Progetto - Fondamenti di informatica

Francesco Andreuzzi
IN0500630

Anno 2018-2019

1 Calcolo della funzione

Ricavo la funzione dal resto della divisione del numero di matricola per 2^{16}:

$(500630 \mod 65536) = 41878$
$41878_{10} = 1010001110010110_2$ $\longrightarrow$

x	y	z	k	f(x,y,z,k)
0	0	0	0	1
0	0	0	1	0
0	0	1	0	1
0	0	1	1	0
0	1	0	0	0
0	1	0	1	0
0	1	1	0	1
0	1	1	1	1
1	0	0	0	1
1	0	0	1	0
1	0	1	0	0
1	0	1	1	1
1	1	0	0	0
1	1	0	1	1
1	1	1	0	1
1	1	1	1	0

Minterm

Riscrivo le combinazioni (x, y, z, k) in cui la funzione assume valore 1:

x	y	z	k	f(x,y,z,k)
0	0	0	0	1
0	0	1	0	1
0	1	1	0	1
0	1	1	1	1
1	0	0	0	1
1	0	1	1	1
1	1	0	1	1
1	1	1	0	1

La funzione $f(x, y, z, k)$ quindi si può esprimere nel seguente modo:

$$\boldsymbol{f(x,y,z,k)} = (\overline{x} \cdot \overline{y} \cdot \overline{z} \cdot \overline{k}) + (\overline{x} \cdot \overline{y} \cdot z \cdot \overline{k}) + (\overline{x} \cdot y \cdot z \cdot \overline{k}) + (\overline{x} \cdot y \cdot z \cdot k) + (x \cdot \overline{y} \cdot \overline{z} \cdot \overline{k}) + (x \cdot \overline{y} \cdot z \cdot k) + \\ +(x \cdot y \cdot \overline{z} \cdot k) + (x \cdot y \cdot z \cdot \overline{k})$$

Maxterm

Riscrivo le combinazioni (x, y, z, k) in cui la funzione assume valore 0:

x	y	z	k	f(x,y,z,k)
0	0	0	1	0
0	0	1	1	0
0	1	0	0	0
0	1	0	1	0
1	0	0	1	0
1	0	1	0	0
1	1	0	0	0
1	1	1	1	0

La funzione $f(x, y, z, k)$ quindi si può esprimere nel seguente modo:

$$\boldsymbol{f(x,y,z,k)} = (x + y + z + \overline{k}) \cdot (x + y + \overline{z} + \overline{k}) \cdot (x + \overline{y} + z + k) \cdot (x + \overline{y} + z + \overline{k}) \cdot (\overline{x} + y + z + \overline{k}) \cdot \\ \cdot (\overline{x} + y + \overline{z} + k) \cdot (\overline{x} + \overline{y} + z + k) \cdot (\overline{x} + \overline{y} + \overline{z} + \overline{k})$$

