Programming Language

Homework #1

Yuqian Zhang

N19945556

1.

a) ([A-Za-z0-9]\*) [A-Z] ([A-Za-z0-9]\*)[0-9] ([A-Za-z0-9]\*)

| ([A-Za-z0-9]\*) [0-9]([A-Za-z0-9]\*)[A-Z] ([A-Za-z0-9]\*)

b) [0-9]\* [0-9].[0-9][0-9]\*E[0-9][0-9]\*

c) [A-Za-z]([A-Za-z0-9]|\_|ε)([A-Za-z0-9]|\_|ε)([A-Za-z0-9]|\_|ε)([A-Za-z0-9]|\_|ε)([A-Za-z0-9]|\_|ε)([A-Za-z0-9]|\_|ε)

2.

a)

P:= program name ; VD FD PD BE|PP

VD:= var name|var name,|var name;| ε|VD VD

FD:= function name ( VD ) VD BE|ε|FD FD

PD:= procedure name (VD) VD BE|ε|PD PD

BE:= begin EXPR end name;

EXPR:= EXPR:=EXPR;|return EXPR;|name|number|EXPR OP EXPR |name(VD)||name(EXPR)|print(EXPR);|EXPR EXPR

OP:= +|-|\*

b) Please the attached document for the parse tree

3.

a)

Static scoping: the body of a function is evaluated in the environment in which the function is defined.

Dynamic scoping: the body of a function is evaluated in the environment in which the function is called.

b) The difference between static scoping and dynamic scoping.

Consider the following code:

x: integer :=7 //line(1)

procedure a()

begin

b();

end

procedure b ()

x: integer = 20 //line(2)

procedure f ()

begin

x:= x+1;

end

begin

f();

end

If a() is called, it will start b(), and then call f(). In procedure f, it reassigns the value of variable x.

In the static scoping, x refers to where the function defines, which is in procedure b(line (2)), thus it gets reassigned with the value 21.

In dynamic scoping, x refers to where the function is called, which is in procedure a(line (1)), thus it gets reassigned with the value 8.

c) Rule for resolving variable references in a block structured, statically scoped language.

A variable reference is resolved to the corresponding declaration in the innermost surrounding block.

x=x+1

Finding the reference inside out.

d) Rule for resolving variable references in a block structured, dynamically scoped language.

Tracing back to the head of call chain. (looking backwards)

a b c d e f

4. a)

DL

RA

SL

x:6

DL

RA

SL

DL

RA

SL

DL

RA

SL

Local Variable

DL

RA

SL

closure1

closure2

CP EP

CP EP

dynamic link

static link

A

F

B

C/G

D/H

b) There are two parts of a closure: code pointer (CP)+ environment pointer(EP)

code pointer (CP)is pointing to the code for the procedure being passed.

environment pointer (EP)is the static link to be used when the passed procedure is called.

c) Dynamic link points in to the stack frame of the calling procedure.

Return address points to the place in the code of the calling procedure to return to.

5.

a) pass by value

10 20 30 40 50

b) pass by reference

31 20 30 40 50

c) pass by value-result

21 20 30 40 50

d) pass by name

10 20 31 40 50

6.

a)

b) The printing of ‘One’ and the printing of ‘Two’ are occurring concurrently.

It is Rendezvous concurrency.

In my code, two printing tasks communicate by exchanging messages, in other words, message passing.

In the loop, Task one print ‘one’ and then blocks until Task two finishes its printing of ‘two’.

This synchronous message passing method promises that ‘one ‘ and ‘two’ are printed in right order.

