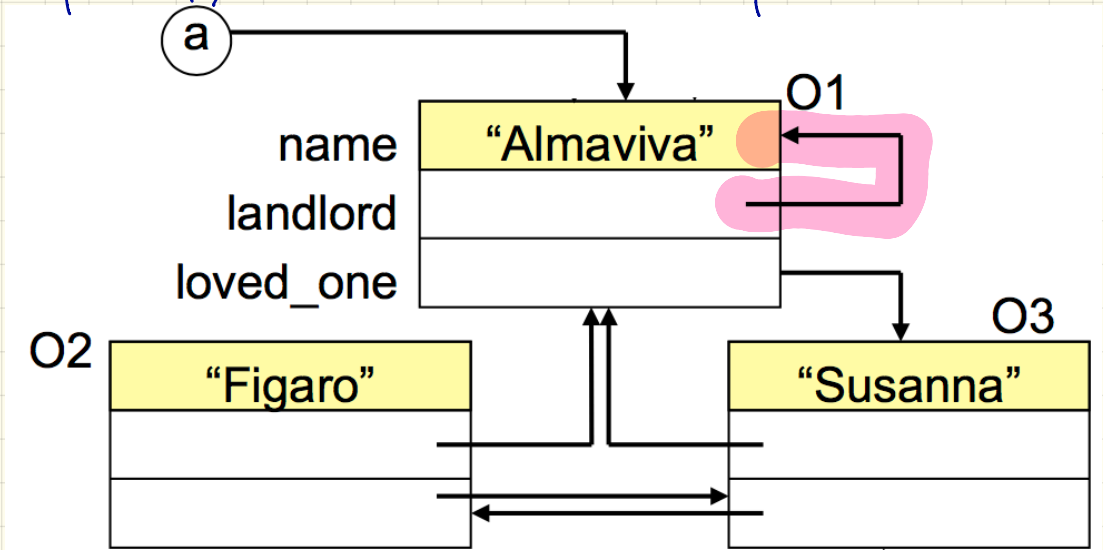
b



Shallow Copy:  $C := A.twin$



Deep Copy:  $d := a.deep\_twice$



s1, s2 : STRING

s1 := "fork"

s2 := "fork"

---

s1 = s2

create s1. make\_string  
("fork")

create s2. make\_string  
("fork")

precondition

withdraw (a: INTEGER)

require

do

ensure

$$\text{balance} = \text{old\_balance} - a$$

old\_balance := balance

postcondition and invariant.

insert\_at ( —————> )

