PONTIFICIA UNIVERSIDAD CATOLICA MADRE Y MAESTRA

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Materia:
ST-ISC-314-T-001 Programación 3

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Practica sobre:

Práctica 3 - Parser

Fecha de Entrega:

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Tiger.lex

```
type svalue = Tokens.svalue
type pos = int
type ('a,'b) token = ('a,'b) Tokens.token
type lexresult = (svalue,pos) token
val lineNum = ErrorMsg.lineNum
val linePos = ErrorMsg.linePos
val strBuilder = ref ""
val strPosition = ref 0
val uncloseStr = ref false
val cmCount = ref 0
fun eof() =
    let
        val pos = hd(!linePos)
    in
        if !cmCount > 0
            then (ErrorMsg.error pos (Int.toString(!cmCount) ^ " unclosed
comments "); cmCount := 0; Tokens.EOF(pos,pos))
            else if !uncloseStr = true
                then (ErrorMsg.error pos ("unclosed string starting " ^
Int.toString(!strPosition)); Tokens.EOF(pos,pos))
                else (Tokens.EOF(pos,pos))
end


%%
digit   = [0-9];
letter  = [a-zA-Z];
%header (functor TigerLexFun(structure Tokens: Tiger_TOKENS));
%s  COMMENT NPSTRING STRING;
%%
<INITIAL>\n => (lineNum := !lineNum+1; linePos := yypos+1 :: !linePos;
continue());
<INITIAL>[\ \t] => (continue());

<INITIAL>type   => (Tokens.TYPE(yypos,yypos+4));
<INITIAL>var    => (Tokens.VAR(yypos,yypos+3));
<INITIAL>function   => (Tokens.FUNCTION(yypos,yypos+8));
<INITIAL>break  => (Tokens.BREAK(yypos,yypos+5));
<INITIAL>of => (Tokens.OF(yypos,yypos+2));
<INITIAL>end    => (Tokens.END(yypos,yypos+3));
<INITIAL>in     => (Tokens.IN(yypos,yypos+2));
<INITIAL>nil    => (Tokens.NIL(yypos,yypos+3));
<INITIAL>let    => (Tokens.LET(yypos,yypos+3));
<INITIAL>do => (Tokens.DO(yypos,yypos+2));
<INITIAL>to     => (Tokens.TO(yypos,yypos+2));
<INITIAL>for    => (Tokens.FOR(yypos,yypos+3));
<INITIAL>while  => (Tokens.WHILE(yypos,yypos+5));
```

```
<INITIAL>else   => (Tokens.ELSE(yypos,yypos+4));
<INITIAL>then   => (Tokens.THEN(yypos,yypos+4));

<INITIAL>if => (Tokens.IF(yypos, yypos+2));
<INITIAL>array  => (Tokens.ARRAY(yypos, yypos+5));
<INITIAL>":="   => (Tokens.ASSIGN(yypos, yypos+2));
<INITIAL>"|"    => (Tokens.OR(yypos, yypos+1));
<INITIAL>"&"    => (Tokens.AND(yypos, yypos+1));
<INITIAL>">="   => (Tokens.GE(yypos, yypos+2));
<INITIAL>">"    => (Tokens.GT(yypos, yypos+1));
<INITIAL>"<="   => (Tokens.LE(yypos, yypos+2));
<INITIAL>"<"    => (Tokens.LT(yypos, yypos+1));
<INITIAL>"<>"   => (Tokens.NEQ(yypos, yypos+2));
<INITIAL>"="    => (Tokens.EQ(yypos, yypos+1));
<INITIAL>"/"    => (Tokens.DIVIDE(yypos, yypos+1));
<INITIAL>"*"    => (Tokens.TIMES(yypos, yypos+1));
<INITIAL>"-"    => (Tokens.MINUS(yypos, yypos+1));
<INITIAL>"+"    => (Tokens.PLUS(yypos, yypos+1));
<INITIAL>"."    => (Tokens.DOT(yypos, yypos+1));

<INITIAL>"}"    => (Tokens.RBRACE(yypos, yypos+1));
<INITIAL>"{"    => (Tokens.LBRACE(yypos, yypos+1));
<INITIAL>"]"    => (Tokens.RBRACK(yypos, yypos+1));
<INITIAL>"["    => (Tokens.LBRACK(yypos, yypos+1));
<INITIAL>")"    => (Tokens.RPAREN(yypos, yypos+1));
<INITIAL>"("    => (Tokens.LPAREN(yypos, yypos+1));
<INITIAL>";"    => (Tokens.SEMICOLON(yypos, yypos+1));
<INITIAL>":"    => (Tokens.COLON(yypos, yypos+1));
<INITIAL>","    => (Tokens.COMMA(yypos, yypos+1));

<INITIAL>{digit}+   => (Tokens.INT(valOf(Int.fromString yytext), yypos, yypos
+ size yytext));
<INITIAL>{letter}+({letter}|{digit}|_)* => (Tokens.ID(yytext, yypos, yypos +
size yytext));

<INITIAL>\"     => (YYBEGIN STRING; strBuilder := ""; strPosition := yypos;
uncloseStr := true; continue());
<STRING>\"      => (YYBEGIN INITIAL; uncloseStr := false;
Tokens.STRING(!strBuilder, !strPosition, yypos+1));
<STRING>\\(n|t|\^c|[0-9]{3}|\"|\\)  => (strBuilder := !strBuilder ^
valOf(String.fromString yytext); continue());
<STRING>[\\]    => (YYBEGIN NPSTRING; continue());
<NPSTRING>[\n]  => (lineNum := !lineNum+1; linePos := yypos+1 :: !linePos;
continue());
<NPSTRING>[\ \t\f]  => (continue());
<NPSTRING>[\\]  => (YYBEGIN STRING; continue());
<NPSTRING>.     => (ErrorMsg.error yypos ("Illegal escape character: " ^
yytext); YYBEGIN STRING; continue());
```

