

TRANSITION OF SOURCE CODE FROM C TO JAVA USING YACC

by

Mak Un Pong

Master of Science in Software Engineering

2000



**Faculty of Science and Technology
University of Macau**

TABLE OF CONTENTS

List of Figures	v
List of Tables	vi
Glossary	viii
List of Abbreviations	x
Chapter 1: INTRODUCTION.....	1
1.1 RUNNING ENVIRONMENT.....	1
Chapter 2: STAGE FOR LANGUAGE TRANSLATION	2
2.1 TYPICAL COMPILER.....	2
2.1.1 The Scanner	2
2.1.2 The Parser	3
2.1.3 Symbol Tables and Error Handlers.....	3
2.1.4. Semantic Checkers.....	3
2.1.5. Code Generator	3
2.2. USING LEX AND YACC FOR LANGUAGE TRANSITION	3
Chapter 3: INTRODUCTION TO C PROGRAMMING.....	4
3.1 STRUCTURE OF C PROGRAMS.....	4
3.1.1 C's Character Set.....	4
3.1.2 Keywords.....	4
3.1.3 The layout of C Programs	4
3.1.4 Preprocessor Directives	5
3.1.5 Comments	5
3.2 VARIABLES, CONSTANTS, OPERATORS, AND EXPRESSION	5
3.2.1 Identifier Names	5
3.2.2 Basic Data Types	6
3.2.3 Type Modifiers	6
3.2.4 Access Modifiers	7
3.2.5 Variables	7
3.3.6 Storage Class Specifiers.....	8
3.2.7 Assignment Statement	8
3.2.8 Arithmetic Operators	9
3.2.9 Relational and Logical Operators	9
3.2.10 Bitwise Operators	10
3.3 PROGRAM CONTROL STATEMENTS	10
3.3.1 Input Statement And Output Statement	10

3.3.2 Control Statements.....	11
3.3.3 Loop.....	12
3.3.4 Functions.....	13
3.4 ARRAYS	15
3.5 POINTERS	16
3.6 STRUCTURES, UNIONS AND USER-DEFINED VARIABLES.....	16
3.6.1 Structures	16
3.6.2 Bit Fields.....	17
3.6.3 Unions.....	17
3.6.4 Enumerations	17
3.6.5 typedef	18
3.7 REFERENCE.....	18
Chapter 4: JAVA.....	19
4.1. JAVA SOURCE FILES	19
4.1.1 Beginning Comments	19
4.1.2 Package and Import Statements	20
4.1.3 Class and Interface Declarations.....	20
4.2 - STATEMENTS	20
4.2.1 Simple Statements.....	20
4.2.2 Compound Statements	20
4.2.3 return Statements	21
4.2.4 if, if-else, if else-if else Statements	21
4.2.5 for Statements	21
4.2.6 while Statements.....	21
4.2.7 do-while Statements.....	22
4.2.8 switch Statements	22
4.2.9 try-catch Statements.....	22
4.3 MAIN FEATURES OF THE JAVA PROGRAMMING LANGUAGE.....	23
4.3.1 Primitive Data Types	23
4.3.2 Arithmetic and Relational Operators	24
4.4 FEATURES REMOVED FROM C AND C++	27
4.4.1 No More Typedefs, Defines, or Preprocessor	27
4.4.2 No More Structures or Unions	27
4.4.3 No Enums	27
4.4.4 No More Functions	27
4.4.5 No More Goto Statements	28
4.4.6 No More Pointers.....	28
4.5 REFERENCE.....	29

Chapter 5: LEX - A LEXICAL ANALYZER GENERATOR	30
5.1 INTRODUCTION	30
5.2 LEX SOURCE	31
5.3 LEX REGULAR EXPRESSIONS.....	32
5.4 LEX ACTIONS	34
5.5 AMBIGUOUS SOURCE RULES	36
5.6 LEX SOURCE DEFINITIONS	37
5.7 USAGE	39
5.8 LEX AND YACC	39
5.9 CHARACTER SET	39
5.10 SUMMARY OF SOURCE FORMAT.....	40
5.12 REFERENCE.....	41
Chapter 6: YACC - YET ANOTHER COMPILER-COMPILER	42
6.1 INTRODUCTION	42
6.2 BASIC SPECIFICATIONS	42
6.3 ACTIONS	44
6.4 LEXICAL ANALYSIS.....	46
6.5 AMBIGUITY AND CONFLICTS	46
6.6 PRECEDENCE.....	48
6.7 ERROR HANDLING	50
6.8 THE YACC ENVIRONMENT.....	52
6.9 REFERENCES	53
Chapter 7: A SIMLE LANGUAGE TRANSLATOR	54
7.1 A TEXT SCANNER.....	54
7.2 SEMANTIC CHECKERS	55
7.3 A SIMPLE TRANSLATOR	57
7.4 AN EXAMPLE CAUSES THE SHIFT/REDUCE CONFLICT.....	60
7.5 REFERENCE.....	60
Chapter 8: TRANSITION TABLE	61
8.1 THE EASY AND DIFFICULT PART TO HANDLE.....	61
8.2 TRANSITION TABLE.....	62
Chapter 9: SYMBOLS TABLE	82
9.1 USING AN HASH TABLE.....	82
9.1.1 Bucket.....	83
9.1.2 Symbol.....	83
9.1.3 Diagram Of Symbols Table	86
9.1.4 Diagram Of A Program Using Hash Table	86
9.1.4 Diagram Of A Program Using Hash Table	87

9.2 THE LIST DATA STRUCTURE FOR SYMBOLS TABLE.....	88
9.3 REFERENCE.....	89
Chapter 10: CODE GENERATION AND ERROR HANDLING.....	90
10.1 A LEXICAL ANALYZERS.....	90
10.2 SYNTACTICAL ANALYSIS	91
10.2.1 Grammars	91
10.2.2 Symbol Values.....	91
10.2.3 Code Generation	91
10.2.4 Symbol Tables	92
10.2.5 Compile and Run the Program.....	94
10.2.4 Result of the program.....	94
10.3 ERROR HANDLING	94
10.4 REFERENCE.....	94
Chapter 11: CONCLUSION	95
11.1 PROBLEMS IN DEVELOPMENT	95
11.2 CONCLUSIION	95
APPENDIX A: GRAMMAR OF C.....	96
APPENDIX B: SOURCE CODE OF LEXICAL ANALYZER - C_LEX.L	101
APPENDIX C: SOURCE CODE OF YACC PARSING PROGRAM - C_YACC.Y	104
APPENDIX D: RESULT OF RUNNING PROGRAM.....	140