National Institute Of Technology Surathkal Mangalore Karnataka-575025

Department Of Information Technology

Lab Assignment :- 06

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Roll Number:- 211IT017

Branch:- Information Technology (B.Tech)

Section :- S13

Course:- Automata And Compiler Design (IT251)

Submitted To:-

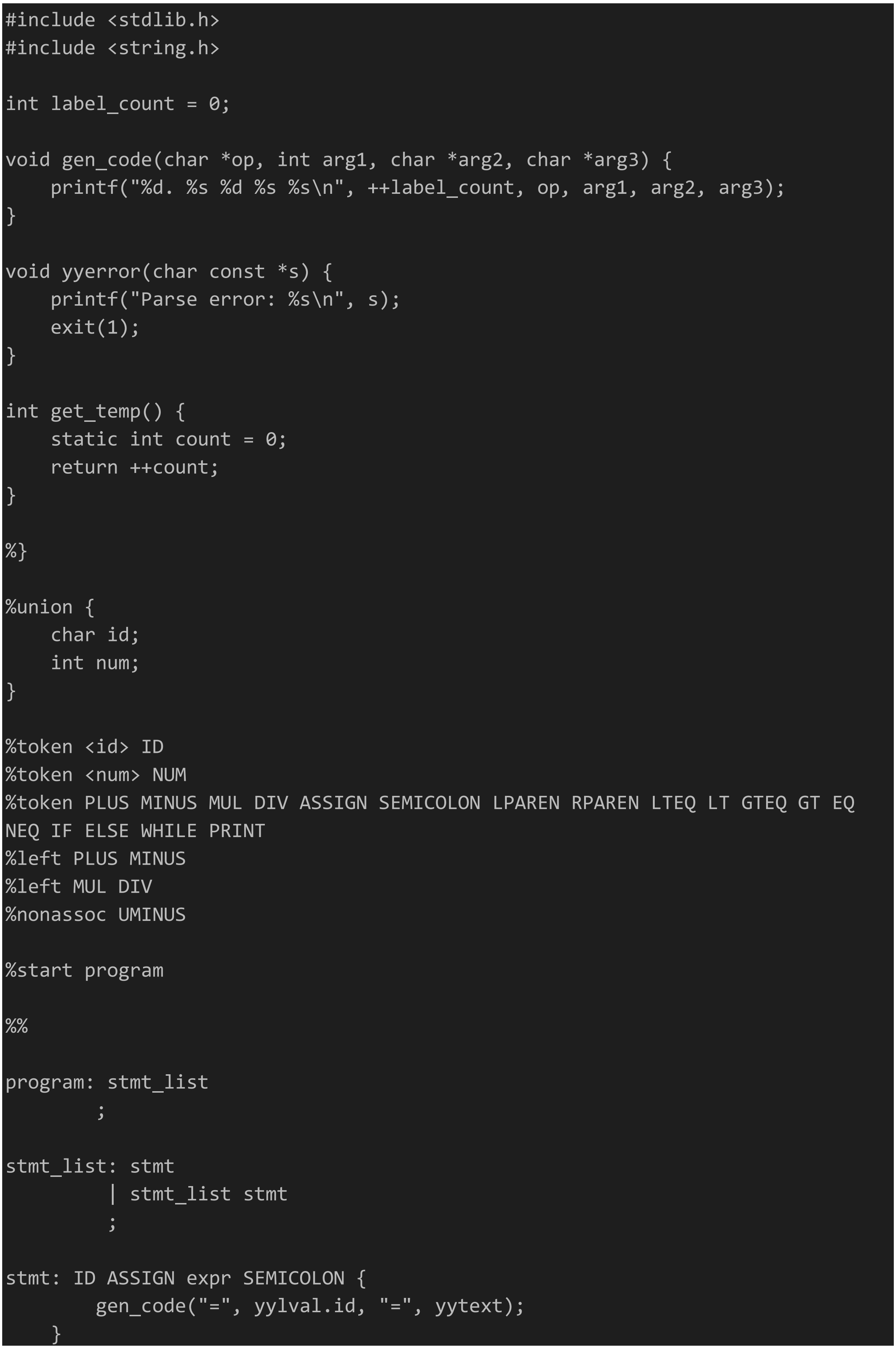
Anupama H C Mam

Lex.l

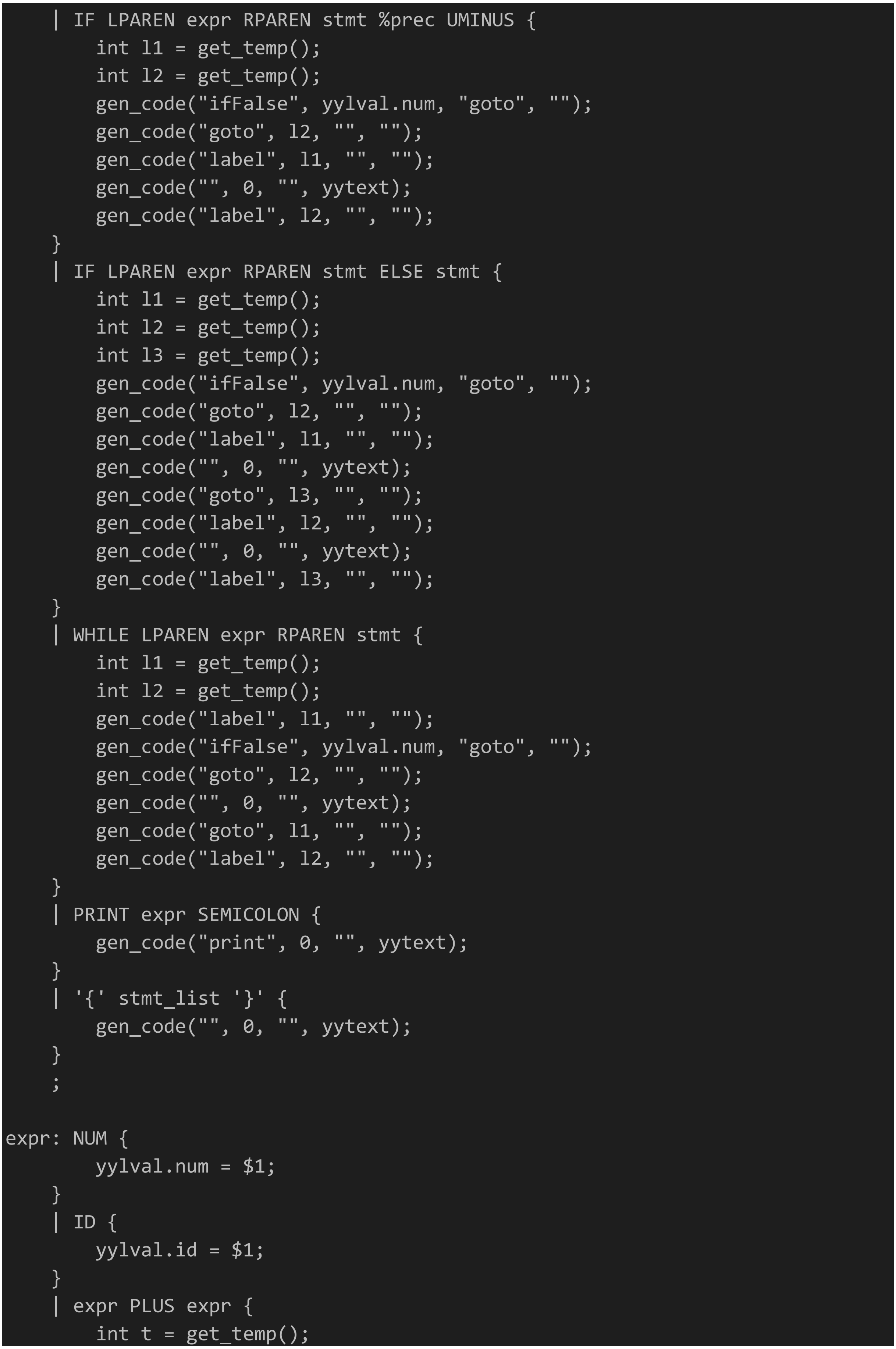
```
%{
#include <stdio.h>
#include "y.tab.h"
%}

DIGIT [0-9]
LETTER [a-zA-Z]
WHITESPACE [ \t\n]

%%

{DIGIT}+                { yylval.num = atoi(yytext); return NUM; }
