Procesadores de lenguajes

WIC

Descenso recursivo

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Índice

Introducción al descenso recursivo

Los analizadores sintácticos descendentes pueden considerarse como una manera de encontrar una derivación por la izquierda para una cadena de entrada. Los analizadores sintácticos descendentes pueden ser de dos tipos: recursivos y predictivos.

Los analizadores sintácticos por descenso recursivo contienen un conjunto de procedimientos recursivos, donde cada no terminal de la gramática tiene asociado un procedimiento. Cuando se construye el árbol de análisis, al llegar al terminal comprueba si el procedimiento escogido es el adecuado y si lo es avanza el siguiente token, si no lo es emite mensaje de error y aplica una estrategia de recuperación que puede consistir en deshacer la operación, retroceder y llamar a otro procedimiento.

Gramática elegida

Para la práctica de descenso recursivo con el lenguaje Winter Is Coming (WIC), hemos decidido emplear una gramática con los TOKENS del lenguaje definido, con reglas destinadas a la escritura de instrucciones de tipo while. La gramática resultante sería la siguiente:

while_instr := expr OR while_instr
while_instr := expr AND while_instr
while_instr := EXPR FOR_WHILE_CLAUSE HEADER_END END_OF_INSTR
OPEN_CONTEXT_TAG input CLOSE_CONTEXT_TAG

expr := term LESS term
expr := term GREATER term
expr := term EQUALS term
expr := term LESS_EQUALSterm
expr := term GREATER_EQUALS term
expr := term NOT_EQUALS term
expr := term

term := ID SUM term
term := ID SUBSTRACT term
term := ID PRODUCT term
term := ID DIVIDE term
term := ID
term := data_value SUM term
term := data_value SUBSTRACT term
term := data_value PRODUCT term
term := data_value DIVIDE term
term := data_value

data_value := INT_VAL
data_value := REAL_VAL
data_value := BOOL_VAL

input := instr input
input := ε

instr := BREAK END_OF_INSTR
instr := ID ASSIGN term END_OF_INSTR
instr := ID END_OF_INSTR
instr := ID preanid_while anid_while

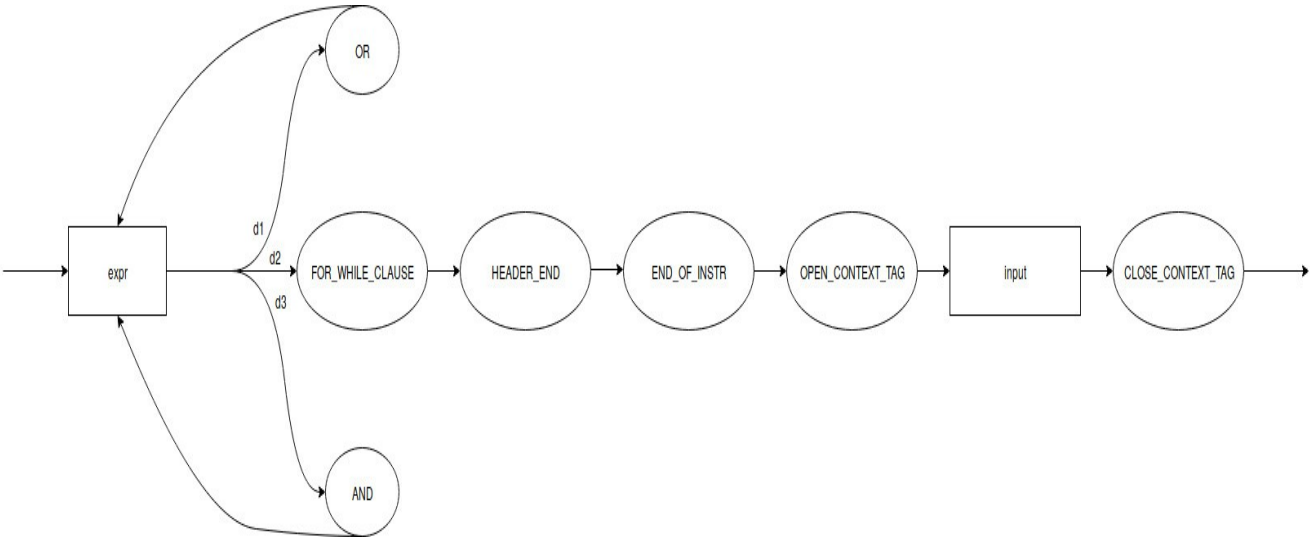
instr := INT_VAL anid_while
instr := REAL_VAL anid_while
instr := BOOL_VAL anid_while
instr := INT_VAL preanid_while anid_while
instr := REAL_VAL preanid_while anid_while
instr := BOOL_VAL preanid_while anid_while
instr := INT_TYPE ID ASSIGN term END_OF_INSTR
instr := REAL_TYPE ID ASSIGN term END_OF_INSTR

