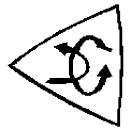

Digitalna tehnika

4. poglavje:

Kombinacijska vezja

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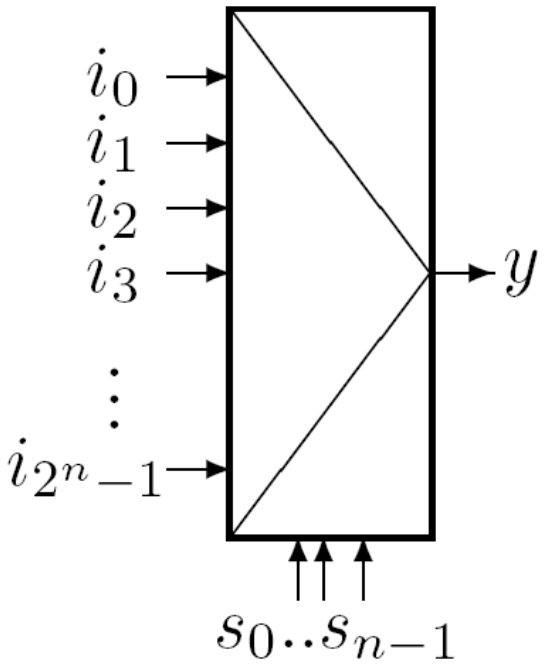
Kombinacijska vezja so sestavljena iz osnovnih logičnih vrat.

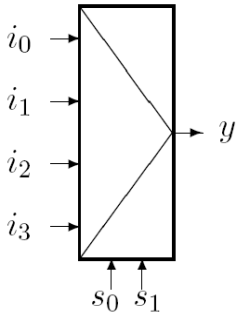
Stanje izhodov je neposredno odvisno od vhodov v istem trenutku (nimajo lastnosti pomnjenja).

Koristna spletna stran z razlago, s poskusi in kvizi:

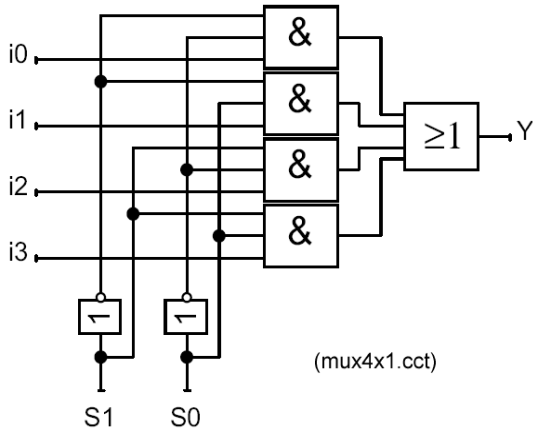
http://www.fernuni-hagen.de/IT/webcircuits/main.html

Multiplekserji

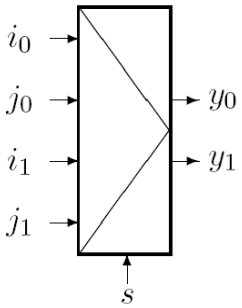




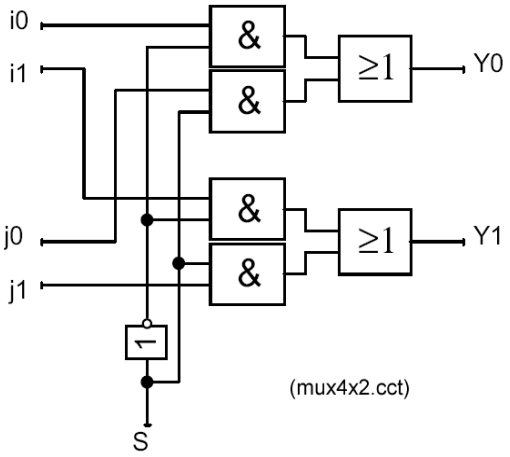
s_0	s_1	y
0	0	i_0
0	1	i_1
1	0	i_2
1	1	i_3



