

Ejercicio nº6 de la hoja nº 4

$P = \{$
 1) $S \rightarrow S D$
 2) $S \rightarrow \varepsilon$
 3) $D \rightarrow T \text{ identificador } (P) ;$
 4) $T \rightarrow T *$
 5) $T \rightarrow \text{int}$
 6) $T \rightarrow \text{char}$
 7) $P \rightarrow \varepsilon$
 8) $P \rightarrow T L$
 9) $L \rightarrow \varepsilon$
 10) $L \rightarrow , T L$
 $\}$

COLECCIÓN CANÓNICA DE ELEMENTOS LR(1)

$I_0 = \text{clausura} (\{[S' \rightarrow \bullet S, \$]\})$
 $= \{[S' \rightarrow \bullet S, \$],$
 $[S \rightarrow \bullet S D, \$, \text{int}, \text{char}]$
 $[S \rightarrow \bullet, \$, \text{int}, \text{char}]\}$

$\text{Ir-a } (I_0, S) = \text{clausura} (\{[S' \rightarrow S \bullet, \$], [S \rightarrow S \bullet D, \$, \text{int}, \text{char}]\})$
 $= \{[S' \rightarrow S \bullet, \$],$
 $[S \rightarrow S \bullet D, \$, \text{int}, \text{char}],$
 $[D \rightarrow \bullet T \text{ identificador } (P) ; , \$, \text{int}, \text{char}],$
 $[T \rightarrow \bullet T *, \text{identificador}, *],$
 $[T \rightarrow \bullet \text{int}, \text{identificador}, *],$
 $[T \rightarrow \bullet \text{char}, \text{identificador}, *]$
 $\}$
 $= I_1$

$\text{Ir-a } (I_1, D) = \text{clausura} (\{[S \rightarrow S D \bullet, \$, \text{int}, \text{char}]\})$
 $= \{[S \rightarrow S D \bullet, \$, \text{int}, \text{char}]\}$
 $= I_2$

$\text{Ir-a } (I_1, T) = \text{clausura} (\{[D \rightarrow T \bullet \text{identificador } (P) ; , \$, \text{int}, \text{char}],$
 $[T \rightarrow T \bullet *, \text{identificador}, *]\})$
 $= \{[D \rightarrow T \bullet \text{identificador } (P) ; , \$, \text{int}, \text{char}],$
 $[T \rightarrow T \bullet *, \text{identificador}, *]\}$
 $= I_3$

$\text{Ir-a } (I_1, \text{int}) = \text{clausura} (\{[T \rightarrow \text{int} \bullet, \text{identificador}, *]\})$
 $= \{[T \rightarrow \text{int} \bullet, \text{identificador}, *]\}$
 $= I_4$

$\text{Ir-a } (I_1, \text{char}) = \text{clausura} (\{[T \rightarrow \text{char} \bullet, \text{identificador}, *]\})$
 $= \{[T \rightarrow \text{char} \bullet, \text{identificador}, *]\}$
 $= I_5$

$$\begin{aligned} \text{Ir-a } (I_3, \text{identificador}) &= \text{clausura} (\{[D \rightarrow T \text{ identificador} \bullet (P) ; , \$, \text{int}, \text{char}]\}) \\ &= \{[D \rightarrow T \text{ identificador} \bullet (P) ; , \$, \text{int}, \text{char}]\} \\ &= I_6 \end{aligned}$$

$$\begin{aligned} \text{Ir-a } (I_3, *) &= \text{clausura} (\{[T \rightarrow T * \bullet, \text{identificador}, *]\}) \\ &= \{[T \rightarrow T * \bullet, \text{identificador}, *]\} \\ &= I_7 \end{aligned}$$

$$\begin{aligned} \text{Ir-a } (I_6, "(") &= \text{clausura} (\{[D \rightarrow T \text{ identificador} (\bullet P) ; , \$, \text{int}, \text{char}]\}) \\ &= \{[D \rightarrow T \text{ identificador} (\bullet P) ; , \$, \text{int}, \text{char}] \\ &\quad [P \rightarrow \bullet, "("), \\ &\quad [P \rightarrow \bullet T L, "("), \\ &\quad [T \rightarrow \bullet T *, ",", *, "("), \\ &\quad [T \rightarrow \bullet \text{int}, ",", *, "("), \\ &\quad [T \rightarrow \bullet \text{char}, ",", *, "(") \\ &\quad \} \\ &= I_8 \end{aligned}$$

$$\begin{aligned} \text{Ir-a } (I_8, P) &= \text{clausura} (\{[D \rightarrow T \text{ identificador} (P \bullet) ; , \$, \text{int}, \text{char}]\}) \\ &= \{[D \rightarrow T \text{ identificador} (P \bullet) ; , \$, \text{int}, \text{char}]\} \\ &= I_9 \end{aligned}$$

