

Programming Assignment #3

Deadline: 17th March, 2021

1. $\langle \text{prog} \rangle ::= \text{PROGRAM } \langle \text{prog-name} \rangle \text{ VAR } \langle \text{dec-list} \rangle \text{ BEGIN } \langle \text{stmt-list} \rangle \text{ END.}$
2. $\langle \text{prog-name} \rangle ::= \text{id}$
3. $\langle \text{dec-list} \rangle ::= \langle \text{dec} \rangle \mid \langle \text{dec-list} \rangle \mid \langle \text{dec} \rangle$
4. $\langle \text{dec} \rangle ::= \langle \text{id-list} \rangle : \langle \text{type} \rangle$
5. $\langle \text{type} \rangle ::= \text{INTEGER}$
6. $\langle \text{id-list} \rangle ::= \text{id} \mid \langle \text{id-list} \rangle, \text{id}$
7. $\langle \text{stmt-list} \rangle ::= \langle \text{stmt} \rangle \mid \langle \text{stmt-list} \rangle; \langle \text{stmt} \rangle$
8. $\langle \text{stmt} \rangle ::= \langle \text{assign} \rangle \mid \langle \text{read} \rangle \mid \langle \text{write} \rangle \mid \langle \text{for} \rangle$
9. $\langle \text{assign} \rangle ::= \text{id} := \langle \text{exp} \rangle$
10. $\langle \text{exp} \rangle ::= \langle \text{term} \rangle \mid \langle \text{exp} \rangle + \langle \text{term} \rangle \mid \langle \text{exp} \rangle - \langle \text{term} \rangle$
11. $\langle \text{term} \rangle ::= \langle \text{factor} \rangle \mid \langle \text{term} \rangle * \langle \text{factor} \rangle \mid \langle \text{term} \rangle \text{ DIV } \langle \text{factor} \rangle$
12. $\langle \text{factor} \rangle ::= \text{id} \mid \text{int} \mid (\langle \text{exp} \rangle)$
13. $\langle \text{read} \rangle ::= \text{READ}(\langle \text{id-list} \rangle)$
14. $\langle \text{write} \rangle ::= \text{WRITE}(\langle \text{id-list} \rangle)$
15. $\langle \text{for} \rangle ::= \text{FOR } \langle \text{index-exp} \rangle \text{ DO } \langle \text{body} \rangle$
16. $\langle \text{index-exp} \rangle ::= \text{id} := \langle \text{exp} \rangle \text{ TO } \langle \text{exp} \rangle$
17. $\langle \text{body} \rangle ::= \langle \text{stmt} \rangle \mid \text{BEGIN } \langle \text{stmt-list} \rangle \text{ END}$

We are been provided above a simplified PASCAL grammar in BNF (Backus-Naur Form).

Write a LEX specification of the tokens of PASCAL and use the LEX compiler to construct a lexical analyzer for PASCAL.

Token coding scheme for the above grammar is tabulated as below:

TOKEN	CODE
PROGRAM	1
VAR	2
BEGIN	3
END	4
END.	5
INTEGER	6
FOR	7
READ	8
WRITE	9
TO	10
DO	11
;	12
:	13
,	14
:=	15
+	16
-	17
*	18
DIV	19
(20
)	21
id	22
int	23

Write the two auxiliary functions *install-id*() and *install-num*() using hashed symbol table organization.

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