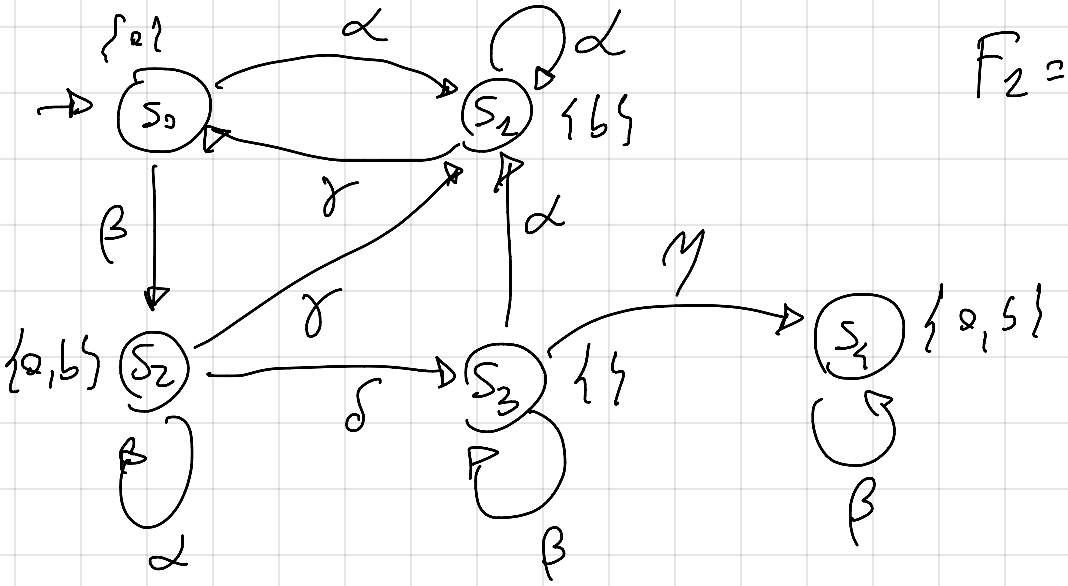


$F_2 = \{\{\{\alpha\}\}, \{\{\beta\}, \{\delta, \gamma\}, \{\eta\}\}, \emptyset\}$

..... $s_3 \xrightarrow{\eta} s_4 \cdots$ unfair because of α unconditional fairness

...... $(s_0 \xrightarrow{\beta} s_2 \xrightarrow{\gamma} s_1 \xrightarrow{\gamma} s_0)^\omega$ unfair

.... $(s_3 \xrightarrow{\beta} s_3)^\omega$ unfair

.... $((s_0 \xrightarrow{\alpha} (s_1 \xrightarrow{\alpha} s_1)^* \xrightarrow{\gamma} s_0)^\omega$ unfair because of strong fairness on β

.... $(s_0\ s_2^+\ s_3 \xrightarrow{\alpha} s_4^+)^\omega$

..... $s_0 \xrightarrow{\beta} (s_2 \xrightarrow{\alpha} s_2)^\omega$ unfair because strong fairness of $\{\delta, \gamma\}$

..... $(s_1 \xrightarrow{\alpha} s_1)^\omega$

.... $(s_0\ s_2^+\ s_3^+\ s_4^+)^\omega$ unfair for strong fairness of $\{\eta\}$

FAIR - F_2 - PATHS

.... $(s_0\ s_2^+\ s_1^+)^\omega \rightsquigarrow (\{a\}\ \{a,b\}^+\ \{b\}^+)^\omega$

.... $((s_0\ s_1^+)^+\ s_2^+\ s_2^+)^\omega \rightsquigarrow ((\{a\}\ \{b\}^+)^+\ \{a,b\}^+\ \{b\}^+)^\omega$

$TS \models_{F_2} P$

$F_2 = \{\{\{\alpha\}\}, \{\{\beta\},\{\gamma\}\}, \{\{\eta\}\}\}$

There are the same fair paths as F_1 plus:

$$\dots \left[(s_0\, s_1^+)^+\, s_2^+\, s_3^+\, s_2^+\, s_0\right]^\omega$$

$$\downarrow$$

$$\dots \left[(\{a\}\{b\}^+)^+\, \{a,b\}^+\, \{\}^+\, \{b\}^+\, \{a\}\right]^\omega$$

P is not satisfied because there is $k > n$ s.t. $a \in A_k$ and $b \notin A_{k+1}$

(a) Whenever A holds then B does not hold for two steps

- Formalise: $E_{(a)} = \{ A_0 A_1 \cdots \in (2^{AP})^\omega \mid$

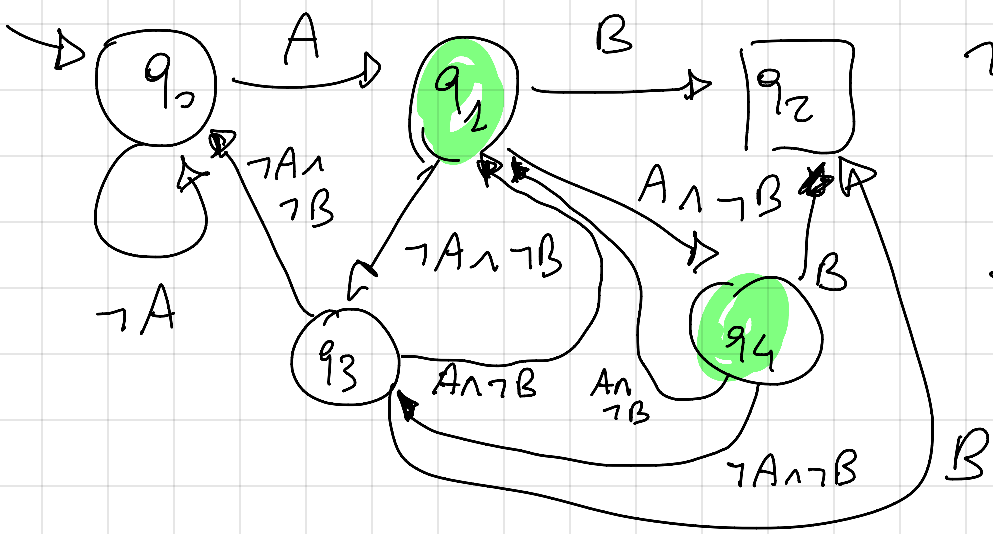
$\forall n \in \mathbb{N}.\ A \in A_n \Rightarrow (B \notin A_{n+1} \land B \notin A_{n+2}) \}$

- SAFETY or LIVENESS? SAFETY

LTL: $\square(\underbrace{A}_{n} \Rightarrow (\underbrace{\bigcirc\bigcirc\neg B}_{n+2} \land \underbrace{\bigcirc\neg B}_{n+1}))$

NFA for minimal bad prefixes

$AP = \{A, B\}$



$B = \{\{B\}, \{A, B\}\}$

$\neg B = \{\{A\}, \{\}\}$

$A = \{\{A\}, \{A, B\}\}$

$\neg A = \{\{B\}, \{\}\}$

equivalent