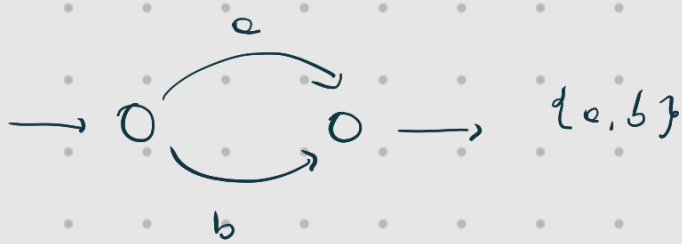


Continuação...

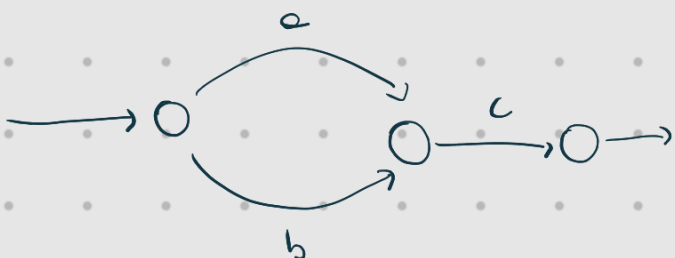
União  $A \cup B = \{\omega \mid \omega \in A \vee \omega \in B\}$

Interseção  $A \cap B = \{\omega \mid \omega \in A \wedge \omega \in B\}$



$\{a, b\}$

$X = \{a\} \cup \{b\}$



$Y = \{ac, bc\}$

Concatenação

$A \cdot B = \{x \cdot y \mid x \in A \wedge y \in B\}$

$\downarrow$   
 $Y = \{a, b\} \cdot \{c\}$   
 $Y = (\{a\} \cup \{b\}) \cdot \{c\}$

Negação

$\bar{A} = \{\omega \mid \omega \in \Sigma^* \wedge \omega \notin A\}$

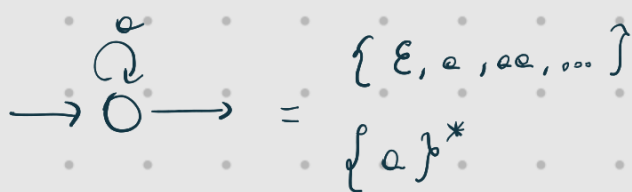
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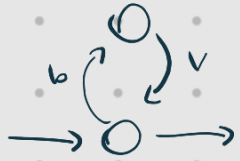
$Z = \{\epsilon, a, aa, aaa, \dots\}$

Estrela de Kleene

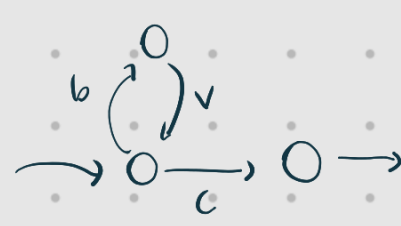
$$A^* = \bigcup_{i=0}^{\infty} A^i$$



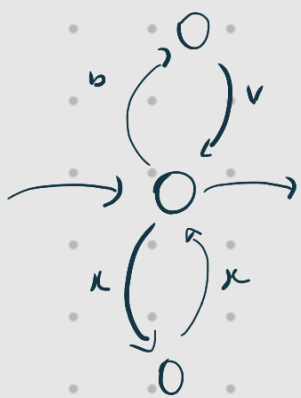
$\{ \epsilon, a, aa, \dots \}$   
 $\{a\}^*$



linguagem:  $\{\epsilon, bv, bvbv, \dots\}$   
 $\{bv\}^*$



$\{c, bvc, bvbvc, \dots\}$   
 $\{bv\}^* \cdot \{c\}$



$$\{bv\}^* \cdot \{xx\}^*$$

não aceita  $bvxxbv$

$$(\{bv\} \cdot \{xx\})^*$$

não aceita  $bvbv$

$$(\{bv\} \cdot \{xx\})^*$$

não aceita  $xx$

$$(\{bv\} \cup \{xx\})^*$$

$$A = \{bv, xx\}$$

$$A = A^0$$

$$\{\epsilon\}$$

$$\cup A^1$$

$$\{bv, xx\}$$

$$\cup A^2$$

$$\{bv, xx\} \cdot \{bv, xx\} = \{bvbv, bvxx, xxbv, xxxx\}$$

...

outra solução via  $(\{bv\}^* \cdot \{xx\}^*)^*$

Provar as equivalências é trabalhoso

Identidades

$$\emptyset = \{\} \neq \{\epsilon\}$$

$$\{\epsilon\} \cdot A = A \cdot \{\epsilon\}$$

Identidade

$$\emptyset \cdot A = \emptyset = A \cdot \emptyset$$

$$A \cup \emptyset = A$$

Conf. vazia.

$$(A \cdot B) \cdot C = A \cdot (B \cdot C)$$

Associatividade

$$(A \cup B) \cup C = A \cup (B \cup C)$$

Associatividade

$$A \cdot (B \cup C) = A \cdot B \cup A \cdot C$$

Distribuição

$$A \cup A = A$$

$$A \cdot \{\}$$

= (def concat)

$$\{xy \mid x \in A \wedge y \in \{\}\}$$

= (ninguém pertence ao vazio)

$$\{xy \mid x \in A \wedge \text{Falso}\}$$

=

$$\{\}$$

$$\begin{aligned}
& (A \circ B) \circ C \\
&= (\text{def concatenação}) \\
&\quad \{\omega z \mid \omega \in (A \circ B) \wedge z \in C\} \\
&= (\text{def concatenação}) \\
&\quad \{\omega z \mid \omega \in \{xy \mid x \in A \wedge y \in B\} \wedge z \in C\} \\
&= (\omega = xy) \\
&\quad \{(xy)z \mid x \in A \wedge y \in B \wedge z \in C\} \\
&= (\text{associatividade de string}) \\
&\quad \{x(yz) \mid x \in A \wedge y \in B \wedge z \in C\} \\
&= (v = yz) \\
&\quad \{xv \mid x \in A \wedge v \in \{yz \mid y \in B \wedge z \in C\}\} \\
&= (\text{def. concatenação}) \\
&\quad \{xv \mid x \in A \wedge v \in (B \circ C)\} \\
&= (\text{def. concatenação}) \\
&\quad A \circ (B \circ C)
\end{aligned}$$

$$\begin{aligned}
& A \circ \{\epsilon\} \\
&= (\text{def concatenação}) \\
&\quad \{xy \mid x \in A \wedge y \in \{\epsilon\}\} \\
&= (y = \epsilon) \\
&\quad \{x \epsilon \mid x \in A\} \\
&= (\epsilon \text{ é elemento neutro do concat string}) \\
&\quad \{x \mid x \in A\} \\
&= A
\end{aligned}$$