

Quiz #2

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1、Please describe the operation of the basic compiler functions. (30%)

1. scanner
2. parser
3. code generator

- Lexical analysis - scanner

- Scanning the source statement, recognizing and classifying the various tokens

- Syntactic analysis - parser

- Recognizing the statement as some language construct.
- Construct a parser tree (syntax tree)

- Code generation – code generator

- Generate assembly language codes
- Generate machine codes (Object codes)

2、Please write the intermediate form for the following PASCAL statement. (30%)

```
FOR I := 1 to 10
  BEGIN
    A := A + C;
    B := D - E;
  END
```

	Operation	Op1	Op2	Result
1	:=	#1		I
2	JGT	I	#10	10
3	+	A	C	i1
4	:=	i1		A
5	+	D	E	i2
6	:=	i2		B
7	:=	I	#1	i4
8	:=	i4		I
9	J			2

3、 $B[l_1..u_1, l_2..u_2]$ is a two-dimensional integer array. Note that the size of each element of B is w . Please give the relative address of $B[s_1, s_2]$. (10%)

$$w * [(s_1 - l_1) * (u_2 - l_2 + 1) + (s_2 - l_2)]$$

4、Please follow the grammar rules to construct the parse tree. (30%)

1. $A * 10 + B \text{ DIV } C - D * E$
2. $A + 10 * B - C \text{ DIV } D + E$

```

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

```