T.Y.B.Tech (CSE)

System Software and Compilers(SSC)

Lab Assignment No – 7

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Subject :- SSC

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Validation of Control stmt

Title:- Validation of compound stmt using LEX & YACC tool:

Problem Statement:- Write a program using LEX & YACC to validate compound statements in High Level Language.

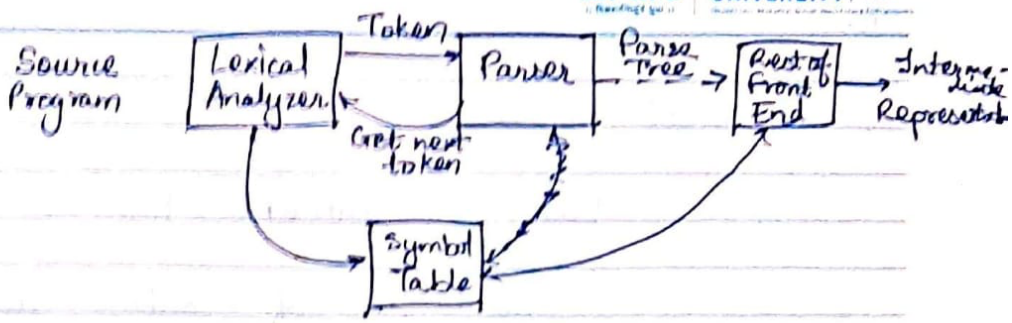
Objective:-

① To study YACC tools for syntax analysis.
② To master YACC utility.

Theory:-

1. Write about the syntax analysis phase of the compiler.

Ans:1. The main objective of syntax ~~analysis~~ analysis phase is checking whether the token stream meets the grammatical specification of language & generates the syntax tree.



2. Description of Each Section of *.y file with example-

Ans.2: YACC input file is saved with *.y extension.

It contains 3 sections:

```
/* definitions */ .....
%. %. rules */
%. %.
/* auxilary routines */
```

Definition Part: It includes information about the tokens used in syntax definition.

Eg:- %. token NUMBER 627

Rules Part: It includes information about the tokens used in the ~~syntax definition~~ & grammar definition in a modified BNF form actions in C code in {} & can be embedded inside {Translation schemes}.

Auxilary Routines Part: It is only C code. It include function definitions for every function needed in rules part. It can also main () function definition.

3. Description of standard inbuilt variables & functions like yylval, yyparse(), yyerror().

Ans 3: ⓐ yylval(): This function gives value associated with that token.
ⓑ yyerror(): It returns a value 0 if the input it parser is valid according to the given grammar rules. It return value 1 if the input is incorrect & error recovery is impossib
ⓒ yyerror(): The YACC passes one argument to this function: a character string describing the type of error that just took place.

4. Compilation & Execution Process.

Ans 4: Compilation :-

```
flex prog.l
bison -dy prog.y
gcc lex.yy.c y.tab.c
```

Execution :-

```
./a.out
```

Input:- Source specification (*.y) file for loop stmt like if statements, while & do-while stmts.

Output:- Parser for validation of compound statement is successfully done.

Platform:- Linux (Lex & YACC)

Conclusion:- Parser for validation of compound statement is successfully done.

FAQ's:-

1. What is the role of y.tab.h file?

Ans:1. This file is generated which contains definitions of token names.

2. Explain YACC tool.

Ans:2. YACC stands for Yet Another Compiler Compiler. YACC provides a tool to produce a parser for a given grammar. It is used to produce the source code of the syntactic analyzer of the language produced by LALR(1) grammas. YACC is a program designed to compile a LALR(1) grammar.

Code & Output:

lab7.l :

```
{%
include "y.tab.h"
extern int yyerror(char *str);
extern int yyparser();
%}

%%

"while" return WH;
"if" return IF;
"do" return DO;
"for" return FOR;
"(" return OP;
")" return CP;
"{" return OCB;
"}" return CCB;
"<" | ">" | "<=" | ">=" | "==" | "!=" return CMP;
"+" | "/" | "-" | "*" return OPR;
"=" return ASG;
([a-zA-Z])("_"|[a-zA-Z0-9])* return ID;
[0-9]+ return NUM;
";" return SC;
"," return COMMA;
" " {}

int yywrap(){
   return 1;
}
```

lab7.y :

```
{%
#include<stdio.h>
extern int yylex();
extern int yywrap();
extern int yyparse();
%}

%token WH IF DO FOR OP CP OCB CCB CMP SC ADG ID NUM COMMA OPR

%%
start: swh | mwh | dowh | sif | mif;
swh: WH OP cmpn CP stmt                    {printf("VALID SINGLE STATEMENT
WHILE LOOP\n");};
```

```
mwh: WH OP cmpn CP OCB stmt CCB                {printf("VALID MULTI STATEMENT
WHILE LOOP\n");};
dowh: DO OCB stmt CCB WH OP cmpn CP SC     {printf("VALID DO-WHILE
LOOP\n");};
sid: IF OP cmpn CP stmt                        {printf("VALID SINGLE STATEMENT
IF\n");};
mif: OF OP cmpn CP OCB stmt CCB                {printf("VALID MULTIPLE
STATEMENT IF");};

cnob: ID CMP ID | ID CMP NUM;

stmt: ID ASG ID OPR ID SC | ID ASG ID OPR NUM SC | ID ADG NUM OPR ID SC | ID
ADG NUM OPR NUM SC | ID ASG NUM | start {printf("NESTED INSIDE A ");}

%%

int yyerror(char *str) {
        printf("%s", str);
}

main() {
        yyparse();
}
```

Output: