॥वसुधैव कुटुम्बकम्॥

SYMBIOSIS INSTITUTE OF TECHNOLOGY, PUNE

Symbiosis International (Deemed University)

(Established under section 3 of the UGC Act, 1956)

Re-accredited by NAAC with 'A' grade (3.58/4) | Awarded Category – I by UGC

Founder: Prof. Dr. S. B. Mujumdar, M. Sc., Ph. D. (Awarded Padma Bhushan and Padma Shri by President of India)

Assignment No. 09

Subject:	Compiler Construction Lab
Name of Student	**Onkar Mendhapurkar**
PRN No.	**22070122135**
Branch	CSE B2, Batch (2022-26)
Academic Year & Semester	2022-26
Date of Performance	25/09/2025
Title of Assignment:	Parser for "FOR" loop statements.
Practice Questions	1. YACC program for parser for "FOR" loop statements. 2. YACC program for checking syntax for a While loop. **PostLab Question** 3. YACC program for checking syntax for a Switch case
Source Code	**1.** **forloop.l**

```
%{
#include "forloop.tab.h"
%}

%%

for             { return FOR; }
[0-9]+          { return NUMBER; }
[a-zA-Z_][a-zA-Z0-9_]*  { return ID; }
"="             { return '='; }
"<"             { return '<'; }
">"             { return '>'; }
"<="            { return LE; }
">="            { return GE; }
```

```
"=="            { return EQ; }
"!="            { return NE; }
"++"            { return INC; }
"--"            { return DEC; }
"+"             { return '+'; }
"-"             { return '-'; }
"*"             { return '*'; }
"/"             { return '/'; }
";"             { return ';'; }
"("             { return '('; }
")"             { return ')'; }
"{"             { return '{'; }
"}"             { return '}'; }
[ \t\n]         { /* ignore whitespace */ }
.               { printf("Unknown character: %s\n", yytext); }

%%

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

forloop.y

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

int yylex();
void yyerror(const char *s);
%}

%token FOR ID NUMBER INC DEC EQ LE GE NE
%left '+' '-'
%left '*' '/'

%%

program:
      /* empty */
    | program stmt
    ;

stmt:
      for_stmt
    ;
```

```
for_stmt:
      FOR '(' init_expr ';' cond_expr ';' update_expr ')' '{' stmt_list '}'
        { printf("Valid FOR loop detected\n"); }
    ;

init_expr:
      ID '=' NUMBER
    ;

cond_expr:
      ID '<' NUMBER
    | ID '>' NUMBER
    | ID LE NUMBER
    | ID GE NUMBER
    | ID EQ NUMBER
    | ID NE NUMBER
    ;

update_expr:
      ID INC
    | ID DEC
    ;

stmt_list:
      /* empty */
    | stmt_list stmt
    ;

%%

void yyerror(const char *s) {
    fprintf(stderr, "Syntax Error: %s\n", s);
}

int main() {
    printf("Enter FOR loop statement:\n");
    yyparse();
    return 0;
}
```

2.

whileloop.l

```
%{
#include "whileloop.tab.h"
%}

%%

while          { return WHILE; }
[0-9]+         { return NUMBER; }
[a-zA-Z_][a-zA-Z0-9_]*  { return ID; }
"="            { return '='; }
"<"            { return '<'; }
">"            { return '>'; }
"<="           { return LE; }
">="           { return GE; }
"=="           { return EQ; }
"!="           { return NE; }
"+"            { return '+'; }
"-"            { return '-'; }
"*"            { return '*'; }
"/"            { return '/'; }
";"            { return ';'; }
"("            { return '('; }
")"            { return ')'; }
"{"            { return '{'; }
"}"            { return '}'; }
[ \t\n]        { /* ignore whitespace */ }
.              { printf("Unknown character: %s\n", yytext); }

%%

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

whileloop.y

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

int yylex();
void yyerror(const char *s);
%}

%token WHILE ID NUMBER EQ LE GE NE
%left '+' '-'
%left '*' '/'
```

```
%%

program:
      /* empty */
    | program stmt
    ;

stmt:
      while_stmt
    | assign_stmt
    ;

while_stmt:
      WHILE '(' cond_expr ')' '{' stmt_list '}'
        { printf("Valid WHILE loop detected\n"); }
    ;

assign_stmt:
      ID '=' NUMBER ';'
    ;

cond_expr:
      ID '<' NUMBER
    | ID '>' NUMBER
    | ID LE NUMBER
    | ID GE NUMBER
    | ID EQ NUMBER
    | ID NE NUMBER
    ;

stmt_list:
      /* empty */
    | stmt_list stmt
    ;

%%

void yyerror(const char *s) {
    fprintf(stderr, "Syntax Error: %s\n", s);
}

int main() {
    printf("Enter WHILE loop statement:\n");
    yyparse();
    return 0;
}
```

3.

switch.l

```
%{
#include "switch.tab.h"
%}

%%

switch          { return SWITCH; }
case            { return CASE; }
default         { return DEFAULT; }
[0-9]+          { return NUMBER; }
[a-zA-Z_][a-zA-Z0-9_]*  { return ID; }
"="             { return '='; }       /* ADDED */
":"             { return ':'; }
";"             { return ';'; }
"{"             { return '{'; }
"}"             { return '}'; }
"("             { return '('; }
")"             { return ')' ;}
[ \t\n]         { /* ignore whitespace */ }
.               { printf("Unknown character: %s\n", yytext); }

%%

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

switch.y

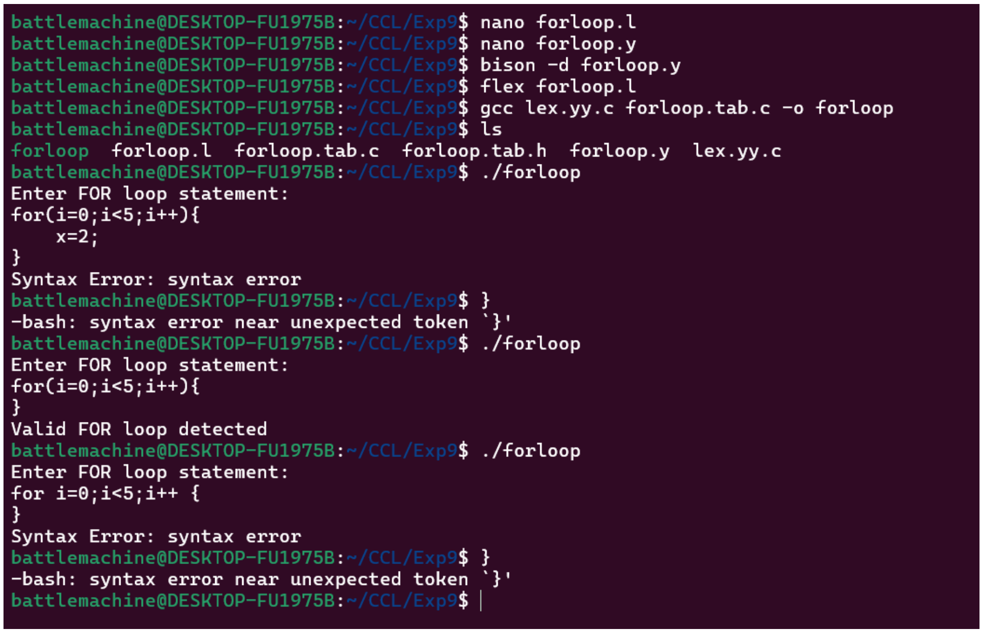
```
%{
#include <stdio.h>
#include <stdlib.h>

int yylex();
void yyerror(const char *s);
%}

%token SWITCH CASE DEFAULT ID NUMBER
```

```
%%

program:
      /* empty */
    | program stmt
    ;

stmt:
      switch_stmt
    ;

switch_stmt:
      SWITCH '(' ID ')' '{' case_list default_case_opt '}'
        { printf("Valid SWITCH statement detected\n"); }
    ;

case_list:
      /* empty */
    | case_list case_stmt
    ;

case_stmt:
      CASE NUMBER ':' stmt_list
    ;

default_case_opt:
      /* empty */
    | DEFAULT ':' stmt_list
    ;

stmt_list:
      /* empty */
    | stmt_list simple_stmt
    ;

simple_stmt:
      ID '=' NUMBER ';'
    ;

%%

void yyerror(const char *s) {
    fprintf(stderr, "Syntax Error: %s\n", s);
}
```

```
int main() {
    printf("Enter SWITCH statement:\n");
    yyparse();
    return 0;
}
```

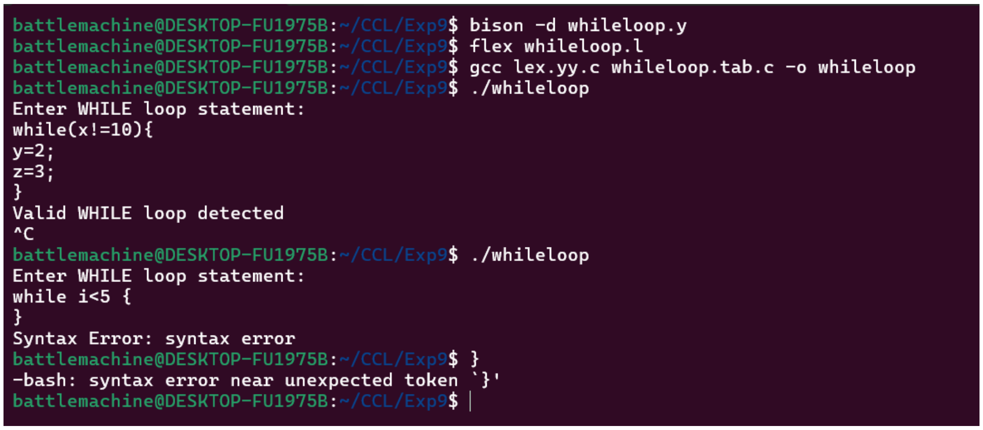
Output Screenshot

1.



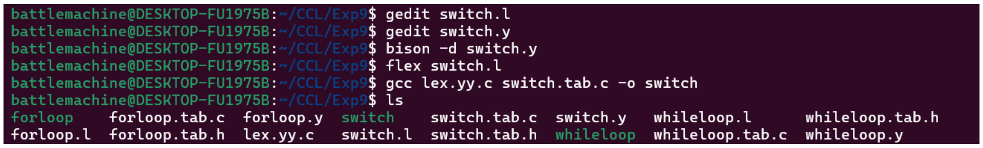
```
battlemachine@DESKTOP-FU1975B:~/CCL/Exp9$ nano forloop.l
battlemachine@DESKTOP-FU1975B:~/CCL/Exp9$ nano forloop.y
battlemachine@DESKTOP-FU1975B:~/CCL/Exp9$ bison -d forloop.y
battlemachine@DESKTOP-FU1975B:~/CCL/Exp9$ flex forloop.l
battlemachine@DESKTOP-FU1975B:~/CCL/Exp9$ gcc lex.yy.c forloop.tab.c -o forloop
battlemachine@DESKTOP-FU1975B:~/CCL/Exp9$ ls
forloop  forloop.l  forloop.tab.c  forloop.tab.h  forloop.y  lex.yy.c
battlemachine@DESKTOP-FU1975B:~/CCL/Exp9$ ./forloop
Enter FOR loop statement:
for(i=0;i<5;i++){
    x=2;
}
Syntax Error: syntax error
battlemachine@DESKTOP-FU1975B:~/CCL/Exp9$ }
-bash: syntax error near unexpected token `}'
battlemachine@DESKTOP-FU1975B:~/CCL/Exp9$ ./forloop
Enter FOR loop statement:
for(i=0;i<5;i++){
}
Valid FOR loop detected
battlemachine@DESKTOP-FU1975B:~/CCL/Exp9$ ./forloop
Enter FOR loop statement:
for i=0;i<5;i++ {
}
Syntax Error: syntax error
battlemachine@DESKTOP-FU1975B:~/CCL/Exp9$ }
-bash: syntax error near unexpected token `}'
battlemachine@DESKTOP-FU1975B:~/CCL/Exp9$ 
```

2.