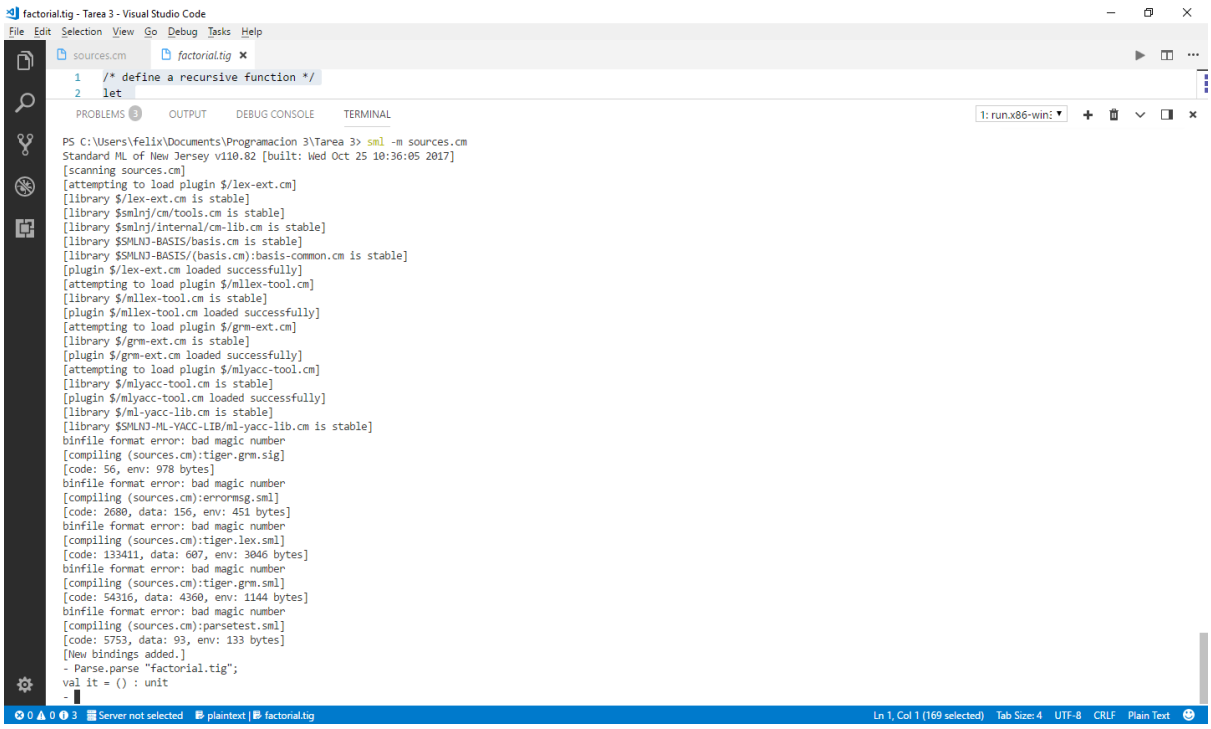
```
<STRING>[\n]    => (lineNum := !lineNum+1; linePos := yypos+1 :: !linePos;
ErrorMsg.error yypos ("illegal linebreak in string literal "); continue());
<STRING>.       => (strBuilder := !strBuilder ^ yytext; continue());


<INITIAL>"/*"   => (YYBEGIN COMMENT; cmCount := !cmCount + 1; continue());
<COMMENT>"/*"   => (cmCount := !cmCount + 1; continue());
<COMMENT>"*/"   => (cmCount := !cmCount - 1; if !cmCount = 0 then YYBEGIN
INITIAL else (); continue());
<COMMENT>[\n]   => (lineNum := !lineNum+1; linePos := yypos+1 :: !linePos;
continue());
<COMMENT>.      => (continue());

.               => (ErrorMsg.error yypos ("Illegal character: " ^ yytext);
continue());
```

Sources.cm

```
Group is

tiger.lex
errormsg.sml
parsetest.sml
tiger.grm

$/smlnj-lib.cm
$/ml-yacc-lib.cm
$/basis.cm
```

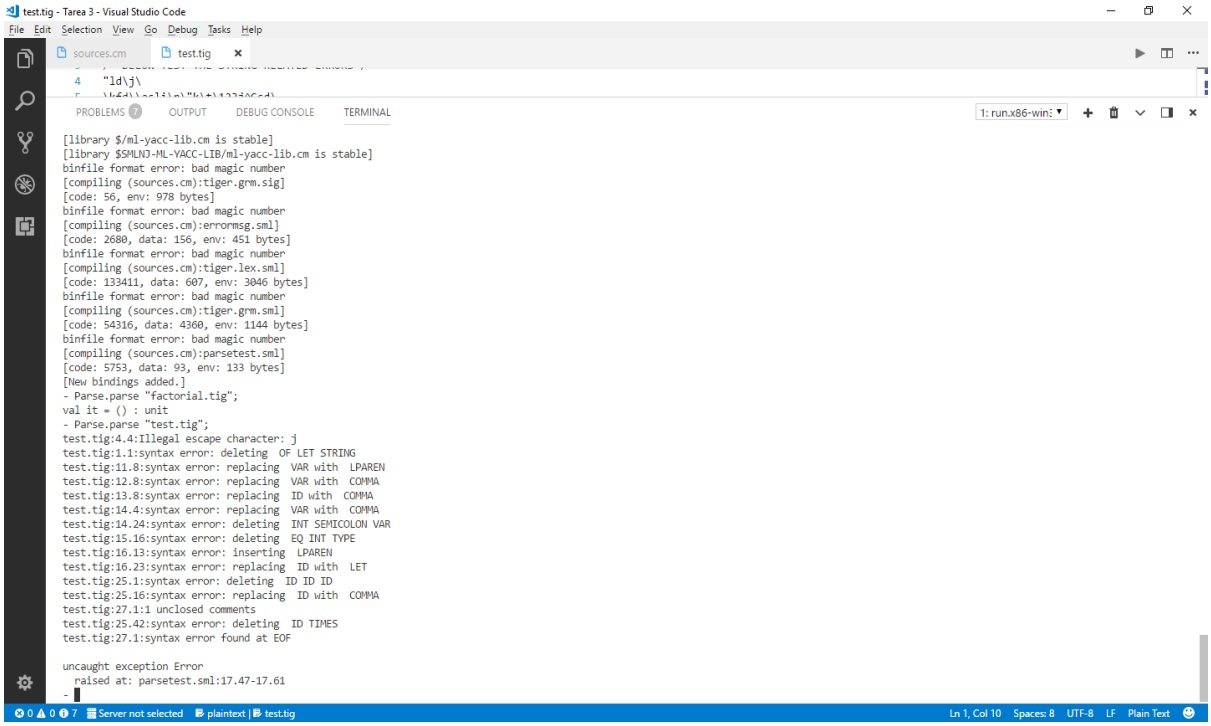
Factorial

```
/* define a recursive function */

let

/* calculate n! */

function nfactor(n: int): int =

                    if  n = 0

                                then 1

                                else n * nfactor(n-1)


in

          nfactor(10)

end
```



Test.tig

```
of   let


/* BELOW TEST THE STRING RELATED ERRORS*/

"ld\j\

\kfd\\asli\n\"k\t\123j^Gsd\


\l\        \f"


/*BELOW TEST THE GENERAL CASES*/

lt

       var if8 = 644

       var xt = 01

       va s_4 = 0

    var sss____44__ss_0=1;

       var T5_ = 7

       type myintT6 = int

       type  arrtype = array of myintT6


       var arr1:arrtype := arrtype [10] of 0

in

       arr1

end



 BELOW TEST THE NESTED COMMENT & UNCLOSED COMMENT*/

/* arr1 is valid since expression 0 is int = myint /
```

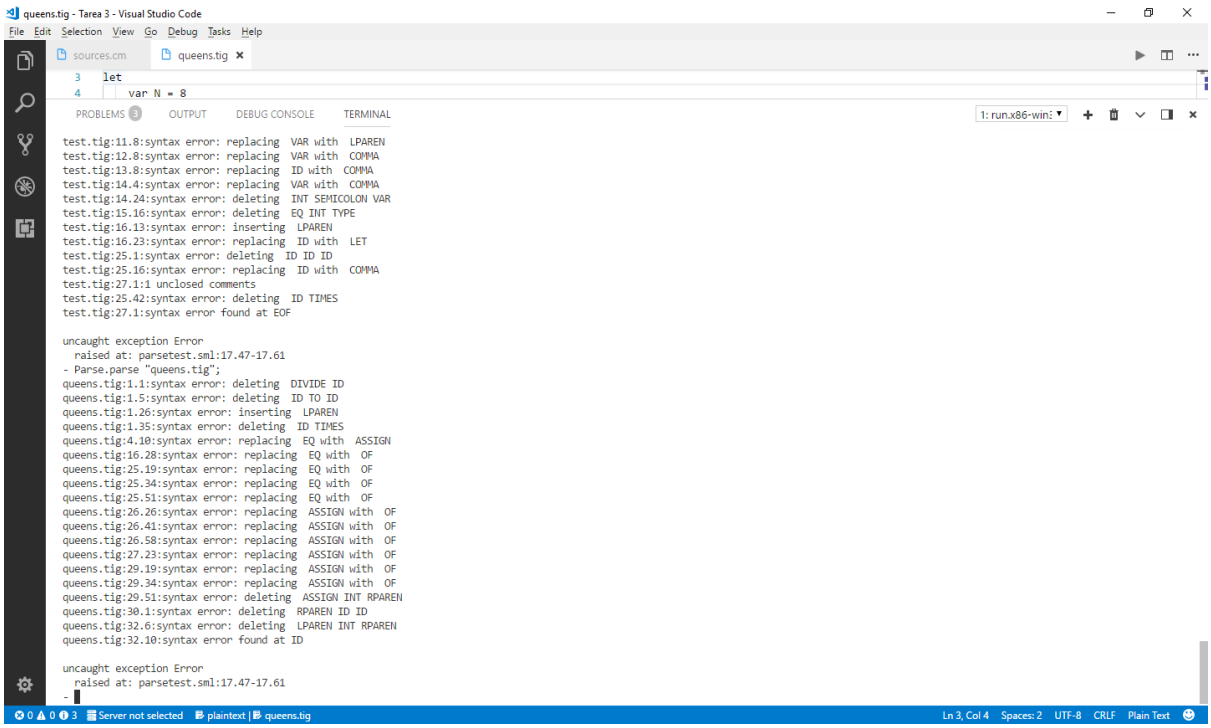


Queens.tig

/ A program to solve the 8-queens problem */

```
let
   var N = 8


   type intArray = array of int


   var row := intArray [ N ] of 0
   var col := intArray [ N ] of 0
   var diag1 := intArray [N+N-1] of 0
   var diag2 := intArray [N+N-1] of 0


   function printoard() =
     (for i := 0 to N-1
    do (for j := 0 to N-1
        do print(if col[i]=j then " O" else " .");
```

```
        print("\n"));
        print("\n"))

    function try(c:nt) =
( /*  for i:= 0 to c do prit("."); print("\n"); flush();*/
    if c=N
    then printboard()
    else for r := 0 to N-1
     do if row[r]=0 & diag1[r+c]=0 & diag2[r+7-c]=0
           then (rw[r]:=1; diag1[r+c]:=1; diag2[r+7-c]:=1;
             col[c]:=r;
               try(c+1);
          row[r]:=0; diag1[r+c]:=0; diag2[r+7-c]:=0)

)
 i try(0)
en
```



En esta práctica se implemento un parser para el lenguaje Tiger utilizando algunos archivos como: errormsg.sml, parsetest.sml, sources.cm, tiger.grm, y tiger.lex.sml.

En el primer ejemplo no hay error de salida, mientras que en el segundo y tercero si hay.