Večbitni multiplekser:



s	y_0	y_1
0	i_0	i_1
1	j_0	j_1



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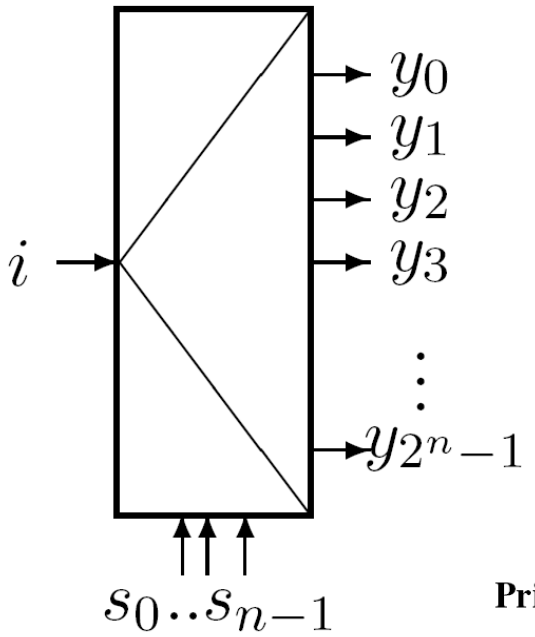
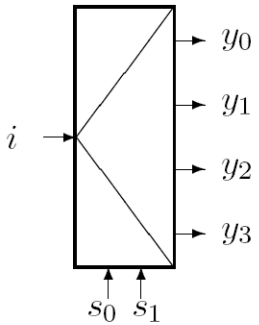
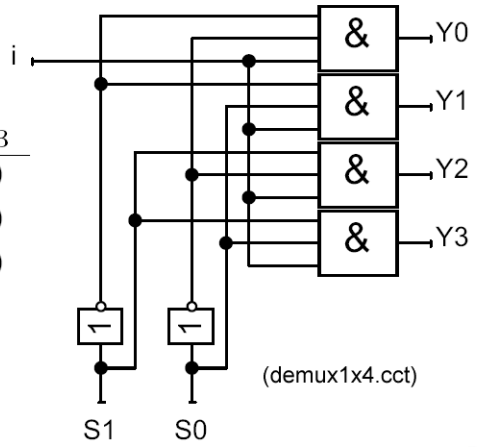
Demultiplekserji



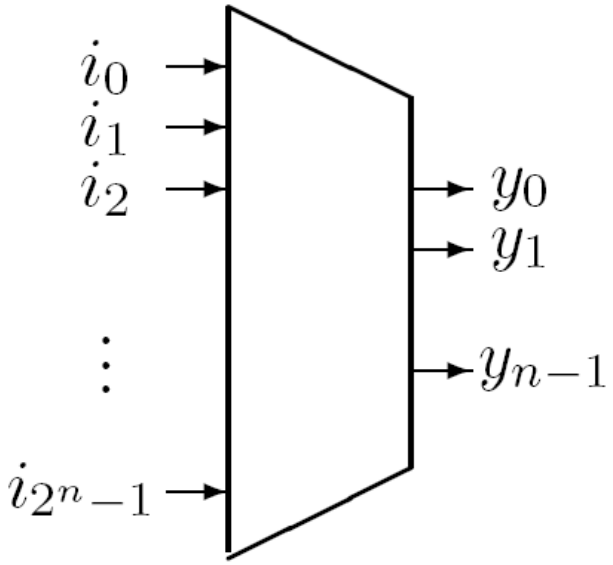
Primer: 1-vhodni 4-izhodni demultiplekser:

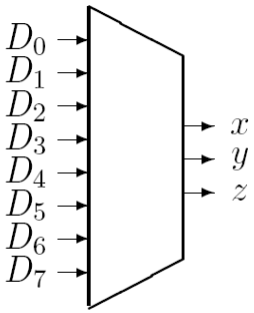


s_0	s_1	y_0	y_1	y_2	y_3
0	0	i	0	0	0
0	1	0	i	0	0
1	0	0	0	i	0
1	1	0	0	0	i



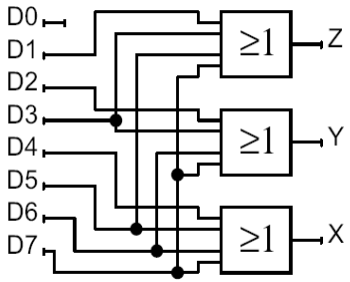
Kodirniki





D_0	D_1	D_2	D_3	D_4	D_5	D_6	D_7	X	Y	Z
1	0	0	0	0	0	0	0	0	0	0
0	1	0	0	0	0	0	0	0	0	1
0	0	1	0	0	0	0	0	0	1	0
0	0	0	1	0	0	0	0	0	1	1
0	0	0	0	1	0	0	0	1	0	0
0	0	0	0	0	1	0	0	1	0	1
0	0	0	0	0	0	1	0	1	1	0
0	0	0	0	0	0	0	1	1	1	1