2 Semplificazione

Semplificazione algebrica

Minterm

$$\begin{aligned}
\boldsymbol{f(x,y,z,k)} &= \underline{(\bar{x}\cdot\bar{y}\cdot\bar{z}\cdot\bar{k})} + (\bar{x}\cdot\bar{y}\cdot z\cdot\bar{k}) + (\bar{x}\cdot y\cdot z\cdot\bar{k}) + (\bar{x}\cdot y\cdot z\cdot k) + \underline{(x\cdot\bar{y}\cdot\bar{z}\cdot\bar{k})} + (x\cdot\bar{y}\cdot z\cdot k)+ \\
&\qquad + (x\cdot y\cdot\bar{z}\cdot k) + (x\cdot y\cdot z\cdot\bar{k}) \\
&\stackrel{T9}{=} \boldsymbol{(\bar{y}\cdot\bar{z}\cdot\bar{k})} + (\bar{x}\cdot\bar{y}\cdot z\cdot\bar{k}) + \underline{(\bar{x}\cdot y\cdot z\cdot\bar{k})} + (\bar{x}\cdot y\cdot z\cdot k) + (x\cdot\bar{y}\cdot z\cdot k) + (x\cdot y\cdot\bar{z}\cdot k) \\
&\qquad + (x\cdot y\cdot z\cdot\bar{k}) \\
&\stackrel{T1}{=} (\bar{y}\cdot\bar{z}\cdot\bar{k}) + \underline{(\bar{x}\cdot\bar{y}\cdot z\cdot\bar{k})} + \underline{\boldsymbol{(\bar{x}\cdot y\cdot z\cdot\bar{k})}} \boldsymbol{+ (\bar{x}\cdot y\cdot z\cdot\bar{k}) + (\bar{x}\cdot y\cdot z\cdot\bar{k})} + (\bar{x}\cdot y\cdot z\cdot k)+ \\
&\qquad + (x\cdot\bar{y}\cdot z\cdot k) + (x\cdot y\cdot\bar{z}\cdot k) + (x\cdot y\cdot z\cdot\bar{k}) \\
&\stackrel{T9}{=} (\bar{y}\cdot\bar{z}\cdot\bar{k}) + \boldsymbol{(\bar{x}\cdot z\cdot\bar{k})} + \underline{(\bar{x}\cdot y\cdot z\cdot\bar{k})} + (\bar{x}\cdot y\cdot z\cdot\bar{k}) + \underline{(\bar{x}\cdot y\cdot z\cdot k)} + (x\cdot\bar{y}\cdot z\cdot k)+ \\
&\qquad + (x\cdot y\cdot\bar{z}\cdot k) + (x\cdot y\cdot z\cdot\bar{k}) \\
&\stackrel{T9}{=} (\bar{y}\cdot\bar{z}\cdot\bar{k}) + (\bar{x}\cdot z\cdot\bar{k}) + \boldsymbol{(\bar{x}\cdot y\cdot z)} + \underline{(\bar{x}\cdot y\cdot z\cdot\bar{k})} + (x\cdot\bar{y}\cdot z\cdot k) + (x\cdot y\cdot\bar{z}\cdot k)+ \\
&\qquad + \underline{(x\cdot y\cdot z\cdot\bar{k})} \\
&\stackrel{T9}{=} (\bar{y}\cdot\bar{z}\cdot\bar{k}) + (\bar{x}\cdot z\cdot\bar{k}) + (\bar{x}\cdot y\cdot z) + \boldsymbol{(y\cdot z\cdot\bar{k})} + (x\cdot\bar{y}\cdot z\cdot k) + (x\cdot y\cdot\bar{z}\cdot k)
\end{aligned}$$

