Trabajo Práctico 1
Análisis de Lenguajes de Programación

Alumnas:

Cipullo, Inés

Sullivan, Katherine

Universidad Nacional de Rosario

2021

Ejercicio 1

Gramática Abstracta

$$
\begin{array}{rcl}
\mathit{intexp} & ::= & \mathit{nat} \mid \mathit{var} \mid \; -_u \; \mathit{intexp} \\
 & \mid & \mathit{intexp} \; + \; \mathit{intexp} \\
 & \mid & \mathit{intexp} \; -_b \; \mathit{intexp} \\
 & \mid & \mathit{intexp} \; \times \; \mathit{intexp} \\
 & \mid & \mathit{intexp} \; \div \; \mathit{intexp} \\
 & \mid & \mathit{var} \; = \; \mathit{intexp} \\
 & \mid & \mathit{intexp} \; , \; \mathit{intexp} \\
\mathit{boolexp} & ::= & \mathbf{true} \mid \mathbf{false} \\
 & \mid & \mathit{intexp} \; == \; \mathit{intexp} \\
 & \mid & \mathit{intexp} \; \neq \; \mathit{intexp} \\
 & \mid & \mathit{intexp} \; < \; \mathit{intexp} \\
 & \mid & \mathit{intexp} \; > \; \mathit{intexp} \\
 & \mid & \mathit{boolexp} \; \wedge \; \mathit{boolexp} \\
 & \mid & \mathit{boolexp} \; \vee \; \mathit{boolexp} \\
 & \mid & \neg \; \mathit{boolexp} \\
\mathit{comm} & := & \mathbf{skip} \\
 & \mid & \mathit{var} = \mathit{intexp} \\
 & \mid & \mathit{comm}; \; \mathit{comm} \\
 & \mid & \mathbf{if} \; \mathit{boolexp} \; \mathbf{then} \; \mathit{comm} \; \mathbf{else} \; \mathit{comm} \\
 & \mid & \mathbf{repeat} \; \mathit{comm} \; \mathbf{until} \; \mathit{boolexp}
\end{array}
$$

Gramática Concreta

Estan mal algunos simbolos

$$
\begin{array}{rcl}
\mathit{digit} & ::= & \textbf{‘0’} \mid \textbf{‘1’} \mid \ldots \mid \textbf{‘9’} \\
\mathit{letter} & ::= & \textbf{‘a’} \mid \ldots \mid \textbf{‘Z’} \\
\mathit{nat} & ::= & \mathit{digit} \mid \mathit{digit}\ \mathit{nat} \\
\mathit{var} & ::= & \mathit{letter} \mid \mathit{letter}\ \mathit{var} \\
\mathit{intexp} & ::= & \mathit{nat} \\
 & \mid & \mathit{var} \\
 & \mid & \textbf{‘-’}\ \mathit{intexp} \\
 & \mid & \mathit{intexp}\ \textbf{‘+’}\ \mathit{intexp} \\
 & \mid & \mathit{intexp}\ \textbf{‘-’}\ \mathit{intexp} \\
 & \mid & \mathit{intexp}\ \textbf{‘*’}\ \mathit{intexp} \\
 & \mid & \mathit{intexp}\ \textbf{‘/’}\ \mathit{intexp} \\
 & \mid & \textbf{‘(’}\ \mathit{intexp}\ \textbf{‘)’} \\
 & \mid & \mathit{var}\ \textbf{‘=’}\ \mathit{intexp} \\
 & \mid & \mathit{intexp}\ \textbf{‘,’}\ \mathit{intexp} \\
\mathit{boolexp} & ::= & \textbf{‘true’} \mid \textbf{‘false’} \\
 & \mid & \mathit{intexp}\ \textbf{‘==’}\ \mathit{intexp} \\
 & \mid & \mathit{intexp}\ \textbf{‘!=’}\ \mathit{intexp} \\
 & \mid & \mathit{intexp}\ \textbf{‘¡’}\ \mathit{intexp} \\
 & \mid & \mathit{intexp}\ \textbf{‘¿’}\ \mathit{intexp} \\
 & \mid & \mathit{boolexp}\ \textbf{‘\&\&’}\ \mathit{boolexp} \\
 & \mid & \mathit{boolexp}\ \textbf{‘——’}\ \mathit{boolexp} \\
 & \mid & \textbf{‘!’}\ \mathit{boolexp} \\
 & \mid & \textbf{‘(’}\ \mathit{boolexp}\ \textbf{‘)’} \\
\mathit{comm} & := & \textbf{\textit{skip}} \\
 & \mid & \mathit{var}\ \textbf{‘=’}\ \mathit{intexp} \\
 & \mid & \mathit{comm}\ \textbf{‘;’}\ \mathit{comm} \\
 & \mid & \textbf{‘if’}\ \mathit{boolexp}\ \textbf{‘\{’}\ \mathit{comm}\ \textbf{‘\}’} \\
 & \mid & \textbf{‘if’}\ \mathit{boolexp}\ \textbf{‘\{’}\ \mathit{comm}\ \textbf{‘\}’}\ \textbf{‘else’}\ \textbf{‘\{’}\ \mathit{comm} \\
 & \mid & \textbf{‘repeat’}\ \mathit{comm}\ \textbf{‘until’}\ \mathit{boolexp}\ \textbf{‘end’}
\end{array}
$$

Ejercicio 6

Habria que enunciar las nuevas reglas (ejercicio 4) y cambiar el nombre aca, y enunciar las reglas de la clausura transitiva.