$$x = D_4 + D_5 + D_6 + D_7$$
$$y = D_2 + D_3 + D_6 + D_7$$
$$z = D_1 + D_3 + D_5 + D_7$$



(kod8-3.cct)

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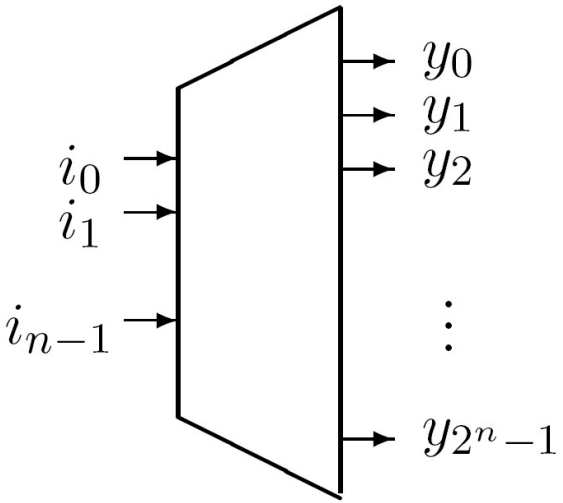
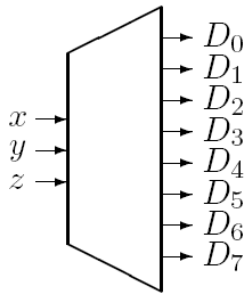
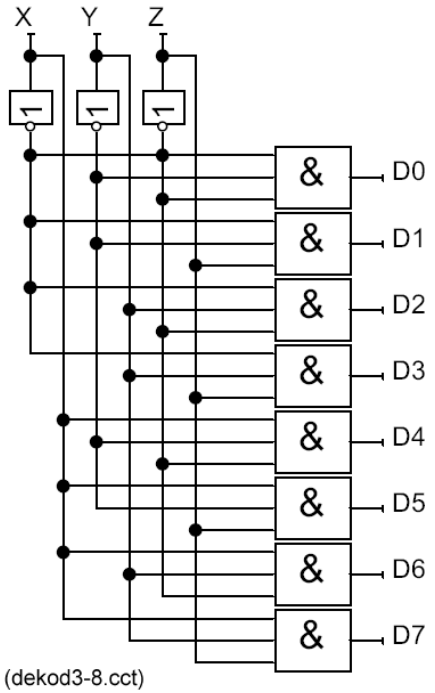
Dekodirniki







(dekod3-8.cct)

X	Y	Z	D_0	D_1	D_2	D_3	D_4	D_5	D_6	D_7
0	0	0	1	0	0	0	0	0	0	0
0	0	1	0	1	0	0	0	0	0	0
0	1	0	0	0	1	0	0	0	0	0
0	1	1	0	0	0	1	0	0	0	0
1	0	0	0	0	0	0	1	0	0	0
1	0	1	0	0	0	0	0	1	0	0
1	1	0	0	0	0	0	0	0	1	0
1	1	1	0	0	0	0	0	0	0	1

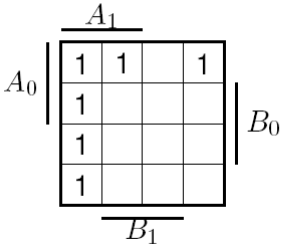
$$D_0 = \overline{X}\,\overline{Y}\,\overline{Z} \quad D_2 = \overline{X}\,Y\,\overline{Z} \quad D_4 = X\,\overline{Y}\,\overline{Z} \quad D_6 = X\,Y\,\overline{Z}$$
$$D_1 = \overline{X}\,\overline{Y}\,Z \quad D_3 = \overline{X}\,Y\,Z \quad D_5 = X\,\overline{Y}\,Z \quad D_7 = X\,Y\,Z$$

