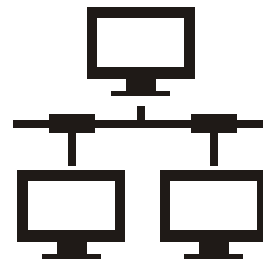# COMPUTER SCIENCE & IT

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COMPUTER SCIENCE & IT

Compiler Design

1
CHAPTER

Introduction to Compiler

Multiple Choice Questions

Q.1 Which translator program converts assembly language program to object program?
(a) Assembler   (b) Compiler
(c) Microprocessor (d) Linker

Q.2 Which one is a phase of a compilation process?
(a) Lexical analysis (b) Code generation
(c) Both (a) and (b) (d) None of these

Q.3 Choose the correct sequence of occurrence during compilation process.
(a) Character stream $\rightarrow$ Parse Tree $\rightarrow$ Optimized code
(b) Parse tree $\rightarrow$ Token stream $\rightarrow$ Intermediate code
(c) SDT tree $\rightarrow$ Parse tree $\rightarrow$ Optimized code
(d) Parse tree $\rightarrow$ 3 address code $\rightarrow$ Character stream

Q.4 Assembly language
(a) is usually the primary user interface
(b) requires fixed format commands
(c) is a mneomonic form of machine language
(d) is quite different from the SCL interpreter

Q.5 For which of the following reasons compiler is preferable to an interpreter?
(a) It can generate stand-alone programs that often take less time for execution.
(b) It is much helpful in the initial stages of program development.
(c) Debugging can be faster and easier
(d) It needs less computer resources

Q.6 In a context-free grammar
(a) ε can't be the right-hand side of any production
(b) terminal symbols can't be present i the left-hand side of any production.
(c) the number of grammar symbols in the left-hand side is not greater than the number of grammar symbols in the right hand side.
(d) All of the above

Q.7 The cost of developing a compiler is proportional to the
(a) complexity of the source language
(b) complexity of the architecture of the target machine
(c) flexibility of the available instruction set
(d) all of the above

Q.8 Semantic errors can be detected by the system
(a) At compile time only
(b) At run time only
(c) Both at compile and run time
(d) None of these

Q.9 Undeclared name is _____ error.
(a) Syntax   (b) Lexical
(c) Semantic   (d) No

Q.10 A simple two-pass assembler does not do which of the following in the first pass?
(a) It allocates space for the literals.
(b) It computes the total length of the program.
(c) It builds the symbol table for the symbols and their values.
(d) It generates code for all the load and stores register instructions.

Q.11 Consider the following statement:
S_1: Analysis phase of compiler includes code optimization stages.
S_2: Synthesis phase of compiler is followed by analysis phase.
(a) S_1 is correct, S_2 is not
(b) S_2 is correct, S_1 is not
(c) S_1 and S_2 are correct
(d) S_1 and S_2 are incorrect

Q.12 Match the following groups:
     List-I
A. Lexical analyzer
B. Syntax analyzer
C. Type checking
D. Intermediate code generation

List-II

1. Checks the structure of the program.
2. Analysis of entire program by reading each character.
3. High level language is translated to simple machine independent language.
4. Checks the consistency requirements in a context of the program.

Codes:

	A	B	C	D
(a)	1	2	4	3
(b)	2	1	4	3
(c)	2	4	3	1
(d)	1	4	3	2

Q.13 An optimizing compiler
(a) is optimized to occupy less space
(b) is optimized to take less time for execution
(c) optimized the code
(d) None of the above

Q.14 Which of the following is not a functionality of C compiler?
(a) Identifying syntax error
(b) Identifying tokens
(c) Linking
(d) None of these

Q.15 Which of the following grammars are not phase structured?
(a) Regular   (b) Context-free
(c) Context-sensitive   (d) None of the above

Q.16 Cross-compiler is a compiler
(a) which is written is a language that a different from the source language.
(b) that generates object code for its last machine.
(c) which is written in a language that is same as the source language.
(d) that runs on one machine but produces object code for another machine.

Q.17 Match **List-I** with **List-II** and select the correct answer using the code given below:

	List-I		List-II
A.	Load Time	1.	Relocation
B.	Compile Time	2.	Token Recognition
C.	Link Time	3.	Resolving Reference
D.	Run Time	4.	Activation Record

Code:

	A	B	C	D
(a)	1	4	3	2
(b)	1	2	3	4
(c)	1	3	2	4
(d)	4	1	3	2

Q.18 If w is a string of terminal and A, B are two non-terminals, then which of the following are right-linear are grammars?
(a) A → B W
(b) A → B W/W
(c) A → WB/W
(d) None of the above

Q.19 CSG can be recognized by
(a) pushdown automata
(b) 2-way linear bounded automata
(c) finite state-automata
(d) None of the above

Q.20 A Top-down parser generates
(a) left-most derivation
(b) right-most derivation
(c) right-most derivation in reverse
(d) left-most derivation in reverse

Q.21 A programming language is to be designed to run on a machine that does not have a big memory. The language should
(a) prefer a 2 pass compiler to a 1 pass compiler
(b) prefer an interpreter to a compiler
(c) not support recursion
(d) All of the above

Q.22 A loader is
(a) a program that place programs into memory and prepares them for execution
(b) a program that automates the translations of assembly language into machine language
(c) a program that accepts a program written in a high level language and produces an object program
(d) a program that appears to execute a source program as if it were machine language

Q.23 Which of the following is the most general phase-structured grammar?
(a) Regular   (b) Context-free
(c) Context-sensitive   (d) None of the above

Q.24 An ideal compiler should
(a) be smaller in size
(b) be written in a high level language
(c) produce object code that is smaller in size and executes faster
(d) All of the above

Q.25 Whether a given pattern constitutes a token or not?
(a) depends on the source language
(b) depends on the target language
(c) depends on the compiler
(d) None of the above comment is true

Q.26 In a compiler, grouping of characters into tokens is done by the
(a) Scanner   (b) Parser
(c) Code generator   (d) Code optimizer

Q.27 Which of following is used for grouping of characters into tokens (in a compiler)
(a) Parser   (b) Code optimizer
(c) Code generator   (d) Scanner

Q.28 Consider the following C fragment
     fro (int $x = 0$; $x <= n$; $x++$)

Which type of error detected by the C compiler for the above code?
(a) Lexical error   (b) Syntactic error
(c) Semantic error   (d) Logical error

Q.29 A grammar will be meaningless if the
(a) terminal set and non-terminal set are not disjoint.
(b) left hand side of a productions is a single terminal
(c) left hand side of a production has no none terminal
(d) All of the above

Q.30 Which of the following is correct?
(a) Loader resolves external memory references, when the code is one file may refer to a location in another file
(b) It is easy to design compiler for different source language and target machines because of the two phase division of compiler.
(c) The storage used for heap section can grow at runtime but not stack section
(d) None of these

Q.31 Match **List-I** and **List-II** and select the correct answer using codes given below:
     List-I
A. Expanding macros into source language statements.
B. It takes the output generated by the compiler as input and generate relocatable machine code as the output.
C. Puts together all the executable object files into memory for execution.
     List-II
1. Assembler
2. Loader
3. Preprocessor
Code:

	A	B	C
(a)	3	2	1
(b)	3	1	2
(c)	1	2	3
(d)	1	3	2

Q.32 Incremental-compiler is a computer
(a) which is written in a language that is different from the source language.
(b) that generates object code for its host machine.
(c) which is written in a language that is same as the source language
(d) that allows a modified position of a programme to be compiled

Q.33 In a context-sensitive grammar.
(a) ε can't be the right-hand side of any production
(b) number of grammar symbols on the left-hand side of a production can't be greater than the number of non-terminals on the right hand side.
(c) number of grammar symbols on the left-hand side of a production can't be greater than the number of grammar symbols on the right-hand side.
(d) All of the above

Q.34 If a is a terminal and S, A, B are three non-terminals, then which of the following are regular grammar,
(a) $S \rightarrow \epsilon$, $A \rightarrow as \,|\, B$
(b) $A \rightarrow aA \,|\, a$, $B \rightarrow bB \,|\, a$
(c) $A \rightarrow Ba \,|\, BaB$
(d) $A \rightarrow aBB \,|\, aB$

Q.35 Choose the correct statements:
  (a) Sentence of a grammar is a sequential form without any terminals.
  (b) Sentence of a grammar should be derivable from the start state.
  (c) Sentence of a grammar should be frontier of a derivation tree, in which the root node has the start state as the label.
  (d) None of the above

Q.36 Representing the syntax by a grammar is advantageous because
  (a) It is concise
  (b) It is accurate
  (c) Automation becomes easy
  (d) All of the above

Q.37 CFG can be recognized by a
  (a) push down automata
  (b) finite state automata
  (c) 2-way linear bounded automata
  (d) Non finite state automata

Multiple Select Questions (MSQ)

Q.38 For which of the following reasons, an interpreter is preferred to a compiler?
  (a) It takes less time to execute
  (b) It is much helpful in the initial stages of program development.
  (c) Debugging is easier.
  (d) It needs less computer resources.

