

TEC

Compiladores e Intérpretes
Proyecto #2: Analizador Léxico
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El Análisis Léxico consiste en descomponer un fuente de entrada en categorías léxicas mínimas llamadas tokens. Un programa en Flex consiste básicamente en una lista de expresiones regulares que definen acciones a ejecutar cuando ocurre un match.

```

token next_token( void ) {
    current_token;
}
void match( token t ) {
    if ( nextev_token == t ) {
        nextev_token = scanner( );
        if ( nextev_token == -1 ) nextev_token = scanner( );
        current_token = nextev_token;
    }
}

```

```
}  
else {  
    syntax_error( t ) ;  
}  
}  
void syntax_error( token t ) {
```

```
printf ( Sintax error, expecting %s\ n, get_token_name( t ) );  
exit ( 0 ) ;  
}  
void system _ goal( void ) {  
  
    program( ) ;
```

```
    match( SCANEOF) ;  
    finish( ) ;  
}  
void  program( void ) {  
  
    start( ) ;  match( BEGIN) ;  
    statement_list( ) ;  
    match( END) ;
```

```
}  
void statement_list( void ) {  
  
    statement( ) ;  
    while ( true ) {  
        switch ( next_token( ) ) {  
            case ID:  
            case READ:
```

```
    case WRITE:
        statement( ) ;
        break ;
    default :
        ;
}
}
}
void statement( void ) {
```



```

token tok= next_token( ) ;
expr_rec result;    expr_rec p_expr;  switch ( tok ) {
    case ID:

        strcpy ( previous_tokenbuffer, token_buffer) ;          match(
ID) ;
        result = process_id( ) ;
        match( ASSIGNOP) ;
        expression( ^ p_expr) ;          assign( result, p_expr) ;
        match( SEMICOLON) ;
        break ;

```

case READ:

```
match( READ) ; match( LPAREN) ;  
id_list( ) ; match( RPAREN) ;  
match( SEMICOLON) ;  
break ;
```

case WRITE:

```
match( WRITE) ; match( LPAREN) ;  
expr_list( ) ; match( RPAREN) ;
```

```
    match( SEMICOLON ) ;  
        break ;  
default :  
    syntax_error( tok ) ;  
    break ;  
}  
}
```

```

void assign ( expr_rec result,  expr_rec p_expr) {
    char * salida;
    salida = calloc ( 1024 ,  sizeof ( char ) ) ;
    strcpy ( salida, extractEXPR( p_expr ) ) ;
    generate ( Store, salida,  , ) ;
}

```

```

void id_list( void ) {

    expr_rec result;
    strcpy ( previous_tokenbuffer, token_buffer );    match( ID );
    strcpy ( , previous_tokenbuffer );
    while ( next_token( ) == COMMA ) {
        strcpy ( previous_tokenbuffer, token_buffer );    match(
COMMA );
        strcpy ( previous_tokenbuffer, token_buffer );    match( ID )
;
        strcpy ( , previous_tokenbuffer );
        read_id( result );
    }
}

```

```

    }
}
void read_id ( expr_rec in_var) {

    generate ( Read, , Integer, );
}
void write_expr ( expr_rec out_expr) {

```

```

    generate ( Write, , Integer, ) ;
}
void expr_list( void ) {

    expr_rec result;
    expression( ^ result ) ;
    write_expr( result ) ;
    while ( next_token( ) == COMMA ) {
        match( COMMA ) ;
    }
}

```

```

    expression( ^ result) ;
    write_ expr( result) ;
}
}
void expression ( expr_rec * result) {
    expr_rec left_ operand, right_ operand;
    op_rec op;
    primary ( ^ left_ operand) ;
    while ( next_token( ) == PLUSOP || next_token( )
== MINUSOP) {

```



```

    add_op ( ^ op) ;
    primary ( ^ right_operand) ;
    left_operand = gen_infix( left_operand, op, right_
operand) ;
}
* result = left_operand;
}
void add_op( op_rec* p_operand) {