require

do

old\_tmp := tmp

old\_tmp\_twim := tmp.twim

old\_tmp\_deep\_twim := tmp.deep\_twim

ensure

end

old

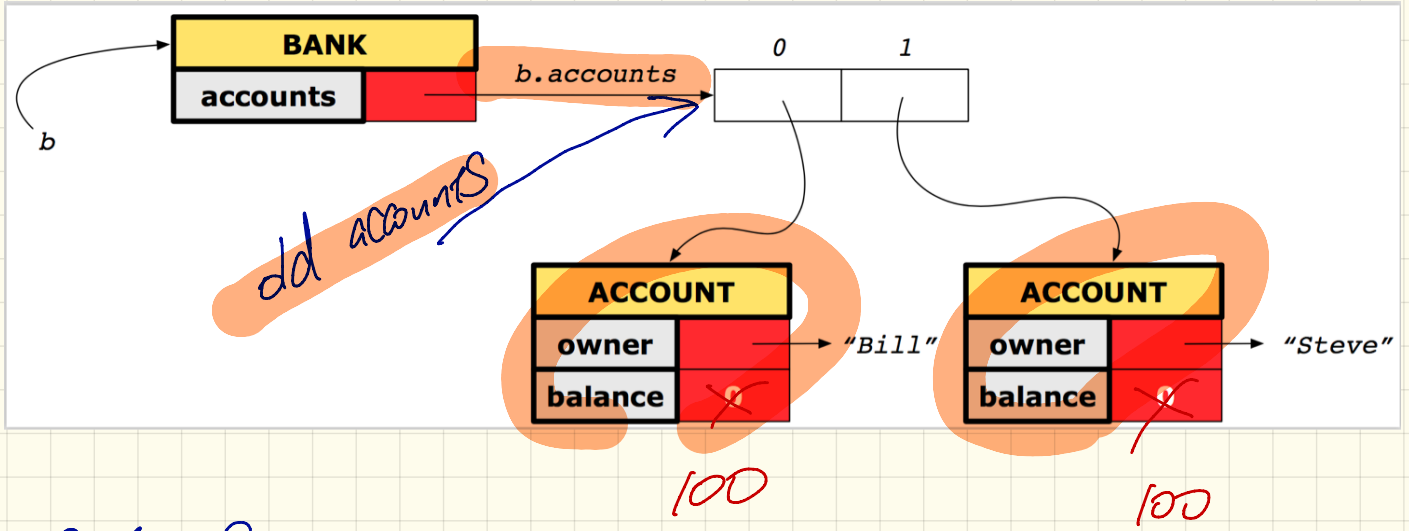
old

old

tmp

tmp.twim ✓

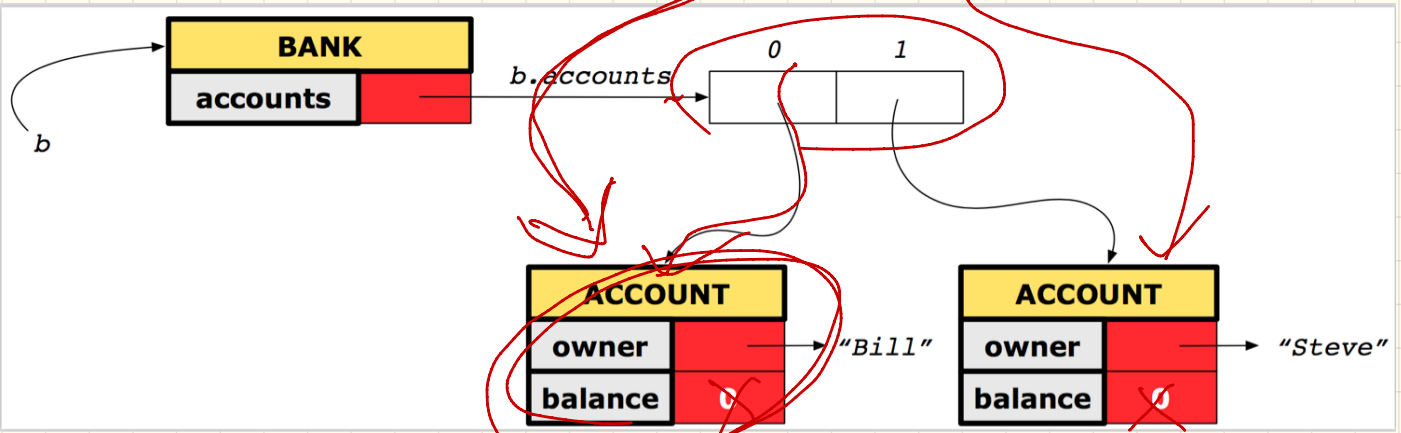
tmp.deep\_twim



ensure

across old accounts

ACCOUNTS. tab



100

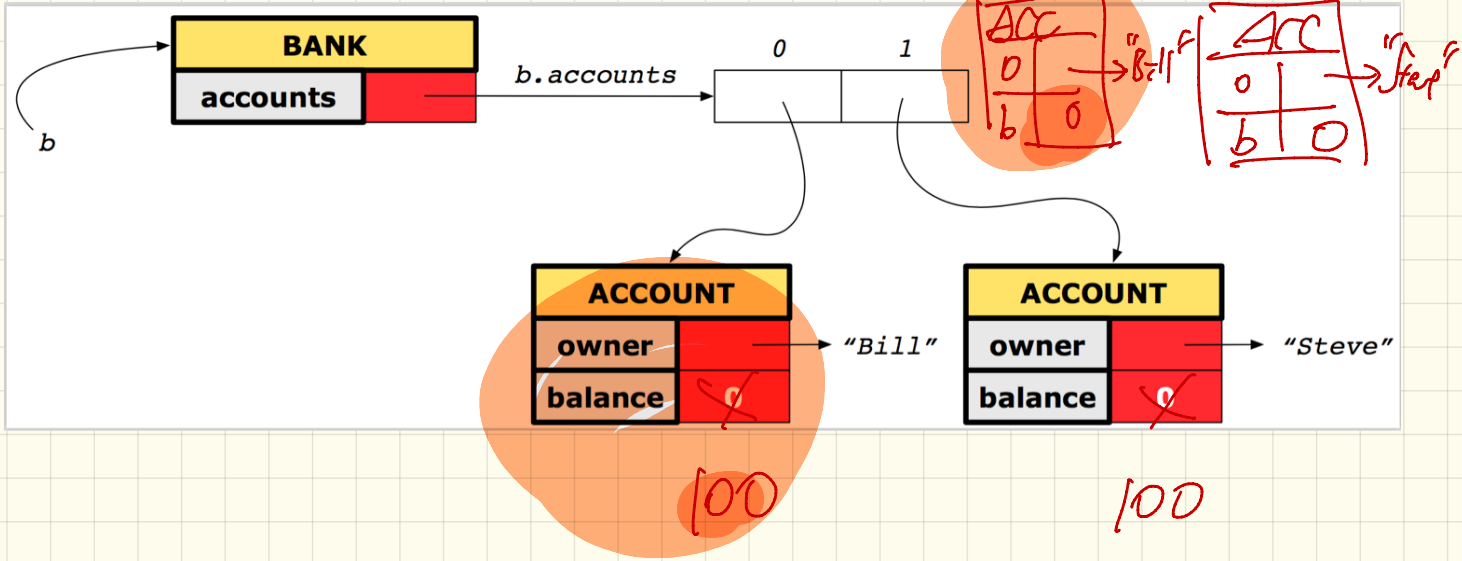
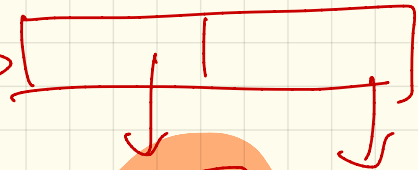
100

ensure

across ACCOUNTS. tab



accounts. deep twin  
dd



ensure across accounts. deep twin