instr := BOOL_TYPE ID ASSIGN term END_OF_INSTR
instr := INT_TYPE ID END_OF_INSTR
instr := REAL_TYPE ID END_OF_INSTR
instr := BOOL_TYPE ID END_OF_INSTR

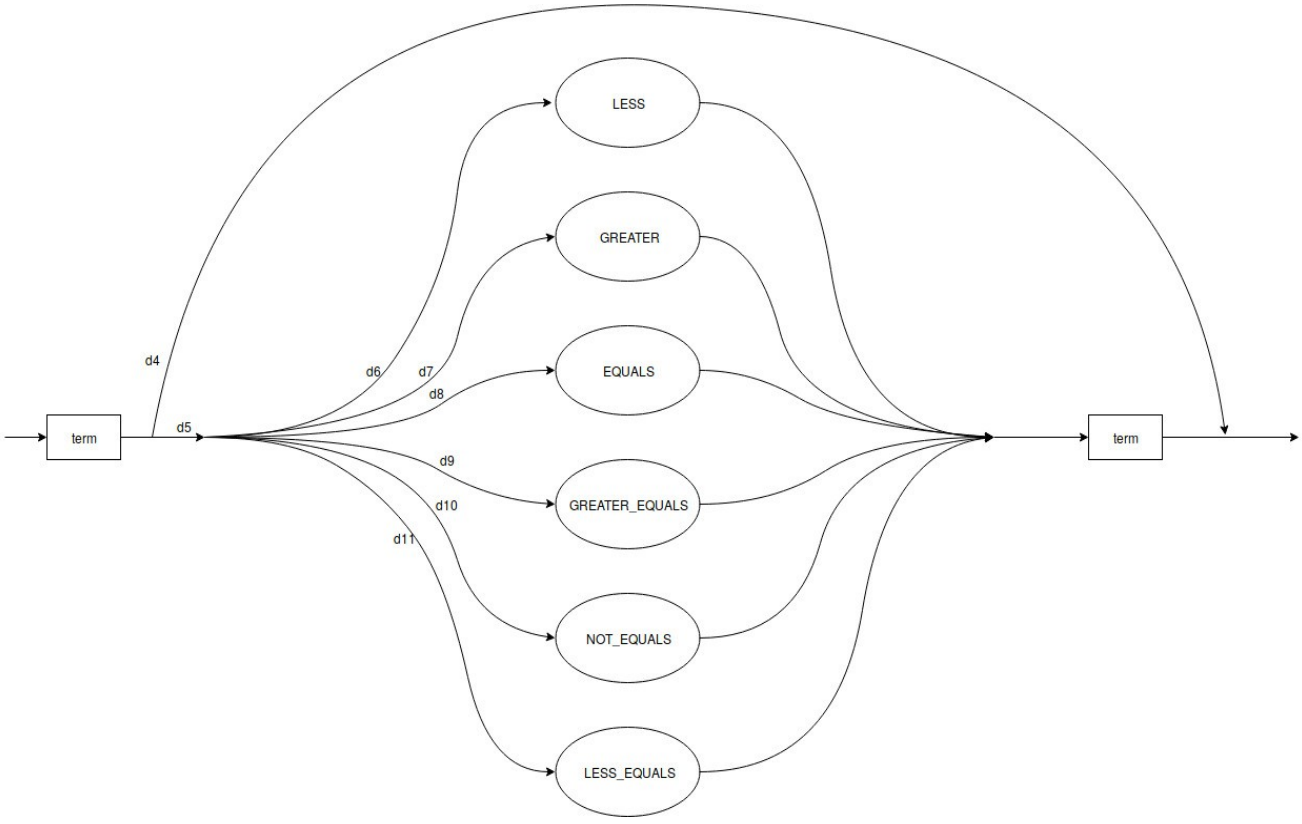
anid_while := FOR_WHILE_INSTR HEADER_END END_OF_INSTR
OPEN_CONTEXT_TAG input CLOSE_CONTEXT_TAG

preanid_while := LESS INT_VAL
preanid_while := LESS REAL_VAL
preanid_while := LESS BOOL_VAL
preanid_while := LESS ID_VAL
preanid_while := GREATER INT_VAL
preanid_while := GREATER REAL_VAL
preanid_while := GREATER BOOL_VAL
preanid_while := GREATER ID_VAL
preanid_while := EQUALS INT_VAL
preanid_while := EQUALS REAL_VAL
preanid_while := EQUALS BOOL_VAL
preanid_while := EQUALS ID_VAL
preanid_while := LESS_EQUALS INT_VAL
preanid_while := LESS_EQUALS REAL_VAL
preanid_while := LESS_EQUALS BOOL_VAL
preanid_while := LESS_EQUALS ID_VAL
preanid_while := GREATER_EQUALS INT_VAL
preanid_while := GREATER_EQUALS REAL_VAL
preanid_while := GREATER_EQUALS BOOL_VAL
preanid_while := GREATER_EQUALS ID_VAL
preanid_while := NOT_EQUALS INT_VAL
preanid_while := NOT_EQUALS REAL_VAL
preanid_while := NOT_EQUALS BOOL_VAL
preanid_while := NOT_EQUALS ID_VAL

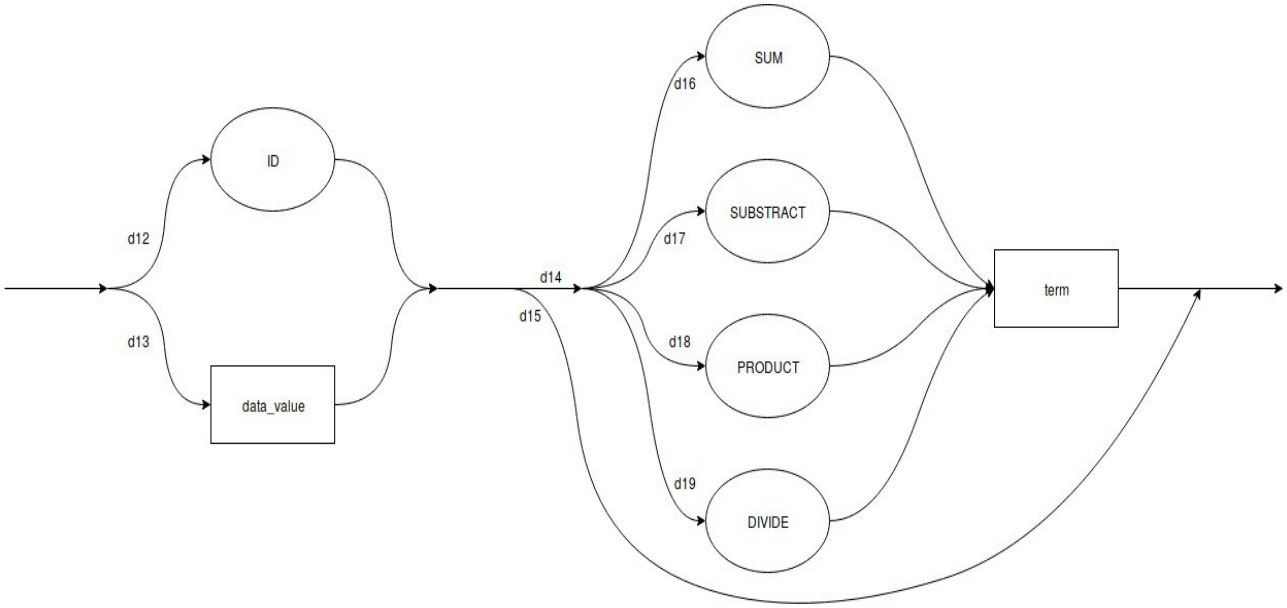
while_instr



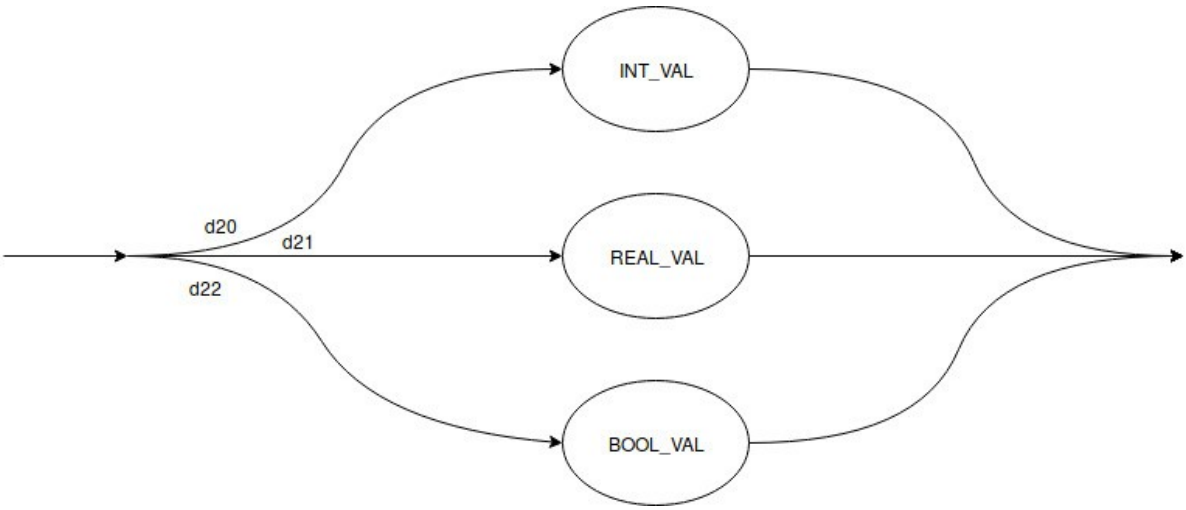
expr



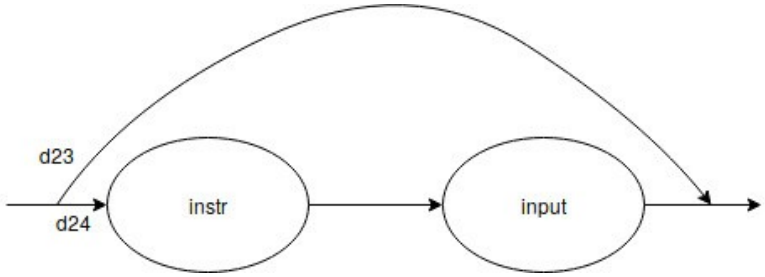
term



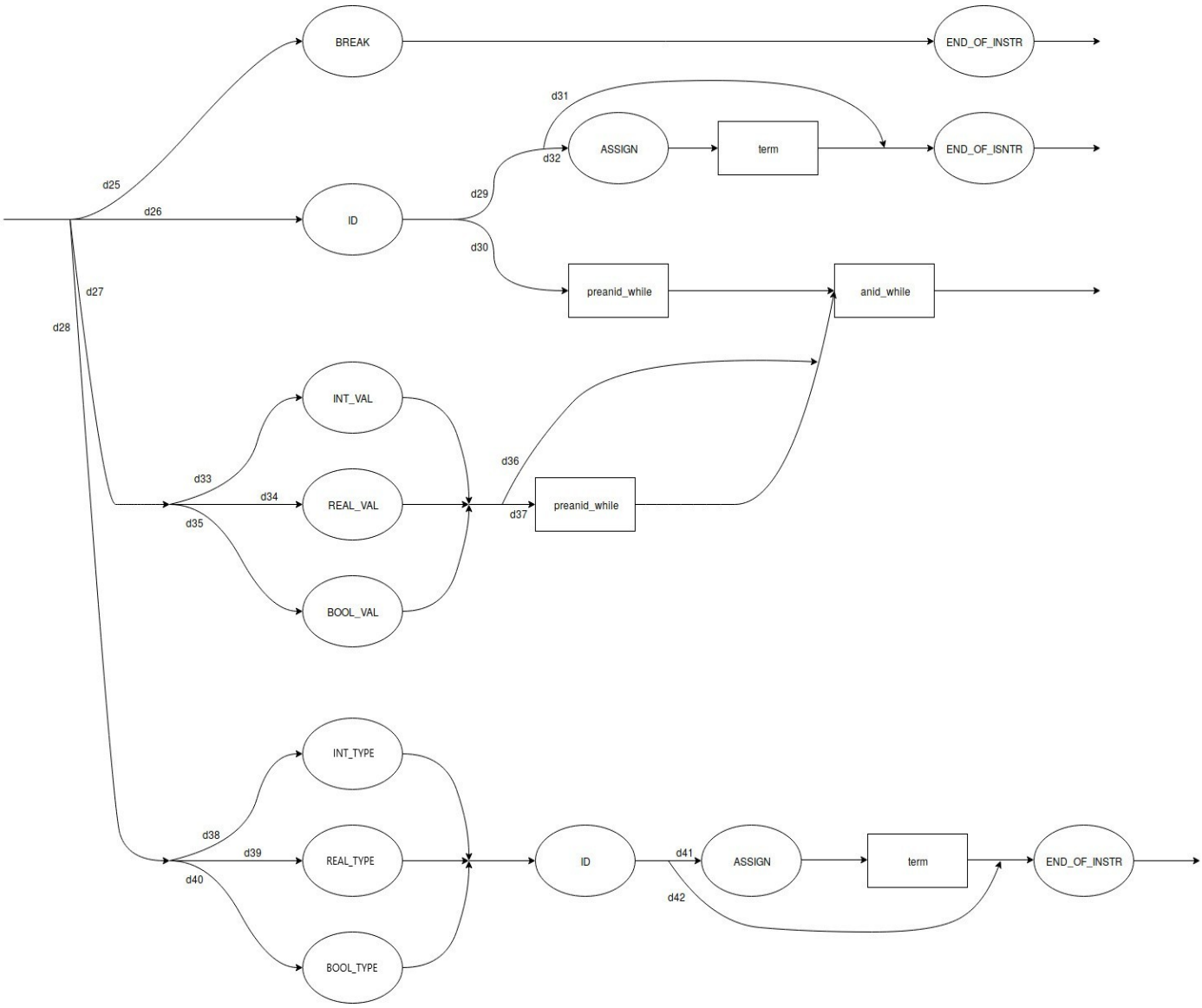
data_value



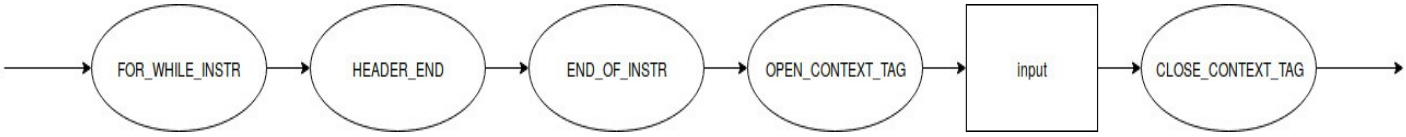
input


d23
d24
instr
input

instr


BREAK
END_OF_INSTR
d31
ASSIGN
term
END_OF_ISNTR
d32
d25
d26
ID
d29
d30
preanid_while
anid_while
d27
d28
INT_VAL
d33
d34
REAL_VAL
d35
BOOL_VAL
d36
d37
preanid_while
INT_TYPE
d38
d39
REAL_TYPE
d40
BOOL_TYPE
ID
d41
ASSIGN
term
END_OF_INSTR
d42

anid_while



preanid_while

Conjuntos de primeros

no_terminal	**primeros**
while_instr	ID, INT_VAL, REAL_VAL, BOOL_VAL
expr	ID, INT_VAL, REAL_VAL, BOOL_VAL
term	ID, INT_VAL, REAL_VAL, BOOL_VAL
data_value	INT_VAL, REAL_VAL, BOOL_VAL
input	BREAK, ID, INT_VAL, REAL_VAL, BOOL_VAL, INT_TYPE, REAL_TYPE, BOOL_TYPE, ε
instr	BREAK, ID, INT_VAL, REAL_VAL, BOOL_VAL, INT_TYPE, REAL_TYPE, BOOL_TYPE
anid_while	FOR_WHILE_CLAUSE
preanid_while	LESS, GREATER, EQUALS, LESS_EQUALS, GREATER_EQUALS, NOT_EQUALS

Conjuntos de siguientes

no_terminal	**siguientes**
while_instr	$
expr	OR, AND, FOR_WHILE_CLAUSE
term	LESS, GREATER, EQUALS, GREATER_EQUALS, LESS_EQUALS, NOT_EQUALS, END_OF_INSTR, FOR, AND, FOR_WHILE_CLAUSE
data_value	LESS, GREATER, EQUALS, GREATER_EQUALS, LESS_EQUALS, NOT_EQUALS, END_OF_INSTR, FOR, AND, FOR_WHILE_CLAUSE, SUM, SUBSTRACT, PRODUCT, DIVIDE
input	CLOSE_CONTEXT_TAG
instr	BREAK, ID, INT_VAL, REAL_VAL, BOOL_VAL, INT_TYPE, REAL_TYPE, BOOL_TYPE, CLOSE_CONTEXT_TAG
anid_while	BREAK, ID, INT_VAL, REAL_VAL, BOOL_VAL, INT_TYPE, REAL_TYPE, BOOL_TYPE, CLOSE_CONTEXT_TAG
preanid_while	FOR_WHILE_CLAUSE

Conjuntos directores

conjunto director	tokens
d1	OR
d2	FOR_WHILE_CLAUSE
d3	AND

conjunto director	tokens
d4	OR, AND, FOR_WHILE_CLAUSE
d5	LESS, GREATER, EQUALS, LESS_EQUALS, GREATER_EQUALS, NOT_EQUALS

conjunto director	tokens
d6	LESS
d7	GREATER
d8	EQUALS
d9	GREATER_EQUALS
d10	NOT_EQUALS
d11	LESS_EQUALS

conjunto director	tokens
d12	ID
d13	INT_VAL, REAL_VAL, BOOL_VAL

conjunto director	tokens
d14	SUM, SUBSTRACT, PRODUCT, DIVIDE
d15	LESS, GREATER, EQUALS, GREATER_EQUALS, LESS_EQUALS, NOT_EQUALS, END_OF_INSTR, FOR, AND, FOR_WHILE_CLAUSE

conjunto director	tokens
d16	SUM
d17	SUBSTRACT
d18	PRODUCT
d19	DIVIDE

conjunto director	tokens
d20	INT_VAL
d21	REAL_VAL
d22	BOOL_VAL

conjuntos directores	tokens
d23	CLOSE_CONTEXT_TAG
d24	BREAK, ID, INT_VAL, REAL_VAL, BOOL_VAL, INT_TYPE, REAL_TYPE, BOOL_TYPE

conjunto director	tokens
d25	BREAK
d26	ID
d27	INT_VAL, REAL_VAL, BOOL_VAL
d28	INT_TYPE, REAL_TYPE, BOOL_TYPE

conjuntos directores	tokens
d29	ASIGN, END_OF_INSTR
d30	FOR_WHILE_CLAUSE

conjuntos directores	tokens
d31	ASIGN
d32	END_OF_INSTR

conjunto director	tokens
d33	INT_VAL
d34	REAL_VAL
d35	BOOL_VAL

conjunto director	tokens
d36	BREAK, ID, INT_VAL, REAL_VAL, BOOL_VAL, INT_TYPE, REAL_TYPE, BOOL_TYPE, CLOSE_CONTEXT_TAG
d37	FOR_WHILE_CLAUSE

conjunto director	tokens
d38	INT_TYPE
d39	REAL_TYPE
d40	BOOL_TYPE

conjunto director	tokens
d41	ASSIGN
d42	END_OF_INSTR

conjunto director	tokens
d43	LESS
d44	GREATER
d45	EQUALS
d46	LESS_EQUALS
d47	GREATER-EQUALS
d48	NOT_EQUALS

conjunto director	tokens
d49	INT_VAL
d50	REAL_VAL
d51	BOOL_VAL
d52	ID