AUTOMATA FINITO NO DETERMINISTA CON TRANSICIONES EPSILON $\quad AFN-\varepsilon$

Se define un $AFN-\varepsilon$ *como una quinteta* $\left(Q,\ \Sigma,\ \delta,\ q_0,\ F\right)$, *donde todos los componentes, excepto* δ, *son como en los modelos anteriores.*

δ *se define como* $\delta(q,\ a)=p$ *que consta de todos los estados* p *que son accesibles desde* q, *a traves de una transicion etiquetada* a, *que puede ser* ε *o un elemento de* Σ.

Cerradura ε *de un estado* p. $\boxed{\varepsilon-c(p)}$

Es el conjunto de todos los estados de Q *que son accesibles desde* p *con trayectorias etiquetadas por* ε *unicamente.*

$\varepsilon-c(p)\neq\varnothing$ *ya que* p *pertenece a su propia cerradura* ε

Cerradura ε *de un conjunto* P *de estados.* $\quad \varepsilon-c(P)$

Para $P\subseteq Q$, *se tiene* $\varepsilon-c(P)=\cup\,\varepsilon-c(p),\ p\in P$

$$\boxed{\varepsilon-c\left(\left\{q_0,q_1\right\}\right)=\varepsilon-c\left(q_0\right)\cup\varepsilon-c\left(q_1\right)=\left\{q_0,\ q_1,q_2\right\}}$$

Definicion de δ^*

$$\delta^*(q,\ \varepsilon)=\varepsilon-c(q)$$

$$\delta^*(q,\ \omega a)=\varepsilon-c\left(\delta\left(\delta^*(q,\ \omega),a\right)\right),\ \omega\in\Sigma^*,\ a\in\Sigma$$

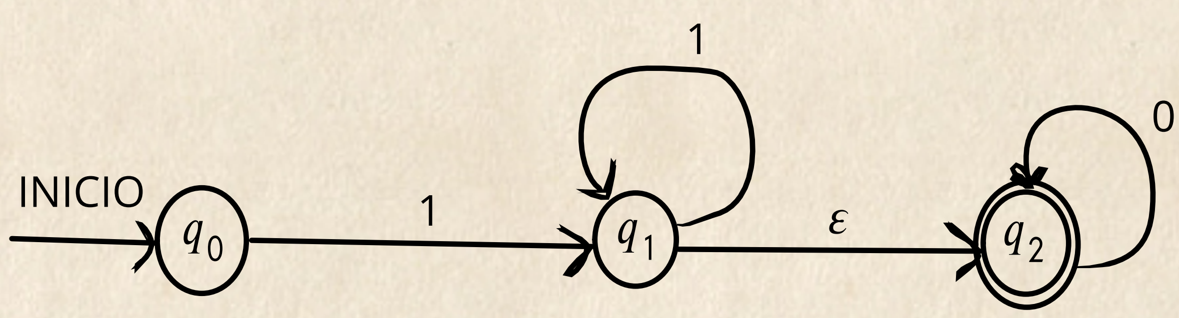
$$\delta^*(R,\ a)=\ \cup\,\delta(q,\ a)\quad q\in R,\ a\in\Sigma$$

$$\delta^*(R,\ \omega)=\ \cup\,\delta(q,\ \omega)\quad q\in R,\ \omega\in\Sigma^*$$

El lenguaje aceptado por $M=\left(Q,\ \Sigma,\ \delta,\ q_0,\ F\right)$ *es :*

$$L(M)=\left\{\omega\mid\delta^*\left(q_0,\ \omega\right)\cap F\neq\varnothing\right\}$$

EJEMPLO: Determinar si la cadena 110 es parte de L(M).



$\boxed{11=11\varepsilon}$ $\quad$ $\boxed{110=11\varepsilon 0}$

ESTADOS	0	1	ε	
q_0	$\varnothing$	$\{q_1\}$	$\varnothing$	0
q_1	$\varnothing$	$\{q_1\}$	$\{q_2\}$	0
q_2	$\{q_2\}$	$\varnothing$	$\varnothing$	1

1. *Calcular todas las cerraduras epsilon para TODOS los estados del automata.*

$$\varepsilon-c\left(q_0\right)=\left\{q_0\right\}=\delta^*\left(q_0,\ \varepsilon\right)$$

$$\varepsilon-c\left(q_1\right)=\left\{q_1,\ q_2\right\}=\delta^*\left(q_1,\ \varepsilon\right)$$

$$\varepsilon-c\left(q_2\right)=\left\{q_2\right\}=\delta^*\left(q_2,\ \varepsilon\right)$$

$$\delta^*\left(q_0,\ 110\right)=\varepsilon-c\left(\delta\left(\delta^*\left(q_0,\ 11\right),\ 0\right)\right)=\varepsilon-c\left(\delta\left(\left\{q_1,\ q_2\right\},0\right)\right)=\varepsilon-c\left(\delta\left(\left\{q_1\right\},\ 0\right)\cup\delta\left(\left\{q_2\right\},0\right)\right)=\varepsilon-c\left(\left\{q_2\right\}\right)=\boxed{\left\{q_2\right\}}$$

$$\delta^*\left(q_0,\ 11\right)=\varepsilon-c\left(\delta\left(\delta^*\left(q_0,\ 1\right),\ 1\right)\right)=\varepsilon-c\left(\delta\left(\left\{q_1,\ q_2\right\},1\right)\right)=\varepsilon-c\left(\delta\left(\left\{q_1\right\},1\right)\cup\delta\left(\left\{q_2\right\},1\right)\right)=\varepsilon-c\left(\left\{q_1\right\}\right)=\left\{q_1,\ q_2\right\}$$

$$\delta^*\left(q_0,\ 1\right)=\varepsilon-c\left(\delta\left(\delta^*\left(q_0,\ \varepsilon\right),\ 1\right)\right)=\varepsilon-c\left(\delta\left(\left\{q_0\right\},\ 1\right)\right)=\varepsilon-c\left(\left\{q_1\right\}\right)=\left\{q_1,\ q_2\right\}$$

$$\delta^*\left(q_0,\ \varepsilon\right)=\left\{q_0\right\}$$