Maxterm

$$\begin{aligned}
\boldsymbol{f(x,y,z,k)} &= \underline{(x+y+z+\bar{k})}\cdot(x+y+\bar{z}+\bar{k})\cdot(x+\bar{y}+z+k)\cdot(x+\bar{y}+z+\bar{k})\cdot(\bar{x}+y+z+\bar{k})\cdot \\
&\qquad \cdot(\bar{x}+y+\bar{z}+k)\cdot(\bar{x}+\bar{y}+z+k)\cdot(\bar{x}+\bar{y}+\bar{z}+\bar{k}) \\
&\stackrel{T1}{=} \underline{\boldsymbol{(x+y+z+\bar{k})}}\boldsymbol{\cdot(x+y+z+\bar{k})\cdot(x+y+z+\bar{k})}\cdot\underline{(x+y+\bar{z}+\bar{k})}\cdot(x+\bar{y}+z+k)\cdot \\
&\qquad \cdot(x+\bar{y}+z+\bar{k})\cdot(\bar{x}+y+z+\bar{k})\cdot(\bar{x}+y+\bar{z}+k)\cdot(\bar{x}+\bar{y}+z+k)\cdot(\bar{x}+\bar{y}+\bar{z}+\bar{k}) \\
&\stackrel{T9}{=} \boldsymbol{(x+y+\bar{k})}\cdot\underline{(x+y+z+\bar{k})}\cdot(x+y+z+\bar{k})\cdot(x+\bar{y}+z+k)\cdot\underline{(x+\bar{y}+z+\bar{k})}\cdot \\
&\qquad \cdot(\bar{x}+y+z+\bar{k})\cdot(\bar{x}+y+\bar{z}+k)\cdot(\bar{x}+\bar{y}+z+k)\cdot(\bar{x}+\bar{y}+\bar{z}+\bar{k}) \\
&\stackrel{T9}{=} (x+y+\bar{k})\cdot\boldsymbol{(x+z+\bar{k})}\cdot\underline{(x+y+z+\bar{k})}\cdot(x+\bar{y}+z+k)\cdot\underline{(\bar{x}+y+z+\bar{k})}\cdot \\
&\qquad \cdot(\bar{x}+y+\bar{z}+k)\cdot(\bar{x}+\bar{y}+z+k)\cdot(\bar{x}+\bar{y}+\bar{z}+\bar{k}) \\
&\stackrel{T9}{=} (x+y+\bar{k})\cdot(x+z+\bar{k})\cdot\boldsymbol{(y+z+\bar{k})}\cdot\underline{(x+\bar{y}+z+k)}\cdot(\bar{x}+y+\bar{z}+k)\cdot\underline{(\bar{x}+\bar{y}+z+k)}\cdot \\
&\qquad \cdot(\bar{x}+\bar{y}+\bar{z}+\bar{k}) \\
&\stackrel{T9}{=} \underline{(x+y+\bar{k})}\cdot\underline{(x+z+\bar{k})}\cdot(y+z+\bar{k})\cdot\boldsymbol{(\bar{y}+z+k)}\cdot(\bar{x}+y+\bar{z}+k)\cdot(\bar{x}+\bar{y}+\bar{z}+\bar{k}) \\
&\stackrel{A6}{=} [\underline{\boldsymbol{x\cdot(x+z+\bar{k})}}\boldsymbol{+y\cdot(x+z+\bar{k})+}\underline{\boldsymbol{\bar{k}\cdot(x+z+\bar{k})}}]\cdot(y+z+\bar{k})\cdot(\bar{y}+z+k)\cdot \\
&\qquad \cdot(\bar{x}+y+\bar{z}+k)\cdot(\bar{x}+\bar{y}+\bar{z}+\bar{k})
\end{aligned}$$

