Diseño de compliadores

Semántica

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23/04/19

Se genera la tabla semántica a partir del AST, donde se ordenan los nodos de acuerdo a su tipo y su scope. Posteriormente de acuerdo a la semántica definida, se verifica la correctez del código.

Se usuaron las siguientes reglas semanticas para verificar el codigo.

Reglas

Las variables y funciones deben de estar definidas se dentro del scope, para ser asignadas y acceder a su valor.

Las funciones deben de regresar el tipo de valor definido en el cuerpo de la función

Para expresiones aritméticas

Int = numeró entro

Int * Int = Int

Int / Int = Int

Int + Int = Int

Int - Int = Int

Int < Int = Int

Int <= Int = Int

Int > Int

int[int] = Int

Expresiones regulares

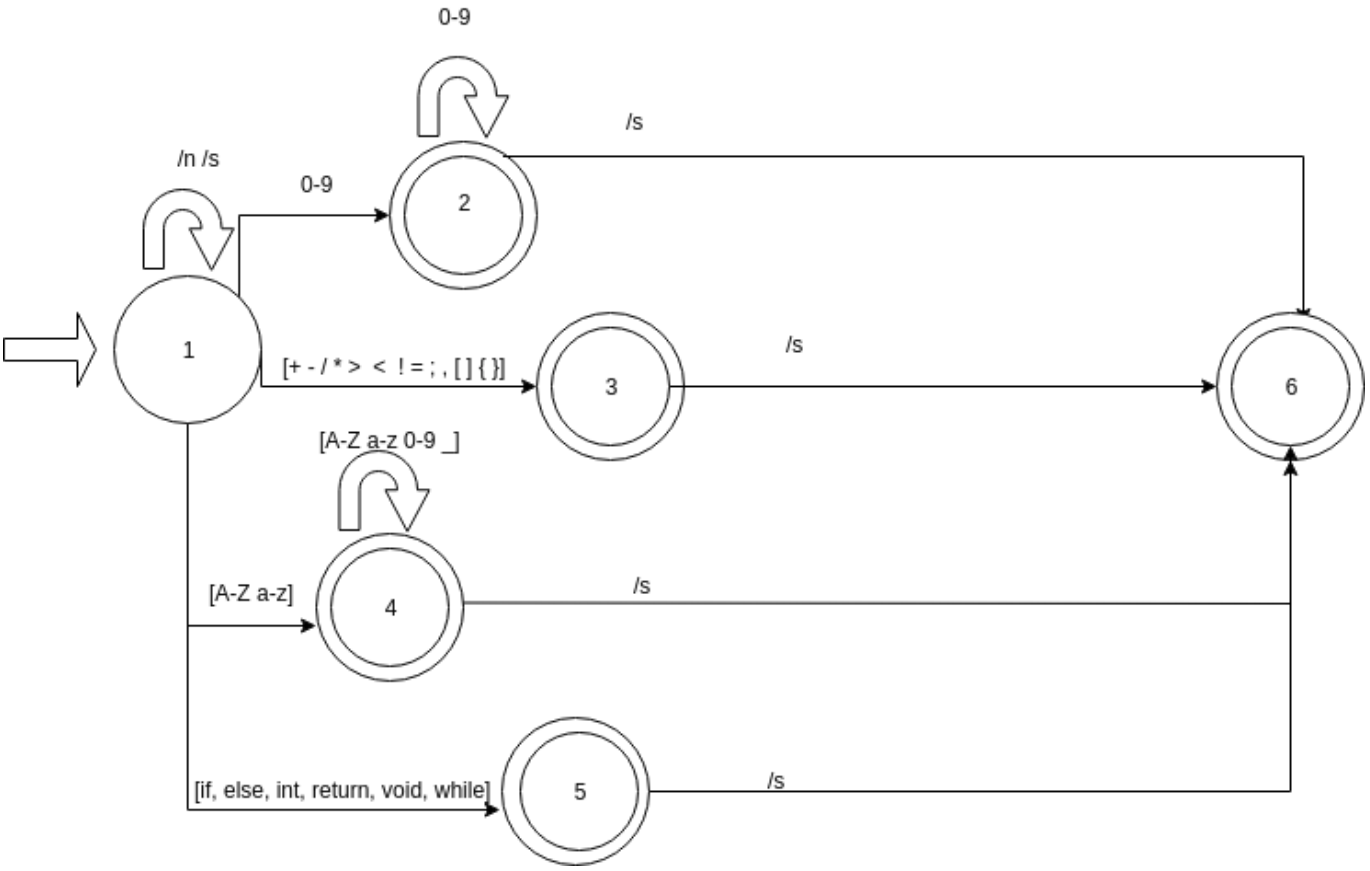
Se implementó del analizador léxico con expresiones regulares, los siguientes expresiones fueron usadas:

```
(r'[ \s\n\t]+',   TokenType.SPACE),

(r'',             TokenType.SPACE),

(r'#[^\n]*',      TokenType.SPACE),
```

```
(r'\$',             TokenType.ENDFILE),
(r'\{',             TokenType.SPECIAL),
(r'\}',             TokenType.SPECIAL),
(r'\[',             TokenType.SPECIAL),
(r'\]',             TokenType.SPECIAL),
(r'\(',             TokenType.SPECIAL),
(r'\)',             TokenType.SPECIAL),
(r'\/\*(\*(?!\/)|[^*])*\*\/', TokenType.COMMENT),
(r';',              TokenType.SPECIAL),
(r',',              TokenType.SPECIAL),
(r'\+',             TokenType.SPECIAL),
(r'-',              TokenType.SPECIAL),
(r'\*',             TokenType.SPECIAL),
(r'/',              TokenType.SPECIAL),
(r'<=',             TokenType.SPECIAL),
(r'<',              TokenType.SPECIAL),
(r'>=',             TokenType.SPECIAL),
(r'>',              TokenType.SPECIAL),
(r'==',             TokenType.SPECIAL),
(r'!=',             TokenType.SPECIAL),
(r'=',              TokenType.SPECIAL),
(r'else',         TokenType.RESERVED),
(r'if',             TokenType.RESERVED),
(r'int',          TokenType.RESERVED),
(r'return',     TokenType.RESERVED),
(r'void',         TokenType.RESERVED),
(r'while',        TokenType.RESERVED),
(r'[0-9]+[a-zA-Z]+', TokenType.ERROR),
(r'[0-9]+',         TokenType.NUM),
```