Primerjalniki

Primer: primerjalnik
Dveh dvobitnih števil

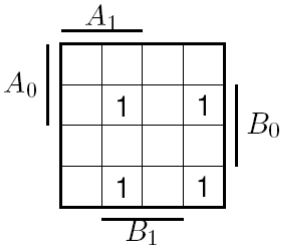
A_1	A_0	B_1	B_0	$X(>)$	$Y(=)$	$Z(<)$
0	0	0	0	0	1	0
0	0	0	1	0	0	1
0	0	1	0	0	0	1
0	0	1	1	0	0	1
0	1	0	0	1	0	0
0	1	0	1	0	1	0
0	1	1	0	0	0	1
0	1	1	1	0	0	1
1	0	0	0	1	0	0
1	0	0	1	1	0	0
1	0	1	0	0	1	0
1	0	1	1	0	0	1
1	1	0	0	1	0	0
1	1	0	1	1	0	0
1	1	1	0	1	0	0
1	1	1	1	0	1	0

Boolov izraz za X = (A > B)



$$X = A_1\,\overline{B_1} + A_0\,A_1\,\overline{B_0} + A_0\,\overline{B_0}\,\overline{B_1}$$

Boolov izraz za Y = (A = B)

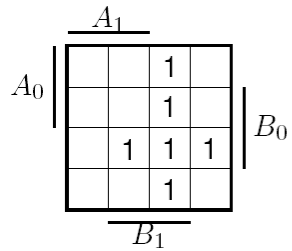


$$Y = \overline{A_0}\,\overline{A_1}\,\overline{B_0}\,\overline{B_1} + A_0\,\overline{A_1}\,B_0\,\overline{B_1} +$$
$$+\overline{A_0}\,A_1\,\overline{B_0}\,B_1 + A_0\,A_1\,B_0\,B_1 =$$

(ker ne gre minimizirati, poskusimo drugače:)

$$\overline{A_1}\,\overline{B_1}\,(A_0\,B_0 + \overline{A_0}\,\overline{B_0}) + A_1\,B_1\,(A_0\,B_0 + \overline{A_0}\,\overline{B_0}) =$$
$$(A_1\,B_1 + \overline{A_1}\,\overline{B_1})(A_0\,B_0 + \overline{A_0}\,\overline{B_0}) =$$
$$(\overline{A_1 \oplus B_1})(\overline{A_0 \oplus B_0})$$

Boolov izraz za Z = (A < B)



$$Z = \overline{A_1}\,B_1 + \overline{A_0}\,\overline{A_1}\,B_0 + \overline{A_0}\,B_0\,B_1$$

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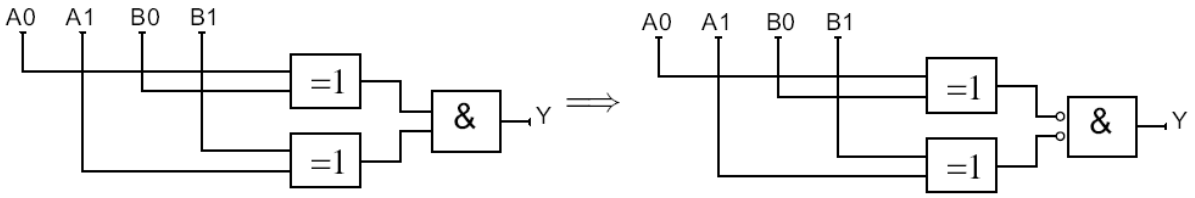
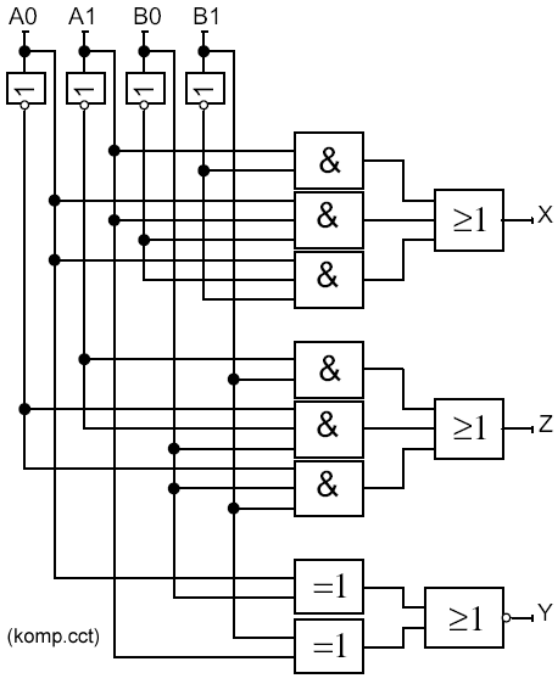
Primerjalniki