$$
\begin{aligned}
\boldsymbol{f(x,y,z,k)} &= ... \\
&\overset{T8}{=} [\boldsymbol{x} + \underline{y\cdot(x+z+\overline{k})} + \boldsymbol{\overline{k}}]\cdot(y+z+\overline{k})\cdot(\overline{y}+z+k)\cdot(\overline{x}+y+\overline{z}+k)\cdot(\overline{x}+\overline{y}+\overline{z}+\overline{k}) \\
&\overset{A6}{=} [\underline{x+\boldsymbol{x\cdot y}}\boldsymbol{+y\cdot z+}\underline{\boldsymbol{y\cdot\overline{k}}+\overline{k}}]\cdot(y+z+\overline{k})\cdot(\overline{y}+z+k)\cdot(\overline{x}+y+\overline{z}+k)\cdot(\overline{x}+\overline{y}+\overline{z}+\overline{k}) \\
&\overset{T4}{=} (\boldsymbol{x}+y\cdot z+\boldsymbol{\overline{k}})\cdot\underline{(y+z+\overline{k})}\cdot\underline{(\overline{y}+z+k)}\cdot(\overline{x}+y+\overline{z}+k)\cdot(\overline{x}+\overline{y}+\overline{z}+\overline{k}) \\
&\overset{A6}{=} (x+y\cdot z+\overline{k})\cdot[\boldsymbol{y\cdot(\overline{y}+z+k)+}\underline{\boldsymbol{z\cdot(\overline{y}+z+k)}}\boldsymbol{+\overline{k}\cdot(\overline{y}+z+k)}]\cdot(\overline{x}+y+\overline{z}+k)\cdot \\
&\qquad\qquad \cdot(\overline{x}+\overline{y}+\overline{z}+\overline{k}) \\
&\overset{T8}{=} (x+y\cdot z+\overline{k})\cdot[\underline{y\cdot(\overline{y}+z+k)}+\boldsymbol{z}+\underline{\overline{k}\cdot(\overline{y}+z+k)}]\cdot(\overline{x}+y+\overline{z}+k)\cdot(\overline{x}+\overline{y}+\overline{z}+\overline{k}) \\
&\overset{A6}{=} (x+y\cdot z+\overline{k})\cdot[\underline{\boldsymbol{y\cdot\overline{y}}}\boldsymbol{+y\cdot z+y\cdot k}+z+\boldsymbol{\overline{y}\cdot\overline{k}+z\cdot\overline{k}+}\underline{\boldsymbol{\overline{k}\cdot k}}]\cdot(\overline{x}+y+\overline{z}+k)\cdot \\
&\qquad\qquad \cdot(\overline{x}+\overline{y}+\overline{z}+\overline{k}) \\
&\overset{A7}{=} (x+y\cdot z+\overline{k})\cdot[\mathbf{0}+\underline{z+y\cdot z+z\cdot\overline{k}}+y\cdot k+\overline{y}\cdot\overline{k}+\mathbf{0}]\cdot(\overline{x}+y+\overline{z}+k)\cdot(\overline{x}+\overline{y}+\overline{z}+\overline{k}) \\
&\overset{T4}{=} \underline{(x+y\cdot z+\overline{k})}\cdot\underline{(y\cdot k+\boldsymbol{z}+\overline{y}\cdot\overline{k})}\cdot(\overline{x}+y+\overline{z}+k)\cdot(\overline{x}+\overline{y}+\overline{z}+\overline{k}) \\
&\overset{A6}{=} [\underline{\boldsymbol{x\cdot(y\cdot k+z+\overline{y}\cdot\overline{k})}}\boldsymbol{+}\underline{\boldsymbol{(y\cdot z)\cdot(y\cdot k+z+\overline{y}\cdot\overline{k})}}\boldsymbol{+}\underline{\boldsymbol{\overline{k}\cdot(y\cdot k+z+\overline{y}\cdot\overline{k})}}]\cdot \\
&\qquad\qquad \cdot(\overline{x}+y+\overline{z}+k)\cdot(\overline{x}+\overline{y}+\overline{z}+\overline{k}) \\
&\overset{A6}{=} (\boldsymbol{x\cdot y\cdot k+x\cdot z+x\cdot\overline{y}\cdot\overline{k}+y\cdot z\cdot k+y\cdot z+}\underline{\boldsymbol{y\cdot z\cdot\overline{y}\cdot\overline{k}}}\boldsymbol{+}\underline{\boldsymbol{y\cdot\overline{k}\cdot k}}\boldsymbol{+z\cdot\overline{k}+\overline{y}\cdot\overline{k}})\cdot \\
&\qquad\qquad \cdot(\overline{x}+y+\overline{z}+k)\cdot(\overline{x}+\overline{y}+\overline{z}+\overline{k}) \\
