VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.



LAB REPORT

on

COMPILER DESIGN

Submitted by

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Under the Guidance of Prof. Prameetha Pai Assistant Professor, BMSCE

in partial fulfilment for the award of the degree of

BACHELOR OF ENGINEERING

in

COMPUTER SCIENCE AND ENGINEERING



B.M.S. COLLEGE OF ENGINEERING

(Autonomous Institution under VTU)

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B. M. S. College of Engineering,

Bull Temple Road, Bangalore 560019

(Affiliated To Visvesvaraya Technological University, Belgaum) Department of Computer Science and Engineering



CERTIFICATE

This is to certify that the Lab work entitled "Compiler Design" carried out by IMRAN WADRALI(1BM21CS077), who is bonafide student of B. M. S. College of Engineering. It is in partial fulfilment for the award of Bachelor of Engineering in Computer Science and Engineering of the Visvesvaraya Technological University, Belgaum during the year 2023-24.

The Lab report has been approved as it satisfies the academic requirements in respect of **Compiler Design-** (22CS5PCCPD) work prescribed for the said degree.

Prof. Prameetha Pai Dr. Jyothi Nayak

Assistant professor Professor and Head

Department of CSE Department of CSE

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DECLARATION

I, Imran Wadrali (1BM21CS077), student of 5th Semester, B.E, Department of Computer Science and Engineering, B. M. S. College of Engineering, Bangalore, here by declare that, this lab report entitled "Compiler Design" has been carried out by me under the guidance of Prof. Sunayana S, Assistant Professor, Department of CSE, B. M. S. College of Engineering, Bangalore during the academic semester November-2023-February-2024.

I also declare that to the best of my knowledge and belief, the development reported here is not from part of any other report by any other students.

TABLE OF CONTENTS

W	1		alle o
			85p# 4
		The who was present	
		Name Iman Wadrali	
		Standard 5 Section B Ro	, ,
	i i	Subject Compile Design	hab.
TEXT EXT	-		Teacher
SI.No.	Date	Title	Page No Sign
	11	1ex	(9/15)
]	20/11/23	Program to count the no of words	R
	1	and consorants	1
23_	20/11/23	Identify tokens, keywords &	
	<u></u>	Segarator	-
3)	27/11/13	Program to demostrate floring point	
	<u> </u>	numbu	
4)	4 12/23	Program. Replacing Sequence of	-
		Program to recognize tokens over	
5)	11 12 23	Program to recognize tokens over	
		Alphabets 40 99	
67	18/12/25	t-Program to disign lexical	
		Analysen	
7)	11/1/24	Goggan Recursin Descent	
8)	11/1/24	Riogram to demostrate Dest	
,		ealculator	
9)	11/24	Parker	
(0)	23/1/20	Program to show syntax	
1	121.12	free -generator	

12 29/1/2 Program to Show infig to Postfix. EYACC] 12 29/1/2 Turu addlers code generales [using YACC]	Postfix. EYACC] 12 29). x Turu addens code genuales [using YACC]	5 No Date	Titlo	Page N
		rslyler u	Program to show injig to postfix. ETACC]	Paga N
		12 29/12	Turn address code generates [using YACC]	
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	Andrew Concept Con			
1 design of a successive state	Andrew of march			1,,31
	CONTRACTOR OF THE PROPERTY OF THE PARTY OF T		the design of a complete	

```
Will a program to identify each of character as conjung
 Or vowel in a given sentence.
  / option noy wap
 45
        Hindud Zstdiah7
 1.4
olelilolulalelilolu ( purib ("vowels :15 \n", yytext); }
[a-2A-2] < punty ("consonant: Y.S \n", yytext);)
4.4.
void mainly
       yylex();
7
Owner
I am King
 Do a rowd: I
        vowed: a
      Consorant: m
       consorrant: k
       voud; i
       Consonant: n
      Consonant : 9.
```

```
Enter a sentence:
Compiler design
No of vowels and consonants are 5 and 9
This is a book
No of vowels and consonants are 5 and 6
```

```
write a lex program to read the following input from a
 file and print the valid token on the Juninal.
     Note: create two files one as Pg. 1 and other one inputite
1.7
int | blood | char & print ("Dotalype -> +.5 \n", yyten E? it
[a-2A-Z]" of print ("Variable + 1.5 m", yytext) i)

X printf ("assignment operator > 1.5 \n", yytext); 4

11; 2 print ("separator > 4.5 /0", 144 text) 14
4.4 - Al agency good Corost o por < - (1, ) troub all a) 1. [-] V
void main (74
  paint ("Ender the file name: In");
  Scarf (" 1.5", frame)
  yyin = fopen(Iname, """);
  yylex ();
   Aclose Lygin);
Output: Exter the file name: input ext
       Datatype > int
       Variable -> a
        assignment operator >=
        digit →5
        Suparator -> )
        Variable >> Sum
        separator -> ;
```

```
enter the input file name
input.txt
enter the output file name
output.txt
```