Skupna shema primerjalnika:



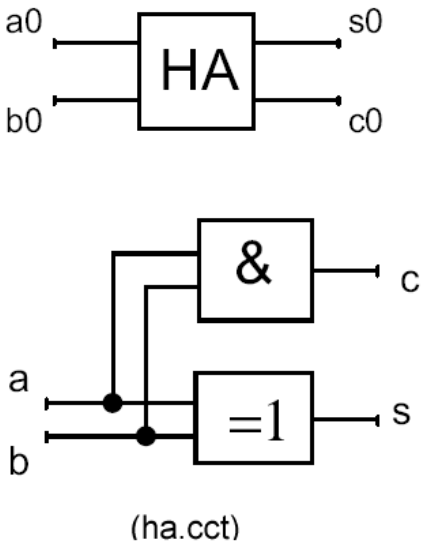
Seštevalniki

Polovični:

Karakteristična tabela polovičnega seštevalnika

a	b	s	c
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

$$s = \overline{a}\,b + a\,\overline{b} = a \oplus b$$
$$c = a\,b$$



(ha.cct)

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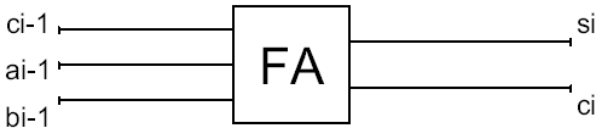
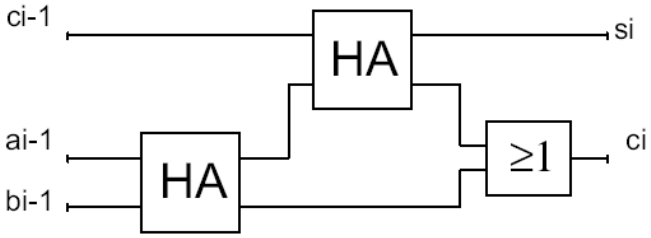
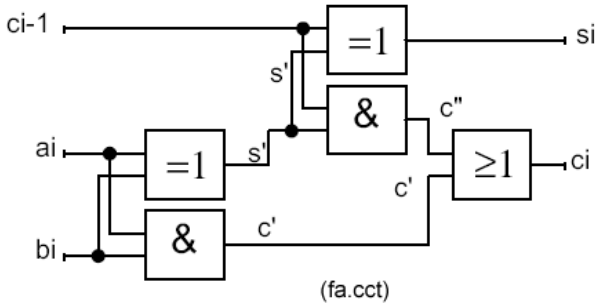
Seštevalniki

Popolni:

a_i	b_i	c_{i-1}	s_i	c_i	pol.vsota a_i in b_i s'	pol.vsota a_i in b_i c'	pol.vsota s' in c_{i-1} s_i	pol.vsota s' in c_{i-1} c"	c' + c" c_i
0	0	0	0	0	0	0	**0**	0	**0**
0	0	1	1	0	0	0	**1**	0	**0**
0	1	0	1	0	1	0	**1**	0	**0**
0	1	1	0	1	1	0	**0**	1	**1**
1	0	0	1	0	1	0	**1**	0	**0**
1	0	1	0	1	1	0	**0**	1	**1**
1	1	0	0	1	0	1	**0**	0	**1**
1	1	1	1	1	0	1	**1**	0	**1**







Seštevalniki

Večbitni: