# Compilers

GATEBOOK

July 2018

## 1 Lexical Analysis

1. Output of lexical analyzer is:
   (A) Regular expressions
   (B) Parse Tree
   (C) Grammar production rules
   (D) Tokens

2. A Lexical analyzer uses which of the following machines to process input?
   (A) DFA
   (B) NFA
   (C) DPDA
   (D) NPDA
   (E) TM

3. A Lexeme is:
   (A) A token
   (B) A token identifier
   (C) A set of tokens
   (D) A viable prefix
   (E) a handle

4. What is the output of Synthesis phase of the compiler?
   (A) Source program
   (B) Intermediate code
   (C) Syntax tree
   (D) Target Code
   (E) Parse Tree

5. Which data structure in a compiler is used for managing information about variables and their attributes?
   (A) Abstract syntax tree

(B) Symbol table
(C) Semantic stack
(D) Parse table

6. In a compiler, keywords of a language are recognized during
(A) parsing of the program
(B) the code generation
(C) the lexical analysis of the program
(D) dataflow analysis

7. A system program that combines the separately compiled modules of a program into one form suitable for execution is called as:
(A) Assembler
(B) Compiler
(C) Linking Loader
(D) Interpreter

8. The lexical analyzer takes A as input and produces a stream of B as output. What are the values of A and B:
(A) Source program, Target program
(B) Tokens, Source program
(C) Source program, Tokens
(D) Source program, syntax tree

9. Which of the following system software always resides in the main memory?
(A) Text Editor
(B) Assembler
(C) Linker
(D) Loader

10. The lexical analysis for a modern computer language such as Java needs the power of which one of the following machine models in a necessary and sufficient sense?
(A) Finite state automata
(B) Deterministic pushdown automata
(C) Non-deterministic pushdown automata
(D) Turing machine

11. The part of a compiler that checks every character/strings of the source program is called:
(A) Token analyzer

(B) Strings anlyzer
(C) Lexical analyzer
(D) Syntax analyzer

12. A symbol table is generated by:
(A) Compiler
(B) Interpreter
(C) Assembler
(D) Application program

13. If the input file to a Lex program is "abc.lex" the Output file name should look like:
(A) abc.c.o
(B) abc.yy.c
(C) abc.lex.c
(D) abc.obj

14. The process of forming tokens from characters/ strings of a program is known as:
(A) Characterisation
(B) Tokenization
(C) Lexemization
(D) None of the above

15. The number of tokens in the following C statement is:
printf("i = %d, &i = %x", i, &i);
(A) 3
(B) 26
(C) 10
(D) 21

16. The number of tokens in the following C program is:

```
#include <stdio.h>
int main()
{
char c;
scanf("%d",&c);
printf("%d",c);
return 0;
}
```

(A) 27
(B) 30
(C) 34

(D) 38

17. Consider the following statements:
(I) The output of a lexical analyzer is groups of characters.
(II) Total number of tokens in
printf("i=%d, &i=%x", i, &i);
are 11.
(III) Symbol table can be implemented by using array and hash table but not with tree.
Which of the following statement(s) is/are correct?
(A) Only (I)
(B) Only (II) and (III)
(C) All (I), (II), and (III)
(D) None of these

18. Describe the languages denoted by the following regular expressions:
(i) $0(0+1)^*0$
(ii) $((\epsilon+0)1^*)^*$
(iii) $(0+1)^*0(0+1)^2$

19. Write regular expressions for the following languages:
(i) All strings of 0's and 1's that do not contain the substring 011.
(ii) All strings of 0's and 1's that do not contain the subsequence 11011.

20. A lexical analyzer uses the following patterns to recognize three tokens $T_1$, $T_2$, and $T_3$ over the alphabet {a,b,c}.
$T_1$: $a?(b|c)^*a$
$T_2$: $b?(a|c)^*b$
$T_3$: $c?(b|a)^*c$
Note that 'x?' means 0 or 1 occurrence of the symbol x. Note also that the analyzer outputs the token that matches the longest possible prefix. If the string "*cbbaabccaacb*" is processed by the analyzer, which one of the following is the sequence of tokens it outputs?
(A) $T_1T_2T_3$
(B) $T_3T_1T_2$
(C) $T_2T_1T_3$
(D) $T_3T_3T_2$

21. A lexical analyzer uses the following patterns to recognize three tokens $T_1$, $T_2$, and $T_3$ over the alphabet {a,b,c}.
$T_1$: $a?(b|c)^*a?$
$T_2$: $b?(a|ab|bc)^*b$
$T_3$: $c(b|caa)^*c$
Note that 'x?' means 0 or 1 occurrence of the symbol x. Note also that

the analyzer outputs the token that matches the longest possible prefix. If the string "*aabcbcbbcbcacbcaabc*" is processed by the analyzer, which one of the following is the sequence of tokens it outputs?
(A) $T_1T_2T_3T_3$
(B) $T_3T_1T_2$
(C) $T_2T_1T_3$
(D) $T_2T_3T_1T_3$

22. A lexical analyzer uses the following patterns to recognize three tokens $T_1$, $T_2$, and $T_3$ over the alphabet {a,b,c}.
$T_1$: $a?b?((b^*c^*)a^*)^*c?$
$T_2$: $b?(cba|abc|bac)^*b$
$T_3$: $c(b|cba|bbaa)^*c$
Note that 'x?' means 0 or 1 occurrence of the symbol x. Note also that the analyzer outputs the token that matches the longest possible prefix. If the string "*bcbaabccbbaacbabbaacbabbbcabcabcb*" is processed by the analyzer, What is the minimum number of tokens required?

23. Consider following C program:
```
#include <stdio.h>
int main()
{
char 123c;
scanf("%d",&123c);
printf("%d",123c);
return 0x111f;
}
```
Which of the following statements about this code is not true?
(A) This code is error-free and compiles successfully.
(B) This code contains 24 valid lexemes.
(C) This code contains 3 invalid lexemes.
(D) This code contains a lexical error.

24. Consider following C program:
```
#include <stdio.h>
int main()
{
/* declare a 2-Dientional array */
int twoDarray[10]['D'];
twoDarray[10-1]['D'-10-2]= 0xff; printf("%d",twoDarray[9][0x38]);
return 0x111f;
}
```
Which of the following statements about this code is true?
(A) This code is error-free and compiles successfully.
(B) This code contains 55 valid lexemes.

(C) This code contains 3 invalid lexemes.
(D) This code contains a lexical error.

25. Consider the following C program:
```
#include <stdio.h>
int main()
{
int x=25, y=30;
char *a; a=(char *)&x; *a=2xy; printf("%d %d",x, *a);
return 0;
}
```
Which of the following types of error is identified while compiling this program?
(A) Lexical error
(B) Syntax error
(C) Semantic error
(D) None of the above

26. Consider the following C program:
```
#include <stdio.h>
#include <stdnoreturn.h>
#include <stdlib.h>
// causes undefined behavior if i <= 0
// exits if i > 0
_Noreturn void stop_now(int i)
{
if (i> 0) exit(i);
}
int main(void)
{
puts("Preparing to stop...");
stop_now(2);
puts("This code is never executed.");
}
```
Which of the following types of error is identified while compiling this program?
(A) Lexical error
(B) Syntax error
(C) Semantic error
(D) None of the above

27. Consider the following C program:
```
#includ<stdio.h>
int main()
```

```
{
printf("This statment has smthng rong. Can you sea eat?");
return 0;
}
```

Which of the following types of error is identified while compiling this program?
(A) Lexical error
(B) Syntax error
(C) Semantic error
(D) None of the above

28. Consider the following C program with 9 lines of code.:

```
#include<stdio.h>
#include<conio.h>
#include<stdlib.h>
float main()
{
printf("Hello Gatebook family..");
;;
return o;
}
```

What will be the result of compiling this code? Does it contain any error in it or it compiles fine? Please specify the line number (in case of any error).

