

ECS 140A Homework 2

Jones, Hardy
999397426
Professor Olsson
Winter 2014

1. Give the output using (a) static scoping and (b) dynamic scoping.

(a) With static scoping, the program outputs

Q 1 1

P 1 3

Q 1 5

P 1 3

(b) With dynamic scoping, the program outputs

Q 1 1

P 1 3

Q 5 5

P 5 3

2. Consider the following program.

(a) Show the runtime stack, including static pointers, each time a block or procedure is entered or exited.

action	stack	static pointers
start:	(empty)	
+A:	A	
+P/D:	A P	$P \rightarrow A$
+S:	A P S	$P \rightarrow A$ $S \rightarrow P$
+Q/C:	A P S Q	$P \rightarrow A$ $S \rightarrow P$ $Q \rightarrow P$
+T:	A P S Q T	$P \rightarrow A$ $S \rightarrow P$ $Q \rightarrow P$ $T \rightarrow Q$
+R/B:	A P S Q T R	$P \rightarrow A$ $S \rightarrow P$ $Q \rightarrow P$ $T \rightarrow Q$ $R \rightarrow A$
+U:	A P S Q T R U	$P \rightarrow A$ $S \rightarrow P$ $Q \rightarrow P$ $T \rightarrow Q$ $R \rightarrow A$ $U \rightarrow R$
-U:	A P S Q T R	$P \rightarrow A$ $S \rightarrow P$ $Q \rightarrow P$ $T \rightarrow Q$ $R \rightarrow A$
-R/B:	A P S Q T	$P \rightarrow A$ $S \rightarrow P$ $Q \rightarrow P$ $T \rightarrow Q$
-T:	A P S Q	$P \rightarrow A$ $S \rightarrow P$ $Q \rightarrow P$
-Q/C:	A P S	$P \rightarrow A$ $S \rightarrow P$
-S:	A P	$P \rightarrow A$
-P/D:	A	
+E:	A E	$E \rightarrow A$
+R/F:	A E R	$E \rightarrow A$ $R \rightarrow A$
+U:	A E R U	$E \rightarrow A$ $R \rightarrow A$ $U \rightarrow R$
-U:	A E R	$E \rightarrow A$ $R \rightarrow A$
-R/F:	A E	$E \rightarrow A$
-E:	A	
-A:	(empty)	

- (b) Show the runtime stack and the display each time a block or procedure is entered or exited.

action	stack	display (@ = pointer to or address of)
start:	(empty)	(empty)
+A:	A	@A
+P/D:	A P	@A @P
+S:	A P S	@A @P @S
+Q/C:	A P S Q	@A @P @Q
+T:	A P S Q T	@A @P @Q @T
+R/B:	A P S Q T R	@A @R
+U:	A P S Q T R U	@A @R @U
-U:	A P S Q T R	@A @R
-R/B:	A P S Q T	@A @P @Q @T
-T:	A P S Q	@A @P @Q
-Q/C:	A P S	@A @P @S
-S:	A P	@A @P
-P/D:	A	@A
+E:	A E	@A @E
+R/F:	A E R	@A @R
+U:	A E R U	@A @R @U
-U:	A E R	@A @R
-R/F:	A E	@A @E
-E:	A	@A
-A:	(empty)	(empty)