(r'[a-zA-Z_][0-9a-zA-Z_]*', TokenType.ID)]

Automata



Gramática:

program -> declaration-list

declaration-list -> declaration {declaration}

declaration -> var-declaration | fun-declaration

var-declaration -> type-specifier [ID ; | ID [NUM] ;]

type-specifier -> int | void

fun-declaration-> type-specifier ID (params) compound-stmt

params-> param-list | void

param-list -> param {, param}

param -> type-specifier [ID | ID [ ]]

compount-stmt -> { local-declarations statement-list }

local-declarations -> empty {var-declaration}

statement-list -> empty {statement}

statement -> expression-stmt | compound-stmt | selection-stmt | iteration-stmt | return-stmt

expression-stmt -> expression ; | ;

selection-stmt -> if (expression) statement | if (expression) statement else statement

iteration-stmt -> while (expression) statement

return-stmt -> return ; | return expression ;

expression -> var = expression | simple-expression

var -> ID | ID [expression]

simple-expression -> additive-expression [relop additive-expression]

relop -> <= | < | > | >= | = | !=

additive-expression -> term {addop term}

addop -> + | -

term -> factor {mulop factor}

mulop -> * | /

factor -> (expression) | var | call | NUM

call -> ID (args)

args -> arg-list | empty

arg-list -> expression {, expression}