$$\begin{aligned} \text{Ir-a } (I_8, T) &= \text{clausura} (\{[P \rightarrow \bullet T L, "("), [T \rightarrow T \bullet *, ",", *]\}) \\ &= \{[P \rightarrow T \bullet L, "("), \\ &\quad [T \rightarrow T \bullet *, ",", *, "("), \\ &\quad [L \rightarrow \bullet, "("), \\ &\quad [L \rightarrow \bullet, T L, "(")]\} \\ &= I_{10} \end{aligned}$$

$$\begin{aligned} \text{Ir-a } (I_8, \text{int}) &= \text{clausura} (\{[T \rightarrow \text{int} \bullet, ",", *]\}) \\ &= \{[T \rightarrow \text{int} \bullet, ",", *, "(")\} \\ &= I_{11} \end{aligned}$$

$$\begin{aligned} \text{Ir-a } (I_8, \text{char}) &= \text{clausura} (\{[T \rightarrow \text{char} \bullet, ",", *]\}) \\ &= \{[T \rightarrow \text{char} \bullet, ",", *, "(")\} \\ &= I_{12} \end{aligned}$$

$$\begin{aligned} \text{Ir-a } (I_9, ")") &= \text{clausura} (\{[D \rightarrow T \text{ identificador} (P) \bullet ; , \$, \text{int}, \text{char}]\}) \\ &= \{[D \rightarrow T \text{ identificador} (P) \bullet ; , \$, \text{int}, \text{char}]\} \\ &= I_{13} \end{aligned}$$

$$\begin{aligned} \text{Ir-a } (I_{10}, L) &= \text{clausura} (\{[P \rightarrow T L \bullet, "(")\}) \\ &= \{[P \rightarrow T L \bullet, "(")\} \\ &= I_{14} \end{aligned}$$

$$\begin{aligned} \text{Ir-a } (I_{10}, *) &= \text{clausura} (\{[T \rightarrow T * \bullet, "(")\}) \\ &= \{[T \rightarrow T * \bullet, ",", *, "(")\} \\ &= I_{15} \end{aligned}$$

$$\begin{aligned}
\text{Ir-a (I}_{10}, \text{“,”})} &= \text{clausura} (\{[L \rightarrow , \bullet T L, \text{“}”]\}) \\
&= \{[L \rightarrow , \bullet T L, \text{“}”], \\
&\quad [T \rightarrow \bullet T *, \text{“}, * , \text{“}”], \\
&\quad [T \rightarrow \bullet \text{int}, \text{“}, * , \text{“}”], \\
&\quad [T \rightarrow \bullet \text{char}, \text{“}, * , \text{“}”]\} \\
&= I_{16}
\end{aligned}$$

$$\begin{aligned}
\text{Ir-a (I}_{13}, \text{“,”})} &= \text{clausura} (\{[D \rightarrow T \text{identificador (P) ; } \bullet , \$, \text{int}, \text{char}]\}) \\
&= \{[D \rightarrow T \text{identificador (P) ; } \bullet , \$, \text{int}, \text{char}]\} \\
&= I_{17}
\end{aligned}$$

$$\begin{aligned}
\text{Ir-a (I}_{16}, T)} &= \text{clausura} (\{[L \rightarrow , T \bullet L, \text{“}”], [T \rightarrow T \bullet *, \text{“}, * , \text{“}”]\}) \\
&= \{[L \rightarrow , T \bullet L, \text{“}”], \\
&\quad [T \rightarrow T \bullet *, \text{“}, * , \text{“}”], \\
&\quad [L \rightarrow \bullet , \text{“}”], \\
&\quad [L \rightarrow \bullet , T L, \text{“}”]\} \\
&= I_{18}
\end{aligned}$$

$$\begin{aligned}
\text{Ir-a (I}_{16}, \text{int})} &= \text{clausura} (\{[T \rightarrow \text{int } \bullet , \text{“}, * , \text{“}”]\}) \\
&= I_{11}
\end{aligned}$$

$$\begin{aligned}
\text{Ir-a (I}_{16}, \text{char})} &= \text{clausura} (\{[T \rightarrow \text{char } \bullet , \text{“}, * , \text{“}”]\}) \\
&= I_{12}
\end{aligned}$$

$$\begin{aligned}
\text{Ir-a (I}_{18}, L)} &= \text{clausura} (\{[L \rightarrow , T L \bullet , \text{“}”]\}) \\
&= \{[L \rightarrow , T L \bullet , \text{“}”]\} \\
&= I_{19}
\end{aligned}$$

$$\begin{aligned}
\text{Ir-a (I}_{18}, *)} &= \text{clausura} (\{[T \rightarrow T * \bullet , \text{“}, * , \text{“}”]\}) \\
&= I_{15}
\end{aligned}$$

$$\begin{aligned}
\text{Ir-a (I}_{18}, \text{“,”})} &= \text{clausura} (\{[L \rightarrow , \bullet T L, \text{“}”]\}) \\
&= I_{16}
\end{aligned}$$

