Programming Language Concepts Homework 4

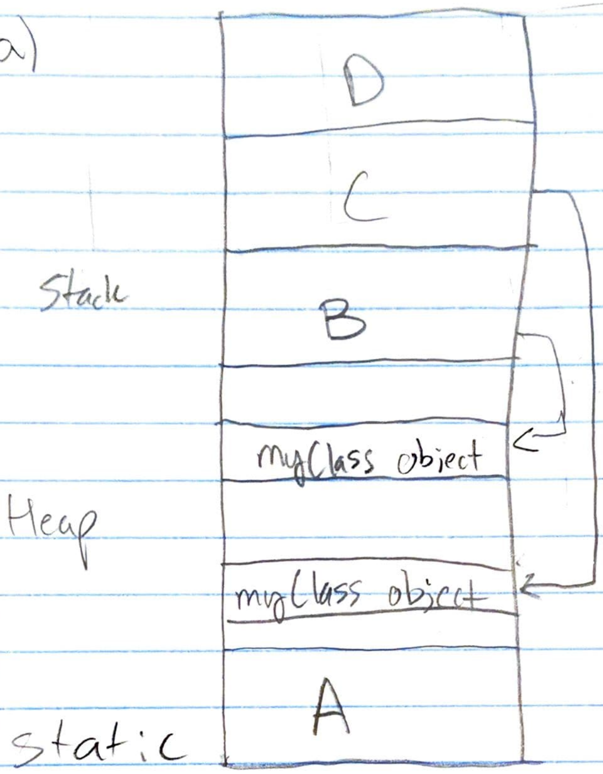
Due Friday Oct 18; Joseph Sepich (jps6444)

1 Problem One

In the first scheme expression the two expressions can only be equivalent if e1 = e2, so if you applied the same value to both x1 and x2, but in the second scheme expression you can gurantee that e1 = e2 if e2 = x1. You can guarantee this because the let* declartion has the scope of x1 start immediately when its declared. This means it can be used in the x2 declaration, however we can not use x1 as meaning e1 in the first expression, because the scope of the x1 in the expression is only in the body of the local function (e).

CMPSC 461 HW4 Problem 2

a)



b)

A lifetime 4 to 7
B lifetime 4 to 6
C lifetime 12 to 13
D lifetime 13

CMPSC 461 HW4   Problem 3

a)

Global

name	type
x	int
f1	int →void
f2	void →void

f1

name	type
x	int

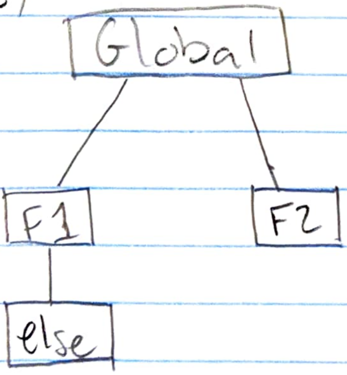
f2

name	type

else

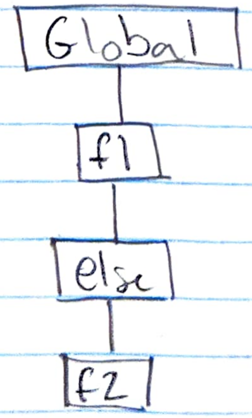
name	type
x	int

b)



The output would be 3. The reference to x does not appear in the f2symbol table, so you go to global in the tree above where x was declared to 3.

c)



The output would be 1. The reference to x does not appear in the f2 symbol table, so you go to the else table in the tree above where x was declared to be 1.

