ISBN: 9788183713795

Compiler Design

Second Edition

Dr. G. Sudha Sadasivam

Assistant Professor

Department of Computer Science and Engineering

PSG College of Technology

Coimbatore - 641 004

SCITECH PUBLICATIONS (INDIA) PVT. LTD.

CHENNAI

www.scitechpublications.com

ISBN: 9788183713795

Contents

1 Introduction to Compiling **1.1 - 1.29**

1.1 Compiler Basics 1.1
1.2 Issues in Compilation 1.3
1.3 Analysis Synthesis Model 1.4
1.4 Cousins of the Compiler 1.7
1.5 Phases of Compilation 1.11
1.6 Grouping of the Phases 1.19
1.7 Execution of a Program 1.20
1.7.1 Translation, linking and loading of a program 1.20
1.7.2 Interpretation of a program 1.21
1.8 Compiler Construction Tools 1.23
1.9 One Pass Compiler and Multipass Compiler 1.24
Objective Type Questions 1.26
Short Answer Questions 1.28
Review Questions 1.28

2 Lexical Analysis **2.1 - 2.42**

2.1 The Role of the Lexical Analyser 2.2
2.2 Input Buffering 2.4
2.3 Specification of Tokens 2.6
2.4 Recognition of Tokens 2.15
2.4.1 Finite automata 2.15
2.4.2 Conversion from regular expression to finite automata . . . 2.17
2.4.3 Deterministic finite automata 2.21
2.4.4 Conversion of NFA to DFA 2.22
2.4.5 Optimization of DFA 2.28
2.5 A Language for Specifying Lexical Analyzer Tool for Generating Lexical Analyzer 2.32
Objective Type Questions 2.37
Short Answer Questions 2.38
Review Questions 2.41

ISBN: 9788183713795

3 Syntax Analysis **3.1 - 3.19**

3.1 Role of the Parser 3.1
3.2 Error Detection and Recovery 3.3
3.3 Context Free Grammar and Writing a Grammar 3.6
Objective Type Questions 3.14
Short Answer Questions 3.14
Review Questions 3.19

4 Top Down Parsing **4.1 - 4.24**

4.1 Introduction 4.1
4.2 Recursive Parsing 4.2
4.3 Problems in Recursive Procedures and Recursive Descent Parsing . 4.4
4.3.1 Recursive descent parsers 4.8
4.4 Predictive Parser 4.12
4.5 Error Handling in Predictive Parsers 4.19
Objective Type Questions 4.20
Short Answer Questions 4.21
Review Questions 4.22

5 Bottom Up Parsing **5.1 - 5.72**

5.1 Shift Reduce Parser 5.2
5.1.1 Actions of the shift reduce parser using stack implementation 5.4
5.1.2 Construction of the parse tree 5.5
5.2 Operator Precedence Parsing 5.7
5.2.1 Components of an operator precedence parser 5.8
5.2.2 Parsing action 5.9
5.2.3 Construction of operator precedence parse table 5.11
5.2.4 Error reporting and recovery in operator precedence Parsers 5.14
5.2.5 Advantages and disadvantages of operator precedence parsing 5.16
5.3 LR Parsers 5.16
5.3.1 SLR parsers 5.20

ISBN: 9788183713795

5.4 CLR Parser 5.31
5.5 LALR Parser 5.42
5.6 Error Handling 5.50
5.7 Tool for Parser - Yacc 5.51
5.7.1 Writing a grammar in Yacc 5.52
5.7.2 Lex and Yacc together 5.55
5.7.3 Error handling in Yacc 5.57
Objective Type Questions 5.64
Short Answer Questions 5.65
Review Questions 5.66

6 Runtime Environments 6.1 - 6.37

6.1 Introduction 6.1
6.2 Source Language Issues 6.2
6.3 Storage Organisation 6.5
6.4 Storage Allocation 6.9
6.4.1 Static allocation 6.9
6.4.2 Stack storage allocation 6.10
6.4.3 Heap allocation 6.15
6.5 Access to Non-local Names 6.15
6.5.1 Lexical scoping 6.16
6.6 Parameter Passing 6.25
Objective Type Questions 6.34
Short Answer Questions 6.35
Review Questions 6.35

7 Intermediate Code Generation 7.1 - 7.50

7.1 Need for Intermediate Code 7.1
7.2 Intermediate Languages 7.3
7.3 Implementations of Three Address Code 7.13
7.4 Syntax Directed Definitions for Programming Language Statements 7.17
7.4.1 Introduction 7.17
7.4.2 Declaration Statements 7.18

ISBN: 9788183713795

7.4.3 Assignment statement 7.21
7.4.4 Boolean expressions and back patching 7.27
7.4.5 Control flow statement 7.32
7.4.6 Procedure calls 7.39
7.5 Syntax Directed Translation Schemes for Case Statement 7.42
Objective Type Questions 7.45
Short Answer Questions 7.47
Review Questions 7.48

8 Code Improving Transformations **8.1 - 8.38**

8.1 Introduction 8.2
8.2 Basic Blocks and Flow Graphs 8.3
8.3 Principle Sources of Optimisation 8.8
8.4 Optimisation of Basic Blocks 8.15
8.5 Global Optimisation 8.19
8.6 Meet Over Paths (MOP) Solutions 8.23
8.7 Global Data Flow Analysis 8.25
Objective Type Questions 8.32
Short Answer Questions 8.33
Review Questions 8.34

9 Code Generation **9.1 - 9.28**

9.1 Issues in the Design of a Code Generator 9.1
9.2 The Target Machine 9.4
9.3 Run-Time Storage Management 9.6
9.4 Next Use Information Using Basic Blocks and flow Graphs 9.8
9.5 Register Allocation and Assignment 9.11
9.6 Generating the Code from DAGs 9.17
9.7 Peephole Optimization 9.24
Objective Type Questions 9.27
Short Answer Questions 9.27
Review Questions 9.28

Index **I.1 - I.2**