COLECCIÓN CANÓNICA DE ELEMENTOS LR (1)

Se indican los conjuntos de elementos que tienen los mismos centros o corazones.

$$\begin{aligned}
 I_0 &= \text{clausura} (\{[S' \rightarrow \bullet S, \$]\}) \\
 &= \{[S' \rightarrow \bullet S, \$], \\
 &\quad [S \rightarrow \bullet S D, \$, \text{int, char}] \\
 &\quad [S \rightarrow \bullet, \$, \text{int, char}]\}
 \end{aligned}$$

$$\begin{aligned}
 I_r\text{-a} (I_0, S) &= \text{clausura} (\{[S' \rightarrow S \bullet, \$], [S \rightarrow S \bullet D, \$, \text{int, char}]\}) \\
 &= \{[S' \rightarrow S \bullet, \$], \\
 &\quad [S \rightarrow S \bullet D, \$, \text{int, char}], \\
 &\quad [D \rightarrow \bullet T \text{identificador} (P) ; , \$, \text{int, char}], \\
 &\quad [T \rightarrow \bullet T *, \text{identificador, *}], \\
 &\quad [T \rightarrow \bullet \text{int, identificador, *}], \\
 &\quad [T \rightarrow \bullet \text{char, identificador, *}] \\
 &\quad \} \\
 &= I_1
 \end{aligned}$$

$$I_2 = \{[S \rightarrow S D \bullet, \$, \text{int, char}]\}$$

$$\begin{aligned}
 I_3 &= \{[D \rightarrow T \bullet \text{identificador} (P) ; , \$, \text{int, char}], \\
 &\quad [T \rightarrow T \bullet *, \text{identificador, *}]\}
 \end{aligned}$$

$$I_4 = \{[T \rightarrow \text{int} \bullet, \text{identificador, *}]\}$$

$$I_5 = \{[T \rightarrow \text{char} \bullet, \text{identificador, *}]\}$$

$$I_6 = \{[D \rightarrow T \text{identificador} \bullet (P) ; , \$, \text{int, char}]\}$$

$$I_7 = \{[T \rightarrow T * \bullet, \text{identificador, *}]\}$$

$$\begin{aligned}
 I_8 &= \{[D \rightarrow T \text{identificador} (\bullet P) ; , \$, \text{int, char}] \\
 &\quad [P \rightarrow \bullet, \text{"}"], \\
 &\quad [P \rightarrow \bullet T L, \text{"}"], \\
 &\quad [T \rightarrow \bullet T *, \text{"}, *], \\
 &\quad [T \rightarrow \bullet \text{int, "}, *], \\
 &\quad [T \rightarrow \bullet \text{char, "}, *] \\
 &\quad \}
 \end{aligned}$$

$$I_9 = \{[D \rightarrow T \text{identificador} (P \bullet) ; , \$, \text{int, char}]\}$$

$$\begin{aligned}
 I_{10} &= \{[P \rightarrow T \bullet L, \text{"}"], \\
 &\quad [T \rightarrow T \bullet *, \text{"}, *], \\
 &\quad [L \rightarrow \bullet, \text{"}"], \\
 &\quad [L \rightarrow \bullet, T L, \text{"}]\}
 \end{aligned}$$

$$I_{11} = \{[T \rightarrow \text{int} \bullet, \text{"}, *],\}$$

$$I_{12} = \{[T \rightarrow \text{char} \bullet, ",", *],\}$$

$$I_{13} = \{[D \rightarrow T \text{ identificador } (P) \bullet ;, \$, \text{int}, \text{char}]\}$$

$$I_{14} = \{[P \rightarrow T L \bullet, ""]\}$$

$$I_{15} = \{[T \rightarrow T * \bullet, ",", *]\}$$

$$I_{16} = \{[L \rightarrow , \bullet T L, ""] , \\ [T \rightarrow \bullet T *, ",", *], \\ [T \rightarrow \bullet \text{int}, ",", *], \\ [T \rightarrow \bullet \text{char}, ",", *]\}$$

$$I_{17} = \{[D \rightarrow T \text{ identificador } (P) ; \bullet , \$, \text{int}, \text{char}]\}$$

