LAB REPORT

COMPILER DESIGN

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BCSE III(A2)

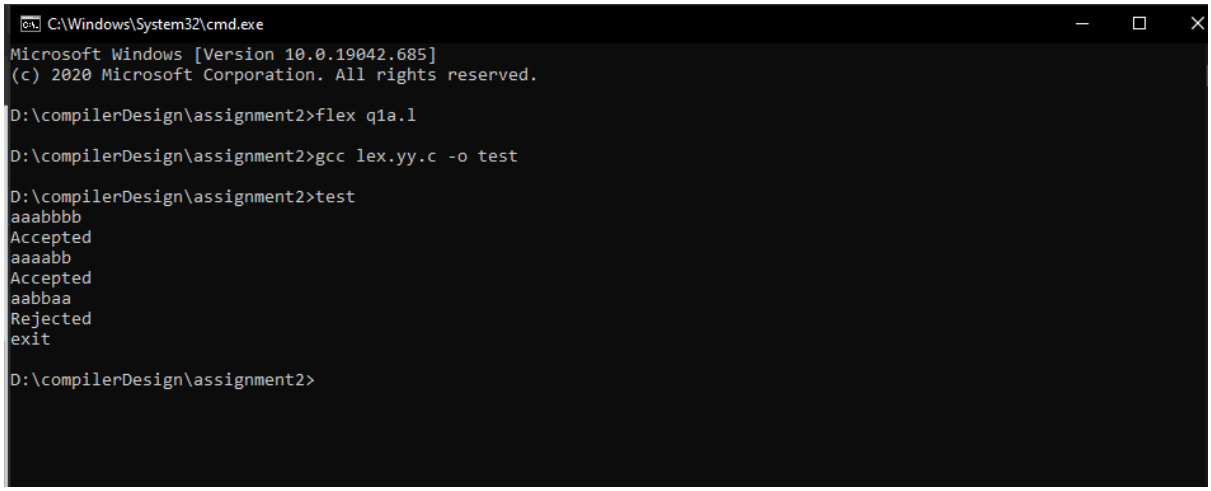
Q1a. Design a grammar to recognise a string of the form AA...ABB...B, i.e. any number of As followed by any number of Bs. Use LEX or YACC to recognise it.

q1a.l

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

%%
\n     { return 1; }
[a]+[b]+\n  {  return 0; }   /*one or more matches and * means zero or more matches*/
exit  { exit(0); }
.       ;

%%
int yywrap() { return 0; }

int main(){
        int temp;
        while(1) {
                temp = yylex(); /*reads characters from file* file pointer called yyin.*/
```

```
            if(!temp) printf("Accepted!! It is of form
a^nb^m\n");
            else printf("Rejected!! It is NOT of form a^nb^m\n");
        }
        return 0;
}
```

OUTPUT

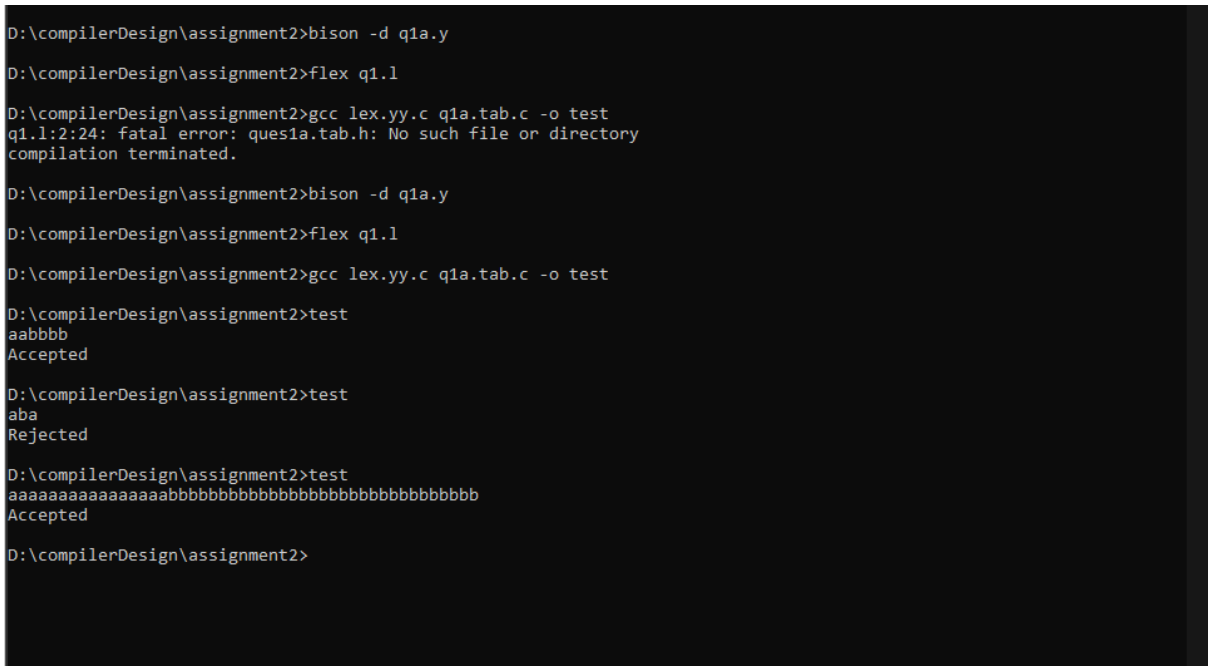


q1a.y