int Keywords a Identifiers, Seperatorb Identifiers; Seperator

PROGRAM-3:

```
Weils a les program to recognize bloating Point News
  Check for all the injust cases.
     Hinchede <stdio his " was apported " flower & complete
               Control ( transport of the order of the order
1.3
     with the large of a very complete of the first
~[+-]?[0-9]*[.][0-9]+ & purt ("xs ==> Flowing point number, you)
1 [1-] ? [0-9] * Sprinty ("15==> Not a glearing point number ", yyter);
1.7.
                            (("11 : 1 men mi) (4) . (6.3)
int yyung ()
                                4
void main (1)
     print ("Enter 10. number: \n");
     yyler ();
                                            if older south
                         take the property of the same
          0.33 => Floating point number.
       - 334
        -334=> Not a floating point number
      + 6.3
      + 6.3 ==> blowny point number.
```

```
Enter a number:
23
Not a floating point number!

0.5
Floating point number!

.8
Floating point number!

-.9
Floating point number!

+56
Not a floating point number!
```

```
Weits a ler Program that copies a file, replacing each
non-empty sequencye of white space by a single blank.
Coole .
     Hinclude <stdio.hz
     # include <string h>
    - of include (stalib. h)
     chan shi [200];
 7.4
 7.4.
[In] < fprintf(yyout, "1.510", str1); str)[0] = '10';4
      < fprintly (yyout, "81.50, str1); str1[0]=10'
          I painly (yyout, "1.1.5", ""); 4
           Streat (strl, gytext);
 «ECF>> & printy (yyout, "xs", strs); return 0; 5
 y : y.
int main ()
   chai filmone [100];
   pring ("Enter the name of the file to copy: 12");
   Scarfl " 1.5 ", bilenane);
    yyin, topen (tilerane, "r");
   if Lygin == NULL) {
          exit (6);
```

```
Tring 1" later the name of the file to write: It "):
  Story ( "75", filenome);
  yout = Jopen Gilename , "w");
 if (grow = = NOLL)
      exit (D;
  yy live();
int yymap (void)
Ownite
Enter the name of file to copy: inpuspace
 Enter the home of the bile to open for wiling: outspace
    Inpuspace :txt
                       I moran.
   Outspacetxt
   hil I am Imran.
```