$$I_{18} = \{[L \rightarrow , T \bullet L, ""] , \\ [T \rightarrow T \bullet *, ",", *], \\ [L \rightarrow \bullet, ""] , \\ [L \rightarrow \bullet , T L, ""]\}$$

$$I_{19} = \{[L \rightarrow , T L \bullet, ""]\}$$

COLECCIÓN CANÓNICA DE ELEMENTOS LALR (1)

$$\begin{aligned}
 I_0 &= \text{clausura} (\{[S' \rightarrow \bullet S, \$]\}) \\
 &= \{[S' \rightarrow \bullet S, \$], \\
 &\quad [S \rightarrow \bullet S D, \$, \text{int}, \text{char}] \\
 &\quad [S \rightarrow \bullet, \$, \text{int}, \text{char}]\}
 \end{aligned}$$

$$\begin{aligned}
 \text{Ir-a } (I_0, S) &= \text{clausura} (\{[S' \rightarrow S \bullet, \$], [S \rightarrow S \bullet D, \$, \text{int}, \text{char}]\}) \\
 &= \{[S' \rightarrow S \bullet, \$], \\
 &\quad [S \rightarrow S \bullet D, \$, \text{int}, \text{char}], \\
 &\quad [D \rightarrow \bullet T \text{ identificador } (P) ; , \$, \text{int}, \text{char}], \\
 &\quad [T \rightarrow \bullet T *, \text{ identificador}, *], \\
 &\quad [T \rightarrow \bullet \text{int}, \text{ identificador}, *], \\
 &\quad [T \rightarrow \bullet \text{char}, \text{ identificador}, *] \\
 &\quad \} \\
 &= I_1
 \end{aligned}$$

$$I_2 = \{[S \rightarrow S D \bullet, \$, \text{int}, \text{char}]\}$$

$$\begin{aligned}
 I_3 &= \{[D \rightarrow T \bullet \text{ identificador } (P) ; , \$, \text{int}, \text{char}], \\
 &\quad [T \rightarrow T \bullet *, \text{ identificador}, *]\}
 \end{aligned}$$

$$I_{4-11} = \{[T \rightarrow \text{int} \bullet, \text{ identificador}, *, \text{“,”}]\}$$

$$I_{5-12} = \{[T \rightarrow \text{char} \bullet, \text{ identificador}, *, \text{“,”}]\}$$

$$I_6 = \{[D \rightarrow T \text{ identificador} \bullet (P) ; , \$, \text{int}, \text{char}]\}$$

$$I_{7-15} = \{[T \rightarrow T * \bullet, \text{ identificador}, *, \text{“,”}]\}$$

$$\begin{aligned}
 I_8 &= \{[D \rightarrow T \text{ identificador } (\bullet P) ; , \$, \text{int}, \text{char}] \\
 &\quad [P \rightarrow \bullet, \text{“}”], \\
 &\quad [P \rightarrow \bullet T L, \text{“}”], \\
 &\quad [T \rightarrow \bullet T *, \text{“}, \text{”}, *], \\
 &\quad [T \rightarrow \bullet \text{int}, \text{“}, \text{”}, *], \\
 &\quad [T \rightarrow \bullet \text{char}, \text{“}, \text{”}, *] \\
 &\quad \}
 \end{aligned}$$

$$I_9 = \{[D \rightarrow T \text{ identificador } (P \bullet) ; , \$, \text{int}, \text{char}]\}$$

$$\begin{aligned}
 I_{10} &= \{[P \rightarrow T \bullet L, \text{“}”], \\
 &\quad [T \rightarrow T \bullet *, \text{“}, \text{”}, *], \\
 &\quad [L \rightarrow \bullet, \text{“}”], \\
 &\quad [L \rightarrow \bullet, T L, \text{“}”]\}
 \end{aligned}$$

$$I_{13} = \{[D \rightarrow T \text{ identificador } (P) \bullet ; , \$, \text{int}, \text{char}]\}$$

$$I_{14} = \{[P \rightarrow T L \bullet, \text{“}”]\}$$

$$I_{16} = \{[L \rightarrow , \bullet TL, ")"], \\ [T \rightarrow \bullet T *, ", *], \\ [T \rightarrow \bullet \text{int}, ", *], \\ [T \rightarrow \bullet \text{char}, ", *]\}$$

$$I_{17} = \{[D \rightarrow T \text{ identificador } (P) ; \bullet , \$, \text{int}, \text{char}]\}$$

$$I_{18} = \{[L \rightarrow , T \bullet L, ")"], \\ [T \rightarrow T \bullet *, ", *], \\ [L \rightarrow \bullet, ")"], \\ [L \rightarrow \bullet, TL, ")"]\}$$

$$I_{19} = \{[L \rightarrow , TL \bullet, ")"]\}$$

