



Daffodil International University  
Department of Computer Science and Engineering

Faculty of Science & Information Technology

Midterm Exam Examination, Summer 2021 @ DIU Blended Learning Center

Course Code: CSE331 (Day), Course Title: Compiler Design

Level: 3 Term: 3 Section: PC-C

Instructor: MSZ Modality: Open Book Exam

Date: Sunday 4 July, 2021 Time: 09:00am-11:30am

Two and half hours (2:30), Marks: 25

1. (a) Consider the following statement:

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$$z = x * y^2 + m/3 + u * x$$

Explain how the compiler will process this equation. Consider  $m$ ,  $x$ ,  $y$ , and  $z$  as float value. Which step of the Compiler is responsible for removing comments from the source code?

(b) Consider the following CFG:

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|   |
|---|
| $A \rightarrow BA \mid cB \mid \epsilon$    |
| $B \rightarrow cdXB \mid cdY \mid \epsilon$ |
| $X \rightarrow mYnZ \mid mnZ \mid \epsilon$ |
| $Y \rightarrow cYd \mid mn \mid \epsilon$   |
| $Z \rightarrow qY \mid Y$                   |

Give the formal definition of the given CFG. Derive the string “ $cdmncqcdmn$ ” using LMD and RMD. And draw the parse tree. Is the grammar ambiguous? Explain.

2. (a) Answer the following questions:

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- (i) Assume that  $\Sigma = \{a, b, c, d\}$ . Write the regular expression of the string, that starts with odd number of  $a$  or even number of  $b$  followed by exactly three  $c$ . Consider that the 2nd letter from the right of the string will be always  $d$ . Using Thompson’s construction rule convert the regular expression into NFA. Give the formal definition of the drawn NFA.
- (ii) Write the regular expression of a binary number which start either with a  $0$  or a  $1$ . And the number is always an even number. Using Thompson’s construction rule convert the regular expression into NFA. Give the formal definition of the drawn NFA.

(b) Answer the following questions:

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(i) Draw the NFA for the following equations (Use Thompson’s Construction Rules):

- $((AB)^2C)D^+$
- $A(B^+D)C \mid PQ^*R$

(ii) Consider the following automaton and find whether they are NFA or DFA with Explanation. If they are NFA then convert them into DFA:

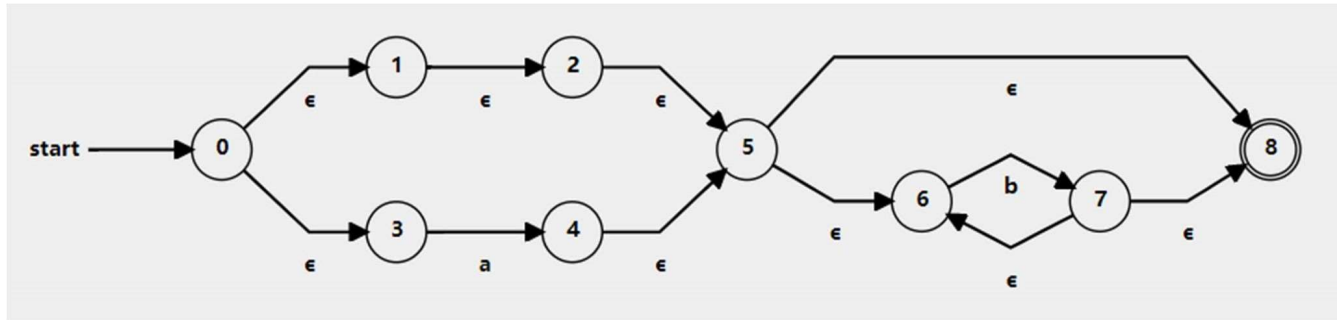


Figure. 1

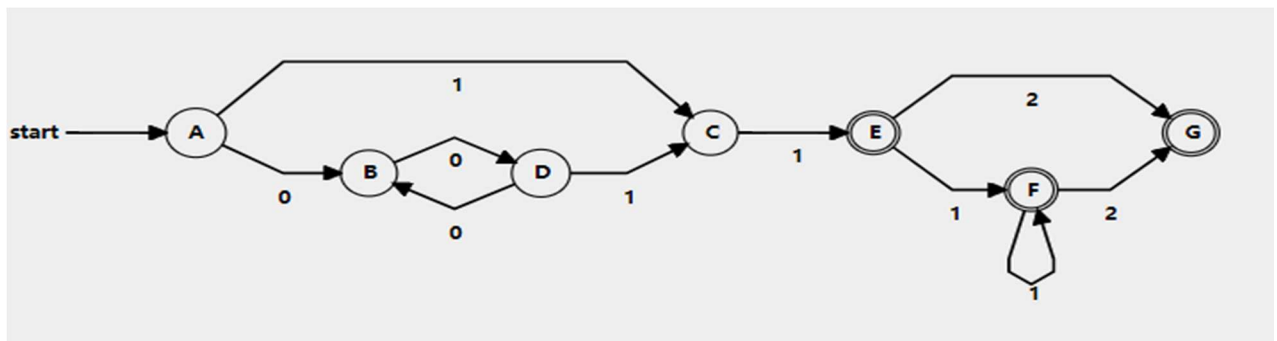


Figure. 2