Enter the name of the file to copy: input.txt
Enter the name of the file to write: output.txt





```
Rogram 131
   Dirte a les program to recognize of the following totens.
  over the alphablets 10,1..., 94
 of The set of all string ending in 00.
 Code:
 16
      # include < stdio. h>
1.}
                               inter trink" | fring & Trans
1.1.
[0-9] "00 < printfe" string accepted "); }
[0-9] * K print ("string rejected");>
                                                     All minus 14
7.1.
int main() <
  yylex()
 redur 0;
int yywape) x
 roun );
Ordput:
 001
String rejected
 100
 String accepted
 000
 String accepted.
```

```
b) The set of all strings with their conscrutive 227's
   Cocle
 => 1.1
         Hindude astdio.hy
      1.4
    1.7.
   [0-9] = 22[0-9] ¿ print ("string accepted"); 4
   [0-9] L quirt ("string rejected"); 4
   1.1.
int main (1)
    yylex();
    now 0;
  int yymap()x
    wehun 1;
   7.
  output:
   1234
  String rejected
  01222567
  String occepted.
```

```
bmscecse@bmscecse-OptiPlex-5070:-/Documents/1BM21C5083$ ./a.out
1111
successbmscecse@bmscecse-OptiPlex-5070:~/Documents/18M21CS083$ ./a.out
11
bmscecse@bmscecse-OptiPlex-5070:-/Documents/1BM21C5083$ lex re5.l
bmscecse@bmscecse-OptiPlex-5070:-/Documents/1BM21C5083$ cc lex.yy.c
bmscecse@bmscecse-OptiPlex-5070:~/Documents/1BM21C5083$
bmscecse@bmscecse-OptiPlex-5070:-/Documents/1BMZ1CS083$ ./a.out
1023002245
1023002245 10th symbol from right end id 1
^Z
[1]+ Stopped
                              ./a.out
bmscecse@bmscecse-OptiPlex-5070:-/Documents/18M21CS083$ lex re6.l
bmscecse@bmscecse-OptiPlex-5070:~/Documents/1BM21C5083$ cc lex.yy.c
bmscecse@bmscecse-OptiPlex-5070:-/Documents/1BM21CS083$ ./a.out
9000
success
bmscecse@bmscecse-OptiPlex-5070:~/Documents/18M21CS083$ ./a.out
4005
success
bmscecse@bmscecse-OptiPlex-5070:-/Documents/18M21CS083$ ./a.out
123
123fail
```

```
fail
bmscecse@bmscecse-OptiPlex-5070:~/Documents/1BM21C5083$ lex blank.l
bmscecse@bmscecse-OptiPlex-5070:~/Documents/18M21CS083$ cc lex.yy.c
bmscecse@bmscecse-OptiPlex-5070:-/Documents/1BM21CS0B3$ ./a.out
Enter the name of the file to copy:
                                        input.txt
Enter the name of the file to write:
                                        output.txt
bmscecse@bmscecse-OptiPlex-5070:-/Documents/1BM21CS0B3$ lex re1.l
bmscecse@bmscecse-OptiPlex-5070:-/Documents/18M21CS083$ cc lex.yy.c
bmscecse@bmscecse-OptiPlex-5070:-/Documents/18M21CS083$ ./a.out
24900
24900 string ends with 00
2352
2352 string does not end with 00
^Z
[2]+ Stopped
                              ./a.out
bmscecse@bmscecse-OptiPlex-5070:-/Documents/1BM21C5083$ lex re2.l
bmscecse@bmscecse-OptiPlex-5070:-/Documents/18M21CS683$ cc lex.yy.c
bmscecse@bmscecse-OptlPlex-5070:-/Documents/1BM21CS083$ ./a.out
12142
12142 string does not have 222
24322245
24322245 string has 222
```

```
18 12 33
  Wise a C program to a lexical analyzer to
    secognise any five Kywords, identifiers, numbers, operato
    and puncheations.
  > (ode:
   # include < stdio. h>
  #include < ctype.h>
   H include (string.h)
  int is Keyword (char "word ) &
        char * Keywords[] = ("int", "float", "char", if", "else "y,
        for (int i= 0; i < 5; ++1) +
              if ( stremp ( Keywords (i), word ) = = 0){
                     return 1;
       return 0;
int is Operator (charch)
        char operators [] = "+-*/1/=><2/1";
        return stricher (operators, ch) != NULL;
y
      is Princhaotion (charch) {
int
            char punctuation []=",;.!";
             rdown struct (punduation, ch) != NULL;
```

```
void classify (chartsta) {
      for C int i = 0; str [i] = 10' ; ++i) {
           if lisalpha(strlij) 11 = bxaiger gtrlij == '-'){
              int j= i+1;
              while ( isalnum (itrojal) stroja == '-'){
             char templj-i+i];
             strnepy (-temp, & Btrain , )-i); illiam,
             temp[j-i] = 10;
