

Praktikum Rechnerstrukturen 02

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2.2a

f: $\mathbb{B}^4 \rightarrow \mathbb{B}^6$

$$\begin{aligned} f(x_3, x_2, x_1, x_0) &= (y_5, y_4, y_3, y_2, y_1, y_0) \text{ für} \\ y_0 &= (x_3 \vee x_2 \vee x_1 \vee x_0) \\ y_1 &= (x_3 \vee (x_2 \wedge x_1)) \\ y_2 &= (x_3 \vee (x_2 \wedge x_1 \wedge x_0)) \\ y_3 &= (x_3 \wedge \neg(x_2 \wedge x_1 \wedge x_0)) \\ y_4 &= ((x_3 \wedge x_2) \vee (x_3 \wedge x_1)) \\ y_5 &= (x_0 \wedge x_1 \wedge x_2 \wedge x_3) \end{aligned}$$

2.2b

$$\begin{aligned} \text{ON}(f_0) &= \{0000\} \\ \text{ON}(f_1) &= \{0001, 0010, 0011, 0100, 0101, 0110, 0111, 1000, 1001, 1010, 1011, 1100, \\ &\quad 1101, 1110, 1111\} \\ \text{ON}(f_2) &= \{0110, 0111, 1000, 1001, 1010, 1011, 1100, 1101, 1110, 1111\} \\ \text{ON}(f_3) &= \{0111, 1000, 1001, 1010, 1011, 1100, 1101, 1110, 1111\} \\ \text{ON}(f_4) &= \{1001, 1010, 1011, 1100, 1101, 1110, 1111\} \\ \text{ON}(f_5) &= \{1010, 1011, 1100, 1101, 1110, 1111\} \\ \text{ON}(f_6) &= \{1111\} \end{aligned}$$

2.2c

Die minimierten Formen entsprechen den bereits beim Ablesen zusammengefassten Werten aus 2.2a.

$$f: \mathbb{B}^4 \rightarrow \mathbb{B}^6$$

$$f(x_3, x_2, x_1, x_0) = (y_5, y_4, y_3, y_2, y_1, y_0) \text{ für}$$

$$y_0 = (x_3 \vee x_2 \vee x_1 \vee x_0)$$

$$y_1 = (x_3 \vee (x_2 \wedge x_1))$$

$$y_2 = (x_3 \vee (x_2 \wedge x_1 \wedge x_0))$$

$$y_3 = (x_3 \wedge \neg(x_2 \wedge x_1 \wedge x_0))$$

$$y_4 = ((x_3 \wedge x_2) \vee (x_3 \wedge x_1))$$

$$y_5 = (x_0 \wedge x_1 \wedge x_2 \wedge x_3)$$

2.3a

$$f: \mathbb{B}^3 \rightarrow \mathbb{B}^3$$

$$f(x_2, x_1, x_0) = (y_2, y_1, y_0) \text{ für}$$

$$y_0 = ((\neg x_2 \wedge x_1 \wedge \neg x_0) \vee (\neg x_2 \wedge x_1 \wedge x_0) \vee (x_2 \wedge \neg x_1 \wedge x_0))$$

$$y_1 = ((\neg x_2 \wedge x_1 \wedge \neg x_0) \vee (x_2 \wedge \neg x_1 \wedge x_0) \vee (x_2 \wedge x_1 \wedge x_0))$$

$$y_2 = ((\neg x_2 \wedge x_1 \wedge x_0) \vee (x_2 \wedge \neg x_1 \wedge x_0))$$

2.3b

$$\text{ON}(f_0) = \{010, 011, 101\}$$

$$\text{ON}(f_1) = \{010, 101, 111\}$$

$$\text{ON}(f_2) = \{011, 101\}$$

$$\text{DC}(f_0) = \{000, 001, 100, 110\}$$

$$\text{DC}(f_1) = \{000, 001, 100, 110\}$$

$$\text{DC}(f_2) = \{000, 001, 100, 110\}$$

2.3c

Führt zu:

$$y_0 = ((\neg x_2 \wedge x_1) \vee (x_2 \wedge \neg x_1 \wedge x_0))$$

A diagram illustrating a 2D grid structure. The grid is composed of 4 columns and 2 rows of cells. The horizontal dimension is labeled x_0 and the vertical dimension is labeled x_1 . The cells are indexed as follows: the top row contains cells 0, 1, 5, and 4; the bottom row contains cells 2, 3, 7, and 6. A path is highlighted, starting at cell 0, moving right to cell 1, then down to cell 3, and finally right to cell 7. The cells 5 and 4 are also part of the path, connected by a vertical line segment.

Führt zu:

$$y_1 = ((x_2 \wedge x_0) \vee (\neg x_2 \wedge x_1 \wedge \neg x_0))$$

		x_0			
x_1		0	0	1	0
		0	1	5	4
		0	1	0	0
		2	3	7	6

Führt weiterhin zu:

$$y_2 = ((\neg x_2 \wedge x_1 \wedge x_0) \vee (x_2 \wedge \neg x_1 \wedge x_0))$$