```
battlemachine@DESKTOP-FU1975B:~/CCL/Exp9$ bison -d whileloop.y
battlemachine@DESKTOP-FU1975B:~/CCL/Exp9$ flex whileloop.l
battlemachine@DESKTOP-FU1975B:~/CCL/Exp9$ gcc lex.yy.c whileloop.tab.c -o whileloop
battlemachine@DESKTOP-FU1975B:~/CCL/Exp9$ ./whileloop
Enter WHILE loop statement:
while(x!=10){
y=2;
z=3;
}
Valid WHILE loop detected
^C
battlemachine@DESKTOP-FU1975B:~/CCL/Exp9$ ./whileloop
Enter WHILE loop statement:
while i<5 {
}
Syntax Error: syntax error
battlemachine@DESKTOP-FU1975B:~/CCL/Exp9$ }
-bash: syntax error near unexpected token `}'
battlemachine@DESKTOP-FU1975B:~/CCL/Exp9$ 
```

3. PostLab Experiment



```
battlemachine@DESKTOP-FU1975B:~/CCL/Exp9$ gedit switch.l
battlemachine@DESKTOP-FU1975B:~/CCL/Exp9$ gedit switch.y
battlemachine@DESKTOP-FU1975B:~/CCL/Exp9$ bison -d switch.y
battlemachine@DESKTOP-FU1975B:~/CCL/Exp9$ flex switch.l
battlemachine@DESKTOP-FU1975B:~/CCL/Exp9$ gcc lex.yy.c switch.tab.c -o switch
battlemachine@DESKTOP-FU1975B:~/CCL/Exp9$ ls
forloop    forloop.tab.c  forloop.y  switch    switch.tab.c  switch.y   whileloop.l      whileloop.tab.h
forloop.l  forloop.tab.h  lex.yy.c   switch.l  switch.tab.h  whileloop  whileloop.tab.c  whileloop.y
```

<table>
<tr>
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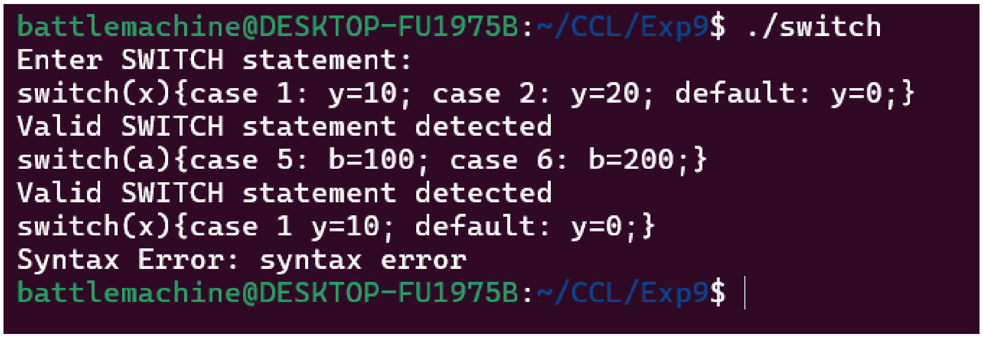

```
battlemachine@DESKTOP-FU1975B:~/CCL/Exp9$ ./switch
Enter SWITCH statement:
switch(x){case 1: y=10; case 2: y=20; default: y=0;}
Valid SWITCH statement detected
switch(a){case 5: b=100; case 6: b=200;}
Valid SWITCH statement detected
switch(x){case 1 y=10; default: y=0;}
Syntax Error: syntax error
battlemachine@DESKTOP-FU1975B:~/CCL/Exp9$ 
```

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<tr>
<td>Conclusion</td>
<td>These experiments demonstrate syntax checking and parsing of control structures FOR loops, WHILE loops, and SWITCH statements using YACC and LEX, validating correct structure and detecting errors in C-style programs.</td>
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