```

```
token tok = next_token( ) ;
```

```
if ( tok == PLUSOP || tok== MINUSOP) {  
    previous_currentToken = current_token;    match( tok) ;  
    * p_operand = process_op( ) ;  
} else {  
    sintax_error( tok) ;  
}  
}
```

```
void primary( expr_rec* p_operand) {  
    expr_rec result;  
    token tok= next_token( );  
    switch ( tok) {  
        case LPAREN:  
  
            match( LPAREN) ;  
            expression( ^ result) ;  
            * p_operand = result;  
            match( RPAREN) ;  
    }
```

```

        break ;
    case ID:

        strcpy ( previous_tokenbuffer, token_buffer) ;           match(
ID) ;
        * p_operand = process_id( ) ;
        break ;
    case INTLITERAL:

        strcpy ( previous_tokenbuffer, token_buffer) ;           match(
INTLITERAL) ;
        * p_operand = process_literal( ) ;

```

```
        break ;  
    default :  
        sintax_error( tok ) ;  
        break ;  
    }  
}  
const char * get_token_name( token t ) {
```

```
switch ( t ) {  
  case BEGIN:  
    BEGIN;  
  case END:  
    END;  
  case READ:  
    READ;  
  case WRITE:  
    WRITE;  
  case ID:
```

```
ID;  
case INTLITERAL:  
    INTLITERAL;  
case LPAREN:  
    LPAREN;  
case RPAREN:  
    RPAREN;  
case SEMICOLON:  
    SEMICOLON;  
case COMMA:
```

```
    COMMA;  
case ASSIGNOP:  
    ASSIGNOP;  
case PLUSOP:  
    PLUSOP;  
case MINUSOP:  
    MINUSOP;  
case SCANEOF:  
    SCANEOF;  
}
```



```
}  
void open_outputFile( ) {  
    output_file = fopen ( , w+ ) ;  
}  
void close_outputFile( ) {  
    fclose ( output_file ) ;
```

```
}  
void start( void ) {  
  
}  
void finish( void ) {  
    generate( Halt, , , ) ;  
}
```

```
void ident( ) {  
    }  
expr_rec process_id( void ) {  
    expr_rec t;  
  
    check_id( previous_tokenbuffer ) ;  
    = IDEXPR;  
    strcpy ( , previous_tokenbuffer ) ;  
    t;
```

```

}
expr_rec process_literal( void ) {
    expr_rec t;

    = LITERALEXPR;
    ( void ) sscanf ( previous_tokenbuffer, % d, ^ );
    t;

```

```
}  
op_rec process_op ( void ) {  
    op_rec o;  
    if ( previous_currentToken == PLUSOP)  
        = PLUS;  
    else  
        = MINUS;
```

```

    o;
}
void check_id( string s) {
    if ( ! lookup( s) ) {
        enter( s) ;
        generate( Declare, s, Integer, ) ;
    }
}

```

```
bool lookup( string s) {  
    int i;  
    for ( i = 0 ; i < symTable_count; i++ ) {  
        if ( strcmp ( symbol_table[ i] , s) == 0 ) {  
            true ;  
        }  
        i++ ;  
    }  
    false ;  
}
```

```

}
void enter( string s) {
    strcpy ( symbol_table[symTable_count] , s) ;
    symTable_count++;
}
void generate( string op1, string op2, string op3, string op4) {
    if ( ( op1 == Declare) || ( op1 == Store) ) {
        fprintf ( output_file, % s % s % s % s\ n , op1, op2, op3,
op4) ;
    }
}

```



```

    } else if ( op1 == Halt) {
        fprintf ( output_file, % s % s % s % s\ n , op1, op2, op3,
op4) ;
    }
    else {
        fprintf ( output_file, % s % s % s % s\ n , op1, op2, op3,
op4) ;
    }
}
char * extractOP( op_rec p_operand) {

```

```

    char * minus = Sub;
char * plus = Add;
if ( == MINUS) {
    minus;
} else if ( == PLUS) {
    plus;
}
}
char * extractEXPR( expr_rec p_expr) {

```

```

char * express_buffer;
express_buffer = calloc ( 1024 , sizeof ( char ) );
if ( == IDEXPR) {
    strcpy ( express_buffer, );
    express_buffer;
} else if ( == LITERALEXPRESS) {
    sprintf ( express_buffer, % d, );
    express_buffer;
} else {
    strcpy ( express_buffer, );

```

```

        express_buffer;
    }
}
expr_rec gen_infix ( expr_rec e1, op_rec op, expr_rec e2)
{
    expr_rec e_rec, e_rec1;

    = LITERALEXPR;

```

```

char * resultadoEXPR2;
resultadoEXPR2 = calloc ( 1024 , sizeof ( char ) );
char * resultadoEXPR1;
resultadoEXPR2 = calloc ( 1024 , sizeof ( char ) );
int resultado;

if (  == LITERALEXPR && == LITERALEXPR ) {
    int numero1 = ;
    int numero2 = ;

```

```

if ( == PLUS) {
    resultado = numero1 + numero2;
} else {
    resultado = numero1 - numero2;
}
= resultado;
e_rec;
} else {
    expr_rec e_rec1;
    = TEMPEXPR;

```

```

    resultadoEXPR1 = extractEXPR( e1 ) ;
    resultadoEXPR2 = extractEXPR( e2 ) ;
    strncpy( , get_temp( ) , MAXIDLEN ) ;
    generate ( extractOP( op ) , resultadoEXPR1, resultadoEXPR2,
) ;
    e_rec1;
}
}
char * get_temp ( void ) {

```

```
static char tempname[ MAXIDLEN] ;  
max_ temp++;  
sprintf( tempname, Temp % d,  max_ temp) ;  
check_ id ( tempname) ;  
    tempname;  
}  
void open_ file( ) {
```



```
char filename [ 100 ] = ;  
printf ( Enter a value : ) ;  
scanf( % s, filename) ;  
file = fopen ( filename, r ) ;  
}  
void read_file( ) {  
    open_file( ) ;  
    if ( file) {  
        len = ftell( file) ;
```

```
    }  
    else {  
        printf ( Problema al abrir el archivo\ n) ;  
        exit ( 0 ) ;  
    }  
}  
void close_ file( ) {
```

```
fclose ( file ) ;  
}  
void buffer_char ( char c ) {  
    token_buffer[ charPos++ ] = c;  
}  
void clear_token_buffer( ) {  
    memset ( token_buffer, 0 , 5 ) ;  
    charPos = 0 ;  
}
```

```

}
token check_reserved( ) {
    int letter, c;
    bool reserved;
    for ( letter= 0 ; letter < len_tb; letter++ ) {
        if ( ' B' == toupper ( token_buffer[ letter] ) ) {
            reserved = true ;
            for ( c = 0 ; c < 5 ; c++ ) {
                if ( begin_buffer[ c] != toupper ( token_buffer[
letter++ ] ) ) {

```

```
        reserved = false ;  
        break ;  
    }  
}  
if ( reserved == true ) {  
    BEGIN;  
} else {  
    ID;  
}
```

```

    break ;
} else if ( ' E' == toupper ( token_ buffer[ letter] ) ) {
    reserved = true ;
    for ( c = 0 ; c < 3 ; c++ ) {
        if ( end_ buffer[ c] != toupper ( token_ buffer[ letter++
] ) ) {
            reserved = false ;
            break ;
        }
    }
    if ( reserved == true ) {

```

```

        END;
    } else {
        ID;
    }
    break ;
} else if ( ' W' == toupper ( token_ buffer[ letter] ) ) {
    reserved = true ;
    for ( c = 0 ; c < 5 ; c++ ) {
        if ( write_ buffer[ c] != toupper ( token_ buffer[
letter++ ] ) ) {
            reserved = false ;

```

```

        break ;
    }
}
if ( reserved == true ) {
    WRITE;
} else {
    ID;
}
break ;
} else if ( ' R' == toupper ( token_buffer[ letter] ) ) {

```



```

reserved = true ;
for ( c = 0 ; c < 4 ; c++ ) {
    if ( read_buffer[ c ] != toupper ( token_buffer[
letter++ ] ) ) {
        reserved = false ;
        break ;
    }
}
if ( reserved == true ) {
    READ;
} else {

```

```

        ID;
    }
    break ;
} else {
    ID;
}
}
}
}
void lexical_error( int character) {

```

```

    printf ( LEXICAL ERROR % d\ n,  character) ;
}
void  print_token_buffer( ) {
    int  i;
    printf ( IMPRIMIENDO TOKEN BUFFER\ n) ;
    for  ( i = 0 ;  i <= len_token_buffer;  i++ ) {
        printf ( % d\ n,  token_buffer[ i]  ) ;
    }
}

```

```
void get_tokens( ) {  
    read_file( ) ;  
    token ejemplo;  
    while ( filePos != len) {  
        ejemplo = scanner( ) ;  
        printf ( token % d\ n, ejemplo ) ;  
    }  
}
```



