BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI
DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION SYSTEMS
Compiler Construction (CS F363)
II Semester 2019-20
Compiler Project (Stage-1 Submission)
Coding Details
(February 24, 2020)

Group No. 31

1. IDs and Names of team members

ID:___2016B4A70933P_____Name:_____MADHUR PANWAR_____

ID:___2016B3A70528P_____Name:_____TUSSANK GUPTA_____

ID:___2016B4A70580P_____Name:_____SALMAAN SHAHID_____

ID:___2016B3A70549P_____Name:_____APURV BAJAJ_____

ID:___2016B5A70452P_____Name:_____HASAN NAQVI_____

2. Mention the names of the Submitted files :

1	lexer.h	**11**	generic_stack.c	**21**	util.c
2	lexer.c	**12**	generic_stack.h	**22**	util.h
3	lexerDef.h	**13**	treeNodePtr_stack.c	**23**	grammar.txt
4	parser.c	**14**	treeNodePtr_stack.h	**24**	gr_hr.txt
5	parser.h	**15**	errorPtr_stack.c	**25**	keywords.txt
6	parserDef.h	**16**	errorPtr_stack.h	**26**	nonTerminals.txt
7	config.h	**17**	set.c	**27**	tokens.txt
8	error.c	**18**	set.h	**28**	makefile
9	error.h	**19**	hash.c	**29**	coding details stage1.pdf
10	driver.c	**20**	hash.h		

Test Case files

30	t1.txt	**34**	t5.txt	**38**	t9.txt
31	t2.txt	**35**	t6.txt	**39**	t10.txt
32	t3.txt	**36**	t7.txt		
33	t4.txt	**37**	t8.txt		

3. Total number of submitted files: ___39_____ (All files should be in **ONE folder** named exactly as Group_#, # is your group number)
4. Have you mentioned your names and IDs at the top of each file (and commented well)? (Yes/ no) ____Yes___ [Note: Files without names will not be evaluated]
5. Have you compressed the folder as specified in the submission guidelines? (yes/no)_____Yes_____

6. **Lexer Details:**

[A]. Technique used for pattern matching: _____DFA_____

[B]. DFA implementation (State transition using switch case, graph, transition table, any other (specify):____

_____Switch Case with each case representing a state of the DFA_____

[C]. Keyword Handling Technique: _____Hash Table and ENUM filled using keywords.txt_____

[D]. Hash function description, if used for keyword handling:_____*djb2* Hash Function which uses Horner's rule for hash computation._____

[E]. Have you used twin buffer? (yes/ no) _____Yes_____

[F]. Lexical error handling and reporting (yes/No):_____Yes_____

[G]. Describe the lexical errors handled by you ____All types of lexical errors_____

[H]. Data Structure Description for tokenInfo (in maximum two lines):

struct tokenInfo { tokenType type; unsigned int lno; char lexeme[101]; union { int num; float rnum; } value; };

Tagged union (tagged with enum tokenType type) within a struct tokenInfo_____

[I]. Interface with parser _____*tokenInfo* getNextToken(FILE *file_ptr)*_____

7. **Parser Details:**

[A]. **High Level Data Structure Description (in maximum three lines each, avoid giving C definitions used):**

i. **grammar** : _An array of grammar nodes with each node containing a left hand side symbol and a head to a linked list containing right hand side symbols of that rule._____

ii. **parse table :** _A two dimensional integer array having number of rows equal to the number of non terminals and number of columns equal to the number of terminals (including $ symbol)_____

iii. **parse tree** (Describe the node structure also) **:**_A linked list based tree of treeNodes with each node containing a token symbol, a tokenInfo returned by lexer (only for terminals), a next pointer to its next sibling, a child pointer to its first child and a parent pointer to its parent._____

iv. **Parsing Stack node structure :** __Each stack node contains the pointer to the node of parse tree and a next pointer which connects it to the stack node below it._____

v. **Any other (specify and describe) :** _In addition to the above, we have an error stack which stores the errors occurring across all compilation phases. Its node contains a pointer to a structure containing error data and a next pointer which connects it to the stack node below it (errors are pushed to the stack in their order of occurrence)._____

[B]. **Parse tree**

i. Constructed (yes/no):___Yes____

ii. Printing as per the given format (yes/no): ___Yes____

iii. Describe the order you have adopted for printing the parse tree nodes (in maximum two lines)

Inorder traversal is used to print the n-ary parse tree. A node is printed only when its leftmost child has been printed inorder (recursive call) and then each of its remaining children are printed inorder (recursive calls to each child).