            if (is Kayword (temps)) <
                  Printy ("Keyword: 1510", temp);
                printy ("Identifier: J. 5\n", temp);
     else if (isdigit (strain)) <
         uhile Lisdigit (strejos) }
             5++5
           print+("Number: 1. .*s\n",j-i, delreis);
     else if Lis aperator Estrais)) (
             party (D perator: x.C In", strcis) $;
     7
```

```
else if (is Punduation (strcia)) (
               Printy (Purchasion: 1. Cloi, strcis);
 int main () {
       chas input [100];
       painty (" Enter input string: ");
       Agets (input ; Size of (input), Stdin);
        print ["In classifying input: In");
         classify (input);
       roun 0;
 Owput:
 input String: int a = 0, b; flow sum = 0.0;
 classifying the input :
 Koyword : int
                            Keyword: Hoat
 Identifier : a
                                Identifica : Som
 operator: =
                                Operator:=
                                 Number = 0
  Numbu = 0
                                punctuation = .
Paretration:)
                                Number : 0
Identifia : b
                                Puntuation: )
Puncharion is
```

```
enter c code
int a = 1234 ;
Keyword: int
Identifier: a
Punctuation/Operator: =
Number: 1234
Punctuation/Operator: ;
```

```
8 1 2024
 White o program to paper Recusive Descent
 Passing on the following grammas.
               5-scAd
              A - abla
> Code
 Hinclude Stdio. hy
 Hindude (stdbool.h)
bool parse_S (charing J-str []);
bool parse - A Chai input-stres);
bool recussive-descent-parser. (char input strl);
                       topic blo (no equi) 2 mg) p
int index;
bool parse_S( that input_str[3) }
    if (inpostr cindex]== 'c') <
          if [parse_Alinput_str) dd input_str [index] == d') x
                  index ++;
               redun true;
           else 1
              return false,
```

```
il (recursive duent-Parser (user_input)) }
        printple The given string is accepted by the grammar. In');
    Else L
      painfly The given string is not accepted by the
             grammar 10');
Output:
Enter The string to parse: @ cad
 5 > cAd
 The given string is accepted by the grammar
 A > ab c
Enter the string to parie: could
  S-> cAda
                                   to buy and were
A> abla
 The given string is not accepted by the geammai.
```

```
nter the input string:
ad
ello
arsing failed. Extra characters found.
mscecse@bmscecse-HP-Elite-Tower-600-G9-Desktop-PC:~/Documents$ ./recursive_descent
nter the input string:
aaad
ello
arsing failed. Extra characters found.
mscecse@bmscecse-HP-Elite-Tower-600-G9-Desktop-PC:-/Documents$ ./recursive_descent
nter the input string:
ab$
ello
arsing successful.
mscecse@bmscecse-HP-Elite-Tower-600-G9-Desktop-PC:-/Documents$ ./recursive_descent
nter the input string:
aad$
ello
arsing failed. Extra characters found.
mscecse@bmscecse-HP-Elite-Tower-600-G9-Desktop-PC:-/Documents$ ./recursive_descent
nter the input string:
abd$
ello
arsing successful.
mscecse@bmscecse-HP-Elite-Tower-600-G9-Desktop-PC:-/Documents$ ./recursive_descent
nter the input string:
aaad$
ello
arsing failed. Extra characters found.
```

```
Disign & suitable grammar for evaluation of 8/1/24
 Authoritic expression being + & - coperators.
 I has least paiority & is left associative
  - has high priority and is ago right associative
Code:
 lex file:
 V. option noyywap
7.4
  #include . "y.tab.h"
1.4
1.1.
[0-9] + dyylval = atoi (gytext); return Num;4
 (14)
In return 0;
 · return ygtext [0];
1.1.
```

```
you plo.
     Alimelud estdiony
V. token NUM
1. right '-'
expr: e < print [" Valid expression ("); print ("Result: 7.d ln", $4)")
            return 0; 4
e: e't'e < $$ = $1+ $3;9
le = e < $$ = $1 - $3;7
 INUM 2 $$ = $1;4
1.1.
int main () &
  Punty (" In Enter an authoretic expression (n');
  yyporse ();
 returo;
int yyeur ()d
    puntil (" In Invalid expression \");
    rotun 0;
 4
```