```
%{
#include<stdio.h>
#include<stdlib.h>
int yyerror (char *s);
int yylex();
%}
%token a b


%%

s : as bs ;
as      : a | as a ;
bs      : b | bs b ;

%%

int yywrap() { return 1; } /*yywrap is called at the end of the file*/
int yyerror(char *s) {
        printf("Rejected!! It is NOT of form a^nb^m");
        exit(0);
```

```
}
int main() {
	yyparse();/*yyparse() reads a stream of token/value pairs from yylex(),*/
	printf("Accepted!! It is of form a^nb^m\n");
	return 0;
}
```

OUTPUT



Conclusion- I think the lex version is much simpler, so I would use lex.

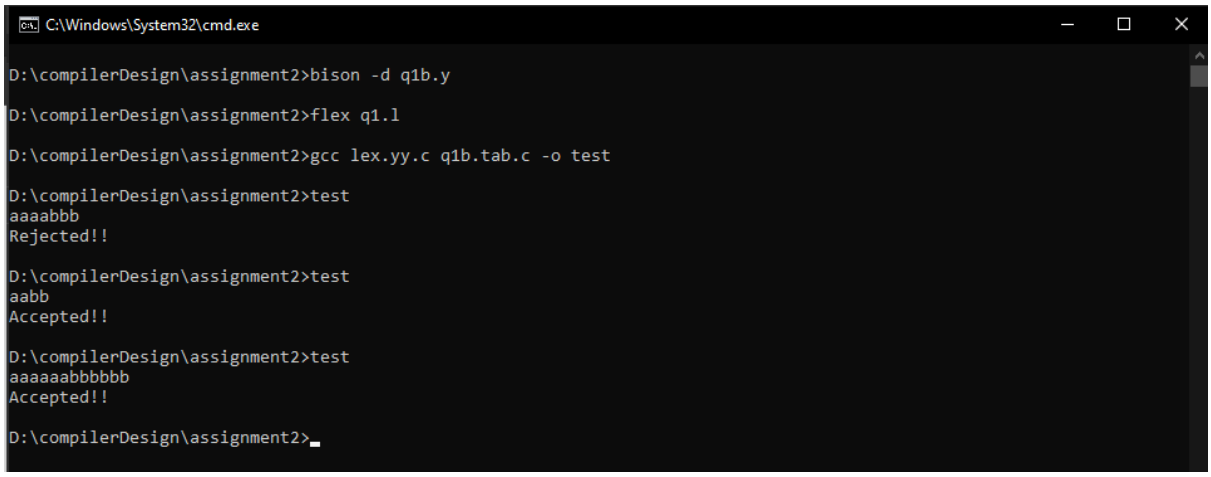
Q1b. Change your grammar to recognise strings with equal numbers of As and Bs - now which one is better?

q1b.l

```
%{
#include<stdio.h>
#include<stdlib.h>
int yyerror (char *s);
int yylex();
%}

%token a b

%%
s : a s b | a b ;
%%

int yywrap() { return 1; }
int yyerror(char *s) {
        printf("Rejected!! It is NOT of form a^nb^n");
        exit(0);
}
```

```
int main() {
        yyparse();
        printf("Accepted!! It is of form a^nb^n\n");
        return 0;
```

OUTPUT



Conclusion-The best Lex can do is as done in previous part, and then count the 'a's and 'b's in the action to make sure they match.

Yacc e.g.:

```
a_b : 'a' a_b 'b' | 'a' 'b' ;
```

I would use the Yacc version.

Q2. Write the lex file and the yacc grammar for an expression calculator. You need to deal with

i) Binary operators ‘+’, ‘*’, ‘-’;

ii) Uniary operator ‘-’;

iii) Boolean operators ‘&’, ‘|’

iv) Expressions will contain both integers and floating point numbers (up to 2 decimal places).

Consider left associativity and operator precedence by order of specification in yacc.

q2.l

```
%{
 #include "ques2.tab.h"
 extern int yylval;
%}

%%

[0-9]+ {yylval = atoi(yytext); return id;}
\n { return 0;}
[' '\t]+ {;}
. { return yytext[0];}

%%
```

q2.y

```
%{
#include<stdio.h>
#include<stdlib.h>
int yylex(void);
int yyerror(char *);
%}

%token  id
%left '+' '-'
%left '*' '/'
%left '(' ')'
%left neg

%%
E1  : E { printf("The resultant value is %d\n", $1);}

E   : E '+' E { $$ = $1 + $3;}
        | E '-' E { $$ = $1 - $3;}
        | E '*' E { $$ = $1 * $3;}
        | E '/' E { $$ = $1 / $3;}
        | '-' E %prec neg{ $$ = -1 * $2;}
        | '(' E ')' { $$ = $2;}
        | id { $$ = $1;}
```

```
        ;
%%



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

int yywrap(){}

int yyerror( char* s){
        printf("You entered an invalid expression\n");
        exit(0);
}
```

OUTPUT

```
D:\compilerDesign\assignment2>bison -d q2.y

D:\compilerDesign\assignment2>flex q2.l

D:\compilerDesign\assignment2>gcc lex.yy.c q2.tab.c -o test

D:\compilerDesign\assignment2>test
-6 * -11
The resultant value is 66

D:\compilerDesign\assignment2>test
98 - 90 + 5 * 70
The resultant value is 358

D:\compilerDesign\assignment2>test
68 * 69
The resultant value is 4692

D:\compilerDesign\assignment2>
```