[C]. **Grammar and Computation of First and Follow Sets**

i. **Data structure for original grammar rules** _Array of a structure containing symbol of left hand side non-terminal and head pointers to linked lists representing right hand sides of productions._

ii. **FIRST and FOLLOW sets computation automated (yes /no)**_____Yes_____

iii. **Data structure for representing sets** _____*unsigned long long int*_____

iv. Time complexity of computing FIRST sets :

__$O(|GrammarRules| * max\{|rhsOfProduction|\} * |Terminals| * |NonTerminals|)$ __

[Assuming constant time for set union, implemented as *bitwiseOR* of two *unsigned long long ints*.]_

v. **Name the functions (if automated) for computation of First and Follow sets:**

_____*populateFirstSet()* and *populateFollowSet()* respectively._____

vi. **If computed First and Follow sets manually and represented in file/function (name that)** _N.A._

[D]. **Error Handling**

i. **Attempted (yes/ no):**_____Yes_____

ii. **Printing errors (All errors/ one at a time) :**_____All Errors_____

iii. **Describe the types of errors handled**

1. Lexical Error when the lexeme does not conform to any of the valid patterns.
2. Syntax Error when the non-terminal on top of the stack cannot produce the token in the input stream.
3. Syntax Error when the terminal on the top of the stack does not match the token in the input stream.
4. Syntax Error when the parsing stack is non-empty but input stream has been read completely.

iv. **Synchronizing tokens for error recovery (describe):** _For every non-terminal, the synchronizing set is constructed by *union of a default set of tokens* (common for all non-terminals) *and follow set of that non-terminal*._____

v. **Total number of errors detected in the given testcase t6(with_syntax_errors).txt** :

_____All errors: 2 Lexical Errors and 10 Syntax Errors_____

8. **Compilation Details:**

   [A]. **Makefile works (yes/no):**_____Yes_____

   [B]. **Code Compiles (yes/ no):**_____Yes_____

   [C]. **Mention the .c files that do not compile:**_____N.A._____

   [D]. **Any specific function that does not compile:**_____N.A._____

   [E]. **Ensured the compatibility of your code with the specified gcc version(yes/no)**____Yes_____

9. **Driver Details**: **Does it take care of the options specified earlier(yes/no):**_____Yes_____

10. **Execution**

    [A]. **status (describe in maximum 2 lines):**__The complete code, post build, executes as expected, displaying the driver menu and performs in desired manner depending on user input._____

    [B]. **Execution time taken for**

    - t1.txt (in ticks) _____209.00_____ and (in seconds) _____0.000209_____
    - t2.txt (in ticks) _____115.00_____ and (in seconds) _____0.000115_____
    - t3.txt (in ticks) _____179.00_____ and (in seconds) _____0.000179_____
    - t4.txt (in ticks) _____365.00_____ and (in seconds) _____0.000365_____
    - t5.txt (in ticks) _____419.00_____ and (in seconds) _____0.000419_____
    - t6.txt (in ticks) _____469.00_____ and (in seconds) _____0.000469_____

    [C]. **Gives segmentation fault with any of the test cases (1-6) uploaded on the course page. If yes, specify the testcase file name:**_____No Segmentation fault_____

11. **Specify the language features your lexer or parser is not able to handle (in maximum one line)**_____N.A._____

12. **Are you availing the lifeline (Yes/No):** _____No_____

13. **Declaration:** We, **MADHUR PANWAR, TUSSANK GUPTA, SALMAAN SHAHID, APURV BAJAJ** and **HASAN NAQVI** declare that we have put our genuine efforts in creating the compiler project code and have submitted the code developed only by our group. We have not copied any piece of code from any source. If our code is found plagiarized in any form or degree, we understand that a disciplinary action as per the institute rules will be taken against us and we will accept the penalty as decided by the department of Computer Science and Information Systems, BITS, Pilani. [Write your ID and names below]

ID:___**2016B4A70933P**_____Name:_____**MADHUR PANWAR**_____
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ID:___**2016B3A70549P**_____Name:_____**APURV BAJAJ**_____
ID:___**2016B5A70452P**_____Name:_____**HASAN NAQVI**_____

Date: ____24/02/2020____