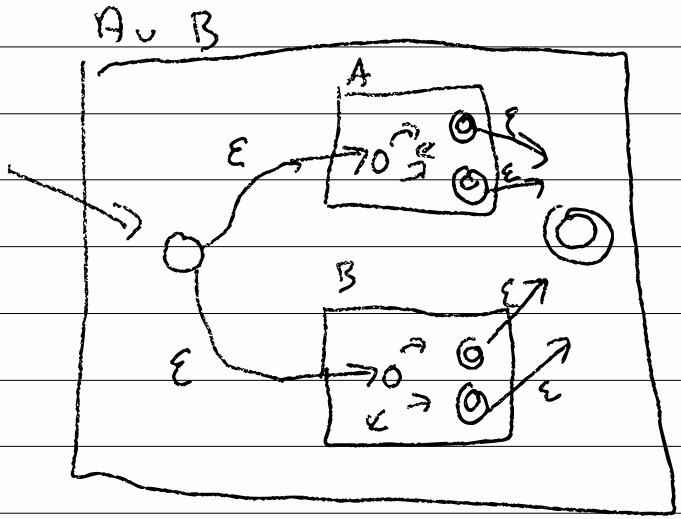
6-1/ NFAs



6-2/ union: $(Q_A, \Sigma, q_{0A}, \delta_A: Q_A \times M(\Sigma) \Rightarrow P(Q_A), F_A)$

$(Q_B, \Sigma, q_{0B}, \delta_B: Q_B \times M(\Sigma) \Rightarrow P(Q_B), F_B)$

$Q_C = \{start, end\} \cup 0 \times Q_A \cup 1 \times Q_B$

$q_{0C} = start$

$F_C = \{end\}$

$\delta_C(start, \varepsilon) = \{(0, q_{0A}), (1, q_{0B})\}$

$\delta_C(start, c \neq \varepsilon) = \emptyset$

$\delta_C(end, \_) = \emptyset$

$\delta_C((0, q_a), c) =$

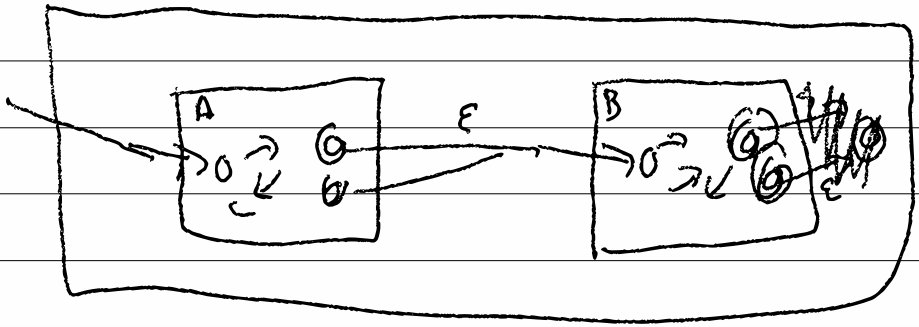
$0 \times \delta_A(q_a, c) \cup$ if $c = \varepsilon$ and $q_a \in F_a$ $\{end\}$ o.w. $\emptyset$

$\delta_C((1, q_b), c) = 1 \times \delta_B(q_b, c)$

$\cup$ if $c = \varepsilon$ and $q_b \in F_b$ $\{end\}$ o.w. $\emptyset$

6-3/ Concatenation

$A \circ B$



$Q_C = \{0\} \times Q_A \cup \{1\} \times Q_B$

$q_{0C} = (0, q_{0A})$

$F_C = \{1\} \times F_B$

$\delta_C((0, q_a), c) = \{0\} \times \delta(q_a, c)$

$\cup$ if $q_a \in F_a$ and ε

$\{(1, q_{0B})\}$ and $\emptyset$

$\delta_C((1, q_b), c) = \{1\} \times \delta_D(q_b, c)$

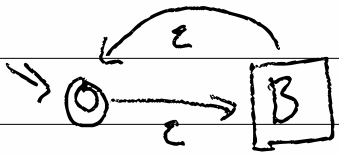
6-4/ Kleene star B^*

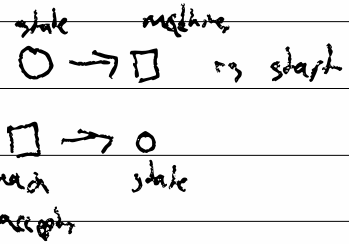
$X \in B^*$ iff $X = X_0 \circ X_1 \circ X_2 \circ \cdots \circ X_n$

s.t. $X_i \in B$

iff $X \in \{\varepsilon\} \cup B \circ B^*$

$a_{ij} a_{ij} \in \{a, i\}$





6-5/ What's a formula for "even length strings"

$(\{0,1\} \circ \{0,1\})^*$

"odd numbers"

$\{0,1\}^* \circ \{1\}$

regular expressions

6-6)   wanted was concatenation on DFAs

BUT we got concat on NFAs

Are NFAs and DFAs equivalent?

~~$\forall$ A. $\exists$ d~~

$\forall d \in DFA.\ \exists n \in NFA.\ L(d) = L(n)$] convert

$\forall n \in NFA.\ \exists d \in DFA.\ L(n) = L(d)$] compile

Regular Languages REG