Ordpot: Entran aithordir Enpression 5 40+10 Valid Expression Roull = 25 (5+ Invalid Expression

Enter an arithmetic expression: 2+3*4 Valid expression! Result:14

Enter an arithmetic expression: 2++3-Invalid expression!

```
Write a you program sling grammas . an b. 17,5;
 Dinclude Litationy
Is include Ksideibo hy
in ygenor (char "s);
ind yy loo (woid );
7.4
y token A
1. tokin B
1. to KinNL
1.%.
South: AAAAA SBNL Lprintble Parsed using the
           rule (ann)h, n>= s\n valid stings \n");}
              of a dear of the first parties - fire
 5 : 5 A
1.7.
void main ()
  puly (" Ender a string! In");
  gy parsi 1);
```

```
int yy wor ( chor = 5)
   < pundformalid String !m");
      meter of
   anbn. 1
   4.4
     Hindude Estdio. Ly
    Ainclude Stdlib. hy
    Hindudi & y.tab.h"
    extern int gylval
  [aA] . x yylval = yytort(0); solun A; 7
  [bB]. I yylval = yytext (0); return B; 4
   10 . Lutur NLiy
   · 1 return gytest (0); 4
L 1/1.
 ind yymapl)
 Y return 1;
```

Cotput

(note a ching)

accorde

parted using stule (a"nb) 1 n>= 5

valid string

accorde

invalid string!

```
Enter a string!
aaaaaaab
Parsed using the rule (a^n)b, n>=5.
Valid String!
ab
Invalid String!
```

Enter a string! abc Invalid String!

```
With an Your program to generate syntax tree for a
  given withmetic expression
 - Code
   PJ. 1
   Ainclude "y tabih"
   entan int yyhal;
   1.7
        < yylval = atoilyytext); sethun digit; }
  1.1.
 [0-9]+
 [11];
  [ fo] return 0;
  .- Adum yylirt [0];
 1/. 1/.
 int yywap ()
 p1.y
 # include < math. h>
 # include ctype. h>
# intludicstdio.n>
# include < stdlib.h >
# include < string. hy
```

```
Struit Ivernode
      that val[10]:
       int de:
       In Ali
    1:
   int ind;
   Sout tree-noch-syn-tree [100];
   void my-print-tree (int cur ind);
   int microde (int le, intre, char val [10]);
   1. token digit
  1.1.
  S:E < my-print_tree ($1); 5.
 E: E'+'T & $ = mknode($1,$3,"+"); 3
 IT { $8 = $1;}
 T: T * f < $ = mknode ($1, $3, 4 + 19); ; 7
 1F 7 $$ = $1; }
IF: 1('E')' \$$ = $2;}
Idigit & char bub[10]; sprint/(but; /d', yylval); $ = mknoch ();
                  by);Y
1.4.
```

```
in main()
  pinty (" Enter on Expression 10");
Lind Di
  yy Partel);
   Actum D;
in yyenor ()
pany ("NITW Error 10");
in Mknodi lint 10, intre, Char val (10)
  staypy (syntu Eind I val, val);
  syn-treisind]. Le= le;
   synther Eind ] . rc = rc;
  ind + + i
   return ind-1;
void my-point-tree (int cur_ind)
   y (syn-tree Elwind 3. le = = -1 St syn-tree [cur-ind]-ve==)
  Printle Digit Noder> Index: 7.d, Value: 7.5 In', (ur-ind, syntra
          Eccu_ind J. val);
   printy ("Operator Node -> Index = Y.d, Value: 7.5, Lyl Child
            Index = Y. d. Right child Index: 1.d (n').
   my-paintdree (syntree semind].(e);
   my pund-tree (syntree [[wind]rc); 4
```

Enter an Expression:

3.3°5

Operator Node > index: 4 value +, LC1 = 0 ; R13=3

liaf Node > Index: 0, Value: 3

Operator Node > index = 3, Value: 4 1C1=1, RC3=2

Liaf Node > Index: 1, value: 3

Liaf Node > Index: 2, value: 8

```
Enter an expression:

2*3+5*4

Operator Node -> Index : 6, Value : +, Left Child Index : 2,Right Child Index : 5

Operator Node -> Index : 2, Value : *, Left Child Index : 0,Right Child Index : 1

Digit Node -> Index : 0, Value : 2

Digit Node -> Index : 1, Value : 3

Operator Node -> Index : 5, Value : *, Left Child Index : 3,Right Child Index : 4

Digit Node -> Index : 3, Value : 5

Digit Node -> Index : 4, Value : 4
```

```
VACC de convert. Infix expession to Postfix expression
Code
 p4.1
of include . y. Lab. h"
extens int yyeral;
1.7
[0-9] + & yylval = atoi(yytexil); setum oligit; >
[1+];
 [In] return o
 · return yytext (0);
 int yymap ()
 1.1
  #include <elype.h>
 #include 251 dio-h7
It include Statito. hy
 17
 1. token digit
```

```
1.1.
   S: E < printf("10 10");}
  E: E'+' T { paint [ "+ " ); }
 T: T'x' f & Rint ("#"); >
 f:'('E')'
 Idigit (printy ("1.d", $1), )
 ;
7. 1 ·
 int main ()
d punty (" Enler infix enpression: ");
  yyparst1);
 yyerroris -
d pringl (Error"),
```

Endr infir expansion: 2+6+3+4

OUTPUT SCREENSHOT:

Enter an infix expression: 2+3*8/4^3-3 238*43^/+3-

```
Dive a program wing MACC de generale Biddrey
  PIL
   d[0-9)+
  a [a-2 A-Z]+
 1.2
  # include < stdio. h >
 Hindude & Adlibing
 Hinclude Kas " y. tab. h"
 entern chariden [20];
 1.4
 7.4.
 <du dyylval = atoilyytext), solundigit; 4
<ay < strepy (iden, yyteet); yy lval=1; returnid; 4
CID KIT
 In return 0;
 · schun gytentlot;
101-
int yywap ()
4
```

```
Timberde Zmath. hy
Minibele Zetype. hy
Hirland / stdio. hy
int var-ent = 0;
char iden [so],
1. form id
y, token aligit
5:id'=E < punt (+1).5 = t 1.d \n', iden, vou-coal-1); 4
E: E + T < $ = var. cm; vant-int++; printf("t.1.d= +7.d + t %.ds
        10', $$, $1, $3);
1E'-'T. L&S=van-cnf; var-cnt++; print("-1")=+1/d-+1/d
70
             1,10" $$ 1$1,837
17 < $$= $1:17
T: T' + ' F & $8 = var_col; var_col++; painly ("t y.d = tr.d"
               14d; n', $$,$1,93);7
ITY F ZSS=var_ent; var_ent++; paintf("tild=t7.d/
               t/d \n"; $$,$1,$3);4
 1t 18$ - $1:1
f; p'n' f & $1 = var-col; var.cot++; puintb(" 1.1.d= +.1.dat 7.din")
 10 x 98= 9117
```

```
(: 11'E')' - 244: 42; Y
     Idigit (1): voimt; voi-int+; print) ("+1d=yd;)
    int mainte)
      Var. (nt - 0;
      print ("Enter on expression: \n");
     yy parsell;
     return D;
     yy evor!)
     Pint ("enor ");
    Output
   a= 2+3+6
  10 = 2;
   11 = 3
  t2 = 6;
i 13= 11 + 12;
 £4 - to+++3;
 · a = 14.
```

```
Enter an expression:

a=2*3/6-4

t0 = 2;

t1 = 3;

t2 = t0 * t1;

t3 = 6;

t4 = t2 / t3;

t5 = 4;

t6 = t4 - t5;

a=t6
```