Q.39 Storage mapping is done by
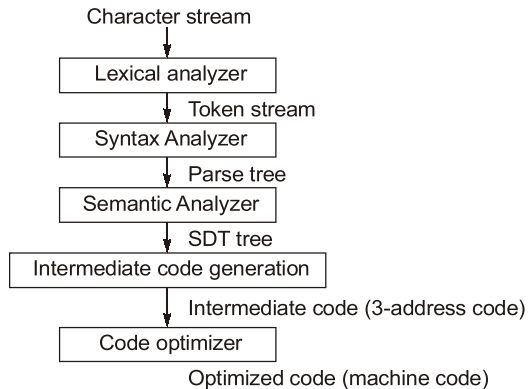 (a) Operating system   (b) Compiler
  (c) Linker   (d) Loader

■■■■

Answers	Introduction to Compiler

1.	(a)	2.	(c)	3.	(a)	4.	(c)	5.	(a)	6.	(b)	7.	(d)	8.	(a)	9.	(c)
10.	(d)	11.	(d)	12.	(b)	13.	(c)	14.	(c)	15.	(d)	16.	(d)	17.	(b)	18.	(c)
19.	(b)	20.	(a)	21.	(d)	22.	(a)	23.	(c)	24.	(d)	25.	(c)	26.	(a)	27.	(d)
28.	(b)	29.	(b)	30.	(b)	31.	(b)	32.	(d)	33.	(d)	34.	(b)	35.	(b)	36.	(d)
37.	(a)	38.	(b, c)	39.	(a, d)												

Explanations **Introduction to Compiler**

3. (a)

Character stream
↓
Lexical analyzer
↓ Token stream
Syntax Analyzer
↓ Parse tree
Semantic Analyzer
↓ SDT tree
Intermediate code generation
↓ Intermediate code (3-address code)
Code optimizer
Optimized code (machine code)

9. (c)
It is a semantic error (run-time error).

11. (d)
Analysis phase {lexical analysis, syntax analysis, semantic analysis} is followed by synthesis phase {intermediate code generation, code optimizer, machine code generation}

12. (b)
Lexical analyzer: Reads every character of the program to identify the tokens.
Syntax analyzer: Analyzes the syntax or structure of the program.
Type checking: It determines violation of consistency requirements.
ICG: Translates the program into intermediate language.

14. (c)
Linking is done by a linker after compilation process.
Compilation can identify token generates compilation error which can be lexical, syntax or semantic.

17. (b)
Load time relocation is done on load time
Compile Time : token recognition during complication
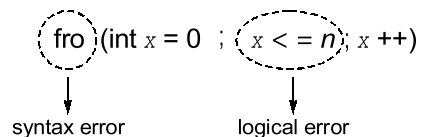Line Time : Reference can be resolved
Run Time : Activation record created during runtime

21. (d)
Since the programming language is to be designed to run on a machine that does not have a big memory. Therefore pass-2 (multi phase), which uses less space is preferred also instead of using a compiler we use an interpreter, which scans the program line by line hence uses less memory at compiler time for each instance. Also it does not support recursion.

28. (b)
Although the statement

$\overbrace{fro}$ (int $x = 0$; $\overbrace{x <= n}$; x ++)

↓ syntax error   ↓ logical error

Has both syntax and logical error
But, it will result in syntax error.
Hence, (b) is correct option.

30. (b)
The compiler is divided into two phase all the compiler modules from lexical analysis till ICG are in front end and alter that back end.

31. (b)
The preprocessor expand macros, into source language statements and generate modified source program as the output.
The assembly language is processed by a program called an assembles that produces relocatable machine code.
Loader puts together all of the executable object files into memory for execution.

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