&\overset{A7}{=} (x\cdot y\cdot k+x\cdot z+x\cdot\overline{y}\cdot\overline{k}+\underline{y\cdot z\cdot k+y\cdot z}+\mathbf{0}+\mathbf{0}+z\cdot\overline{k}+\overline{y}\cdot\overline{k})\cdot(\overline{x}+y+\overline{z}+k)\cdot \\
&\qquad\qquad \cdot(\overline{x}+\overline{y}+\overline{z}+\overline{k}) \\
&\overset{T4}{=} \underline{(x\cdot y\cdot k+x\cdot z+x\cdot\overline{y}\cdot\overline{k}+\boldsymbol{y\cdot z}+z\cdot\overline{k}+\overline{y}\cdot\overline{k})}\cdot\underline{(\overline{x}+y+\overline{z}+k)}\cdot(\overline{x}+\overline{y}+\overline{z}+\overline{k}) \\
&\overset{A6}{=} [\underline{\boldsymbol{x\cdot y\cdot k\cdot(\overline{x}+y+\overline{z}+k)}}\boldsymbol{+}\underline{\boldsymbol{x\cdot z\cdot(\overline{x}+y+\overline{z}+k)}}\boldsymbol{+}\underline{\boldsymbol{x\cdot\overline{y}\cdot\overline{k}\cdot(\overline{x}+y+\overline{z}+k)}}\boldsymbol{+} \\
&\qquad\qquad \boldsymbol{+}\underline{\boldsymbol{y\cdot z\cdot(\overline{x}+y+\overline{z}+k)}}\boldsymbol{+}\underline{\boldsymbol{z\cdot\overline{k}\cdot(\overline{x}+y+\overline{z}+k)}}\boldsymbol{+}\underline{\boldsymbol{\overline{y}\cdot\overline{k}\cdot(\overline{x}+y+\overline{z}+k)}}]\cdot \\
&\qquad\qquad \cdot(\overline{x}+\overline{y}+\overline{z}+\overline{k}) \\
1\quad &\overset{A6}{=} [\boldsymbol{x\cdot y\cdot k+x\cdot y\cdot\overline{z}\cdot k+x\cdot y\cdot k+x\cdot y\cdot z+x\cdot z\cdot k+x\cdot\overline{y}\cdot\overline{z}\cdot\overline{k}+\overline{x}\cdot y\cdot z+y\cdot z+} \\
&\qquad\qquad \boldsymbol{+y\cdot z\cdot k+\overline{x}\cdot z\cdot\overline{k}+y\cdot z\cdot\overline{k}+\overline{x}\cdot\overline{y}\cdot\overline{k}+\overline{y}\cdot\overline{z}\cdot\overline{k}}]\cdot(\overline{x}+\overline{y}+\overline{z}+\overline{k}) \\
&\overset{A4}{=} [\underline{x\cdot y\cdot k+x\cdot y\cdot\overline{z}\cdot k+x\cdot y\cdot k}+x\cdot z\cdot k+\underline{y\cdot z+x\cdot y\cdot z+y\cdot z\cdot k+\overline{x}\cdot y\cdot z+y\cdot z\cdot\overline{k}}+ \\
&\qquad\qquad +\underline{\overline{y}\cdot\overline{z}\cdot\overline{k}+x\cdot\overline{y}\cdot\overline{z}\cdot\overline{k}}+\overline{x}\cdot z\cdot\overline{k}+\overline{x}\cdot\overline{y}\cdot\overline{k}]\cdot(\overline{x}+\overline{y}+\overline{z}+\overline{k}) \\
&\overset{T4}{=} \underline{(\boldsymbol{x\cdot y\cdot k}+x\cdot z\cdot k+\boldsymbol{y\cdot z}+\overline{x}\cdot z\cdot\overline{k}+\overline{x}\cdot\overline{y}\cdot\overline{k}+\boldsymbol{\overline{y}\cdot\overline{z}\cdot\overline{k}})}\cdot\underline{(\overline{x}+\overline{y}+\overline{z}+\overline{k})} \\
&\overset{A6}{=} [\boldsymbol{x\cdot y\cdot k\cdot(\overline{x}+\overline{y}+\overline{z}+\overline{k})+x\cdot z\cdot k\cdot(\overline{x}+\overline{y}+\overline{z}+\overline{k})+y\cdot z\cdot(\overline{x}+\overline{y}+\overline{z}+\overline{k})+} \\
&\qquad\qquad \boldsymbol{+\overline{x}\cdot z\cdot\overline{k}\cdot(\overline{x}+\overline{y}+\overline{z}+\overline{k})+\overline{x}\cdot\overline{y}\cdot\overline{k}\cdot(\overline{x}+\overline{y}+\overline{z}+\overline{k})+} \\
&\qquad\qquad \boldsymbol{+\overline{y}\cdot\overline{z}\cdot\overline{k}\cdot(\overline{x}+\overline{y}+\overline{z}+\overline{k})}]
\end{aligned}
$$