29. Consider the following C program with 9 lines of code.:

```
#include<stdio.h>
#include<conio.h>
#include<stdlib.h>
double main()
{
float c;
/* Ask user to enter a value.
scanf("%f",&c);
/* Print the value.
printf("Value of c=%f", c);;;;
return 0.00000000;
}
```

What will be the result of compiling this code? Does it contain any error in it or it compiles fine? Please specify the line number (in case of any error).

30. Consider the following C program:

```
#include <stdio.h>
int
main
(
)
{
int
x
=
2
;
printf
(
"%d"
,
x
)
;
}
```

Which of the following types of error is identified while compiling this program?
(A) Lexical error
(B) Syntax error
(C) Semantic error
(D) None of the above

31. Consider the following C program:

```
#include <stdio.h>
int
main
(
)
{
char

s
=
"
1
0
0
0
```

```
"
;
printf
(
"%s"
,
s
)
;
}
```

Which of the following types of error is identified while compiling this program?
(A) Lexical error
(B) Syntax error
(C) Semantic error
(D) None of the above

32. Consider the following C program with 10 lines of code:

```
#include <stdio.h>
int main(){
/* Declare 3 integer variables */
int x=40, y=30, z;
/* Double the value of variable Y then Add the two integers and store the result in third variable */
z=x+2y;
/* Print the result of summation */
printf("%d",z);
return 0;
}
```

Which of the following statements is true about this program?
(A) It compiles successfully and prints 100.
(B) It passes lexical analysis phase but fails in syntax analysis phase.
(C) It passes lexical analysis and syntax analysis phases but fails in semantic analysis phase.
(D) Does not compile and throws an unknown error.

33. In the following program how many tokens are there?

```
#include <stdio.h>
int main(){
/* Declare 3 integer variables */
int x=1111, y=40000, z;
/* Add the two integers and store the result in third variable */
z=x+y;
```

```
/* Print the result of summation */
printf("%d",z);
return 0;
}
```
(A) 27
(B) 33
(C) 65
(D) 79

34. Consider the following C program:

```
#include<stdio.h>
#include<conio.h>
#include<stdlib.h>
long int main(){
/* Declare 2 integer variables */
int y=2455, z;
/* Check if Y is nonnegative */
while(y>=0){
y/=2;
x+=1;
}
/* Print the value of x */
printf("%d",x);
return 255.552;
}
```
If the number of tokens in this code is A and the result of compilation of this code is B then what are the values of A and B?
(A) A=28, B= Compilation fails due to Lexical error
(B) A=37, B= Compilation fails due to syntax error
(C) A=40, B= Compilation fails due to semantic error
(D) A=47, B= Compilation doesn't fail.

35. Consider the following C program:

```
#include<stdio.h>
int main(){
/* Declare 2 integer variables */
int y=0x00A01DCH, z=0;
/* Check if Y is nonnegative */
while(y>=0){
y>>=4;
z+=1;
}
```

```
/* Print the value of Z */
printf("%d",z);
return 'B';
}
```

Which of the following statements is true about this program?
(A) It compiles successfully and prints 6.
(B) It passes lexical analysis phase but fails in syntax analysis phase.
(C) It passes lexical analysis and syntax analysis phases but fails in semantic analysis phase.
(D) Does not compile and throws an unknown error.

36. Consider the following C program:

```
#include<stdio.h>
int main(){
/* Declare 2 integer variables */
int y,z;
y=z=10;
/* This is a comment */
z + = 10 + ++ y;
/* This is another comment */
printf("%d ,,, %d"
,y,z);
return 0;
}
```

There are 12 lines in this code. Which of the following statements is true about this code?
(A) Line 5 contains an error.
(B) Line 7 contains an error.
(C) Line 9 and line 10 together contain an error.
(D) There is no error in this code.