A:

$$\dfrac{\dfrac{}{\langle \textbf{skip}; \textbf{repeat}\ x = x - y\ \textbf{until}\ x == 0,\ [[\sigma|x:1]|y:1]\rangle \rightsquigarrow \langle \textbf{repeat}\ x = x - y\ \textbf{until}\ x == 0,\ [[\sigma|x:1]|y:1]\rangle}\,\text{SEQ}_1}{\langle \textbf{skip}; \textbf{repeat}\ x = x - y\ \textbf{until}\ x == 0,\ [[\sigma|x:1]|y:1]\rangle \rightsquigarrow^* \langle \textbf{repeat}\ x = x - y\ \textbf{until}\ x == 0,\ [[\sigma|x:1]|y:1]\rangle}\,\text{T}_1$$

B:

$$\dfrac{\dfrac{}{\langle \textbf{repeat}\ x = x - y\ \textbf{until}\ x == 0,\ [[\sigma|x:1]|y:1]\rangle \rightsquigarrow \langle x = x - y; \textbf{if}\ x == 0\ \textbf{then skip else repeat}\ x = x - y\ \textbf{until}\ x == 0,\ [[\sigma|x:1]|y:1]\rangle}\,\text{REPEAT}}{\langle \textbf{repeat}\ x = x - y\ \textbf{until}\ x == 0,\ [[\sigma|x:1]|y:1]\rangle \rightsquigarrow^* \langle x = x - y; \textbf{if}\ x == 0\ \textbf{then skip else repeat}\ x = x - y\ \textbf{until}\ x == 0,\ [[\sigma|x:1]|y:1]\rangle}\,\text{T}_1$$

C:

$$\dfrac{\dfrac{\dfrac{\dfrac{\dfrac{}{\langle x,\ [[\sigma|x:1]|y:1]\rangle \Downarrow_{exp} \langle \mathbf{1},\ [[\sigma|x:1]|y:1]\rangle}\,\text{VAR} \quad \dfrac{}{\langle y,\ [[\sigma|x:1]|y:1]\rangle \Downarrow_{exp} \langle \mathbf{1},\ [[\sigma|x:1]|y:1]\rangle}\,\text{VAR}}{\langle x - y,\ [[\sigma|x:1]|y:1]\rangle \Downarrow_{exp} \langle \mathbf{0},\ [[\sigma|x:1]|y:1]\rangle}\,\text{MINUS}}{\langle x = x - y,\ [[\sigma|x:1]|y:1]\rangle \rightsquigarrow \langle \textbf{skip},\ [[\sigma|x:0]|y:1]\rangle}\,\text{ASS}}{\langle x = x - y; \textbf{if}\ x == 0\ \textbf{then skip else repeat}\ x = x - y\ \textbf{until}\ x == 0,\ [[\sigma|x:1]|y:1]\rangle \rightsquigarrow \langle \textbf{skip}; \textbf{if}\ x == 0\ \textbf{then skip else repeat}\ x = x - y\ \textbf{until}\ x ==}}{\langle x = x - y; \textbf{if}\ x == 0\ \textbf{then skip else repeat}\ x = x - y\ \textbf{until}\ x == 0,\ [[\sigma|x:1]|y:1]\rangle \rightsquigarrow^* \langle \textbf{skip}; \textbf{if}\ x == 0\ \textbf{then skip else repeat}\ x = x - y\ \textbf{until}\ x ==}$$

D:

$$\dfrac{\dfrac{\dfrac{\dfrac{\dfrac{}{\langle 1,\ [[\sigma|x:2]|y:2]\rangle \Downarrow_{exp} \langle \mathbf{1},\ [[\sigma|x:2]|y:2]\rangle}\,\text{NVAL}}{\langle y = 1,\ [[\sigma|x:2]|y:2]\rangle \Downarrow_{exp} \langle \mathbf{1},\ [[\sigma|x:2]|y:1]\rangle}\,\text{NASS}}{\langle x = y = 1,\ [[\sigma|x:2]|y:2]\rangle \rightsquigarrow \langle \textbf{skip},\ [[\sigma|x:1]|y:1]\rangle}\,\text{ASS}}{\langle x = y = 1; \textbf{repeat}\ x = x - y\ \textbf{until}\ x == 0,\ [[\sigma|x:2]|y:2]\rangle \rightsquigarrow \langle \textbf{skip}; \textbf{repeat}\ x = x - y\ \textbf{until}\ x == 0,\ [[\sigma|x:1]|y:1]\rangle}\,\text{SEQ}_2}{\langle x = y = 1; \textbf{repeat}\ x = x - y\ \textbf{until}\ x == 0,\ [[\sigma|x:2]|y:2]\rangle \rightsquigarrow^* \langle \textbf{skip}; \textbf{repeat}\ x = x - y\ \textbf{until}\ x == 0,\ [[\sigma|x:1]|y:1]\rangle}\,\text{T}_1$$