{LETTER}                { yylval.id = yytext[0]; return ID; }
{WHITESPACE}+           /* Ignore whitespace */
"+"                     { return PLUS; }
"-"                     { return MINUS; }
"*"                     { return MUL; }
"/"                     { return DIV; }
"="                     { return ASSIGN; }
";"                     { return SEMICOLON; }
"("                     { return LPAREN; }
")"                     { return RPAREN; }
"<="                    { return LTEQ; }
"<"                     { return LT; }
">="                    { return GTEQ; }
">"                     { return GT; }
"=="                    { return EQ; }
"!="                    { return NEQ; }
"if"                    { return IF; }
"else"                  { return ELSE; }
"while"                 { return WHILE; }
"print"                 { return PRINT; }
.                       { printf("Invalid character %c\n", *yytext); }

%%

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

Yacc.y

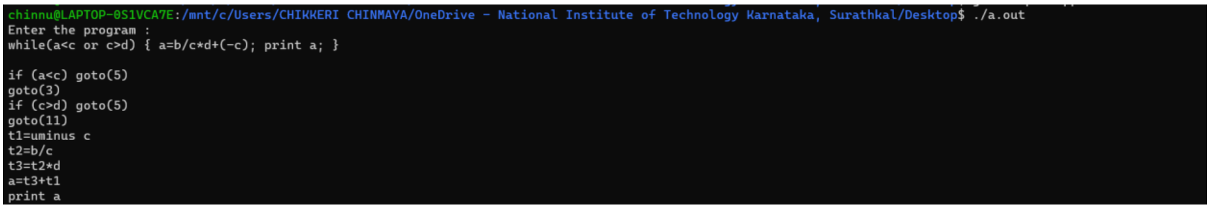
```
%{
#include <stdio.h>
```



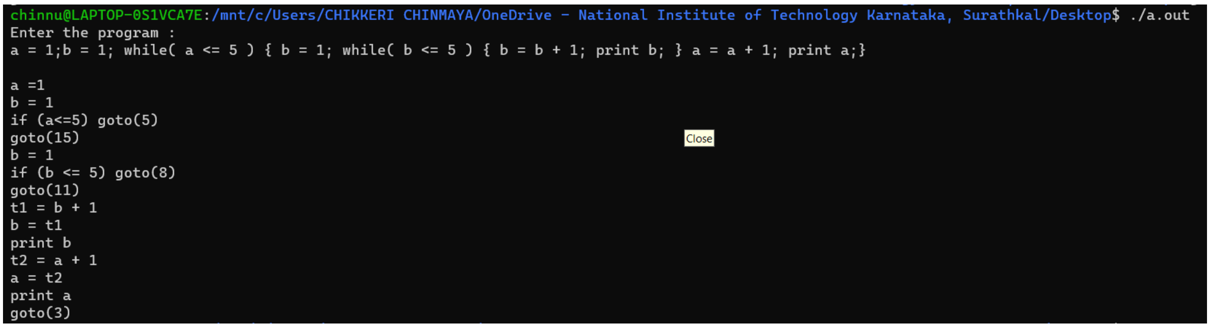
```
#include <stdlib.h>
#include <string.h>

int label_count = 0;

void gen_code(char *op, int arg1, char *arg2, char *arg3) {
    printf("%d. %s %d %s %s\n", ++label_count, op, arg1, arg2, arg3);
}

void yyerror(char const *s) {
    printf("Parse error: %s\n", s);
    exit(1);
}

int get_temp() {
    static int count = 0;
    return ++count;
}

%}

%union {
    char id;
    int num;
}

%token <id> ID
%token <num> NUM
%token PLUS MINUS MUL DIV ASSIGN SEMICOLON LPAREN RPAREN LTEQ LT GTEQ GT EQ
NEQ IF ELSE WHILE PRINT
%left PLUS MINUS
%left MUL DIV
%nonassoc UMINUS

%start program

%%

program: stmt_list
        ;

stmt_list: stmt
         | stmt_list stmt
         ;

stmt: ID ASSIGN expr SEMICOLON {
        gen_code("=", yylval.id, "=", yytext);
    }
```



```
    | IF LPAREN expr RPAREN stmt %prec UMINUS {
        int l1 = get_temp();
        int l2 = get_temp();
        gen_code("ifFalse", yylval.num, "goto", "");
        gen_code("goto", l2, "", "");
        gen_code("label", l1, "", "");
        gen_code("", 0, "", yytext);
        gen_code("label", l2, "", "");
    }
    | IF LPAREN expr RPAREN stmt ELSE stmt {
        int l1 = get_temp();
        int l2 = get_temp();
        int l3 = get_temp();
        gen_code("ifFalse", yylval.num, "goto", "");
        gen_code("goto", l2, "", "");
        gen_code("label", l1, "", "");
        gen_code("", 0, "", yytext);
        gen_code("goto", l3, "", "");
        gen_code("label", l2, "", "");
        gen_code("", 0, "", yytext);
        gen_code("label", l3, "", "");
    }
    | WHILE LPAREN expr RPAREN stmt {
        int l1 = get_temp();
        int l2 = get_temp();
        gen_code("label", l1, "", "");
        gen_code("ifFalse", yylval.num, "goto", "");
        gen_code("goto", l2, "", "");
        gen_code("", 0, "", yytext);
        gen_code("goto", l1, "", "");
        gen_code("label", l2, "", "");
    }
    | PRINT expr SEMICOLON {
        gen_code("print", 0, "", yytext);
    }
    | '{' stmt_list '}' {
        gen_code("", 0, "", yytext);
    }
    ;

expr: NUM {
        yylval.num = $1;
    }
    | ID {
        yylval.id = $1;
    }
    | expr PLUS expr {
        int t = get_temp();
        gen_code("+", t, yytext, yytext);
        yylval.num = t;
    }
    | expr MINUS expr {
        int t = get_temp();
        gen_code("-", t, yytext, yytext);
        yylval.num = t;
    }
    | expr MUL expr {
        int t = get_temp();
        gen_code("*", t, yytext, yytext);
        yylval.num = t;
    }
    | expr DIV expr {
        int t = get_temp();
        gen_code("/", t, yytext, yytext);
        yylval.num = t;
    }
    | expr LT expr {
        int t = get_temp();
        gen_code("<", t, yytext, yytext);
        yylval.num = t;
    }
    | expr GT expr {
        int t = get_temp();
        gen_code(">", t, yytext, yytext);
        yylval.num = t;
    }
    | expr LTEQ expr {
        int t = get_temp();
        gen_code("<=", t, yytext, yytext);
        yylval.num = t;
    }
    | expr GTEQ expr {
        int t = get_temp();
        gen_code(">=", t, yytext, yytext);
        yylval.num = t;
    }
    | expr EQ expr {
        int t = get_temp();
        gen_code("==", t, yytext, yytext);
        yylval.num = t;
    }
    | expr NEQ expr {
        int t = get_temp();
        gen_code("!=", t, yytext, yytext);
        yylval.num = t;
    }
    | LPAREN expr RPAREN
    | MINUS expr %prec UMINUS {
        int t = get_temp();
        gen_code("uminus", t, yytext, "");
        yylval.num = t;
    }
;

%%

int main() {
yyparse();
return 0;
}
```



```
chinnu@LAPTOP-0S1VCA7E:/mnt/c/Users/CHIKKERI CHINMAYA/OneDrive - National Institute of Technology Karnataka, Surathkal/Desktop$ ./a.out
Enter the program :
while(a<c or c>d) { a=b/c*d+(-c); print a; }

if (a<c) goto(5)
goto(3)
if (c>d) goto(5)
goto(11)
t1=uminus c
t2=b/c
t3=t2*d
a=t3+t1
print a
```



```
chinnu@LAPTOP-0S1VCA7E:/mnt/c/Users/CHIKKERI CHINMAYA/OneDrive - National Institute of Technology Karnataka, Surathkal/Desktop$ ./a.out
Enter the program :
a = 1;b = 1; while( a <= 5 ) { b = 1; while( b <= 5 ) { b = b + 1; print b; } a = a + 1; print a;}

a =1
b = 1
if (a<=5) goto(5)
goto(15)
b = 1
if (b <= 5) goto(8)
goto(11)
t1 = b + 1
b = t1
print b
t2 = a + 1
a = t2
print a
goto(3)
```