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Symbol Tables

Global

name	type
A	function

let* func

name	type
X	int
C	function
D	function
B	function

C

name	type
p	param
let	func

D

name	type

C-let

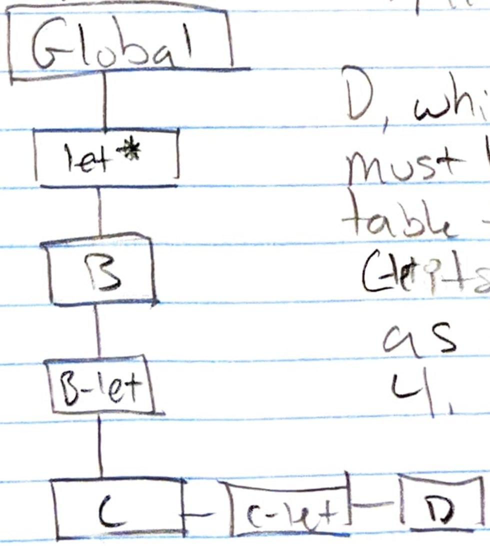
name	type
X	int

B-let

name	type
X	int
C	func

a) dynamic-shallow

↳ relies on calls not declaration



D, which exectes display X must look up through the symbol table tree to see what it prints. C-let itself has x in its table as 4, so the program prints 4.

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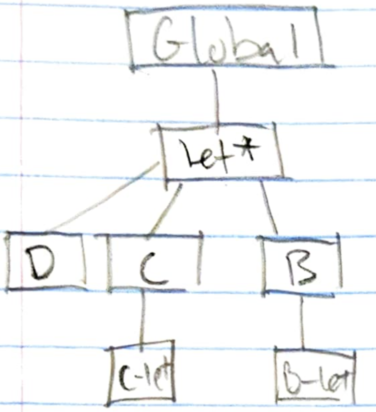
b) dynamic-deep

↳ relies on declaration location

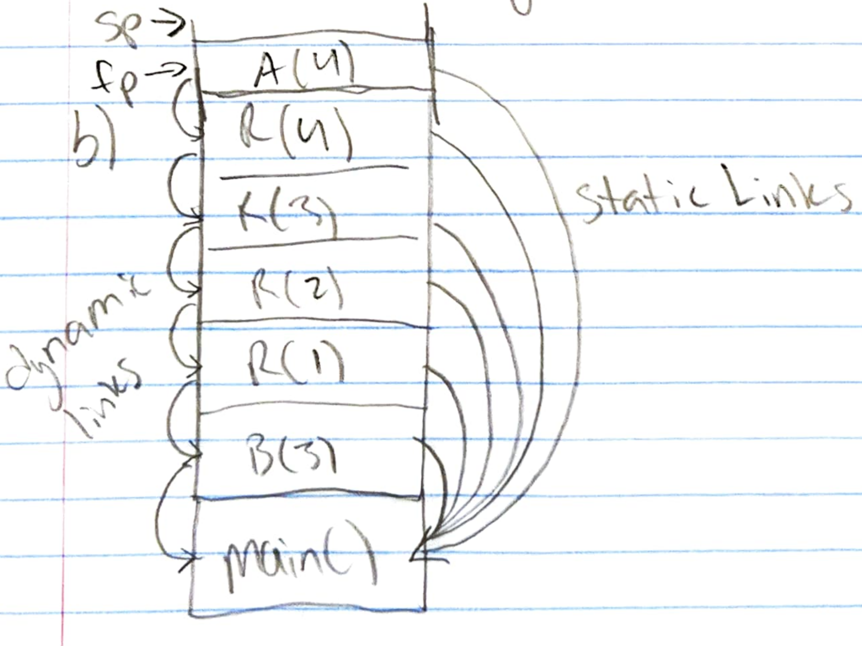


D, which executes display x must look up through the symbol table tree to see what it prints. let* would be the first table above D with an x declaration of 2, so it will print 2.

Problem 5

a) The program prints 8, then 4, then 2, then 1 and finally 4.

b)



c) Since we are assuming static scope, A first looks in it's own symbol table to find g. Not finding the declaration of g there it follows the static link to the global/main() symbol table. Since g was declared in this function, A can find g here.