E:

$$\dfrac{\dfrac{}{\langle \textbf{skip}; \textbf{if}\ x == 0\ \textbf{then skip else repeat}\ x = x - y\ \textbf{until}\ x == 0,\ [[\sigma|x:0]|y:1]\rangle \rightsquigarrow \langle \textbf{if}\ x == 0\ \textbf{then skip else repeat}\ x = x - y\ \textbf{until}\ x == 0,\ [[\sigma|x:0}}{\langle \textbf{skip}; \textbf{if}\ x == 0\ \textbf{then skip else repeat}\ x = x - y\ \textbf{until}\ x == 0,\ [[\sigma|x:0]|y:1]\rangle \rightsquigarrow^* \langle \textbf{if}\ x == 0\ \textbf{then skip else repeat}\ x = x - y\ \textbf{until}\ x == 0,\ [[\sigma|x:0}$$

F:

$$\dfrac{\dfrac{\dfrac{}{\langle x,\ [[\sigma|x:0]|y:1]\rangle \Downarrow_{exp} \langle \mathbf{0},\ [[\sigma|x:0]|y:1]\rangle}\text{VAR} \qquad \dfrac{}{\langle 0,\ [[\sigma|x:0]|y:1]\rangle \Downarrow_{exp} \langle \mathbf{0},\ [[\sigma|x:0]|y:1]\rangle}\text{NVAL}}{\langle x == 0,\ [[\sigma|x:0]|y:1]\rangle \Downarrow_{exp} \langle \mathbf{true},\ [[\sigma|x:0]|y:1]\rangle}\text{EQ}}{\dfrac{\langle \mathbf{if}\ x == 0\ \mathbf{then\ skip\ else\ repeat}\ x = x - y\ \mathbf{until}\ x == 0,\ [[\sigma|x:0]|y:1]\rangle \rightsquigarrow \langle \mathbf{skip},\ [[\sigma|x:0]|y:1]\rangle}{\langle \mathbf{if}\ x == 0\ \mathbf{then\ skip\ else\ repeat}\ x = x - y\ \mathbf{until}\ x == 0,\ [[\sigma|x:0]|y:1]\rangle \rightsquigarrow^* \langle \mathbf{skip},\ [[\sigma|x:0]|y:1]\rangle}\text{T}_1}\text{IF}_1$$

DEM:

$$\dfrac{\dfrac{\dfrac{\dfrac{\dfrac{D \quad A}{\langle x = y = 1; \mathbf{repeat}\ x = x - y\ \mathbf{until}\ x == 0,\ [[\sigma|x:2]|y:2]\rangle \rightsquigarrow^* \langle \mathbf{repeat}\ x = x - y\ \mathbf{until}\ x == 0,\ [[\sigma|x:1]|y:1]\rangle}\text{T}_2 \quad B}{\langle x = y = 1; \mathbf{repeat}\ x = x - y\ \mathbf{until}\ x == 0,\ [[\sigma|x:2]|y:2]\rangle \rightsquigarrow^* \langle x = x - y; \mathbf{if}\ x == 0\ \mathbf{then\ skip\ else\ repeat}\ x = x - y\ \mathbf{until}\ x == 0,\ [[\sigma|x:1]|y:1]\rangle}\text{T}_2}{\langle x = y = 1; \mathbf{repeat}\ x = x - y\ \mathbf{until}\ x == 0,\ [[\sigma|x:2]|y:2]\rangle \rightsquigarrow^* \langle \mathbf{skip}; \mathbf{if}\ x == 0\ \mathbf{then\ skip\ else\ repeat}\ x = x - y\ \mathbf{until}\ x == 0,\ [[\sigma|x:0]|y:1]\rangle}}{\langle x = y = 1; \mathbf{repeat}\ x = x - y\ \mathbf{until}\ x == 0,\ [[\sigma|x:2]|y:2]\rangle \rightsquigarrow^* \langle \mathbf{if}\ x == 0\ \mathbf{then\ skip\ else\ repeat}\ x = x - y\ \mathbf{until}\ x == 0,\ [[\sigma|x:0]|y:1]\rangle}}{\langle x = y = 1; \mathbf{repeat}\ x = x - y\ \mathbf{until}\ x == 0,\ [[\sigma|x:2]|y:2]\rangle \rightsquigarrow^* \langle \mathbf{skip},\ [[\sigma|x:0]|y:1]\rangle}$$