$\boldsymbol{f(x,y,z,k)} = ...$

[1] $$\begin{aligned}
&\overset{A6}{=} (\boldsymbol{x \cdot y \cdot \overline{z} \cdot k + x \cdot \overline{y} \cdot z \cdot k + \overline{x} \cdot y \cdot z + y \cdot z \cdot \overline{k} + \underline{\overline{x} \cdot z \cdot \overline{k} + \overline{x} \cdot \overline{y} \cdot z \cdot \overline{k} + \overline{x} \cdot z \cdot \overline{k}}+}\\
&\qquad \boldsymbol{\underline{+\overline{x} \cdot \overline{y} \cdot \overline{k} + \overline{x} \cdot \overline{y} \cdot \overline{k} + \overline{x} \cdot \overline{y} \cdot \overline{z} \cdot \overline{k} + \overline{x} \cdot \overline{y} \cdot \overline{k} + \overline{x} \cdot \overline{y} \cdot \overline{z} \cdot \overline{k}} + \underline{\overline{y} \cdot \overline{z} \cdot \overline{k}+}}\\
&\qquad \boldsymbol{\underline{+\overline{y} \cdot \overline{z} \cdot \overline{k} + \overline{y} \cdot \overline{z} \cdot \overline{k}}})\\
&\overset{T4}{=} (x \cdot y \cdot \overline{z} \cdot k + x \cdot \overline{y} \cdot z \cdot k + \underline{\overline{x} \cdot y \cdot z} + \underline{y \cdot z \cdot \overline{k}} + \underline{\boldsymbol{\overline{x} \cdot z \cdot \overline{k}}} + \underline{\boldsymbol{\overline{x} \cdot \overline{y} \cdot \overline{k}}} + \underline{\boldsymbol{\overline{y} \cdot \overline{z} \cdot \overline{k}}})\\
&\overset{T9}{=} (x \cdot y \cdot \overline{z} \cdot k + x \cdot \overline{y} \cdot z \cdot k + \boldsymbol{\overline{x} \cdot y \cdot z \cdot k + \overline{x} \cdot y \cdot z \cdot \overline{k}} + \boldsymbol{x \cdot y \cdot z \cdot \overline{k} + \overline{x} \cdot y \cdot z \cdot \overline{k}}+\\
&\qquad + \boldsymbol{\overline{x} \cdot y \cdot z \cdot \overline{k} + \overline{x} \cdot \overline{y} \cdot z \cdot \overline{k}} + \boldsymbol{\overline{x} \cdot \overline{y} \cdot z \cdot \overline{k} + \overline{x} \cdot \overline{y} \cdot \overline{z} \cdot \overline{k}} + \boldsymbol{x \cdot \overline{y} \cdot \overline{z} \cdot \overline{k} + \overline{x} \cdot \overline{y} \cdot \overline{z} \cdot \overline{k}})\\
&\overset{A4}{=} (x \cdot y \cdot \overline{z} \cdot k + x \cdot \overline{y} \cdot z \cdot k + \underline{\overline{x} \cdot y \cdot z \cdot \overline{k} + \overline{x} \cdot y \cdot z \cdot \overline{k} + \overline{x} \cdot y \cdot z \cdot \overline{k}} + \underline{\overline{x} \cdot \overline{y} \cdot \overline{z} \cdot \overline{k} + \overline{x} \cdot \overline{y} \cdot \overline{z} \cdot \overline{k}}\\
&\qquad + \overline{x} \cdot y \cdot z \cdot k + x \cdot y \cdot z \cdot \overline{k} + \underline{\overline{x} \cdot \overline{y} \cdot z \cdot \overline{k} + \overline{x} \cdot \overline{y} \cdot z \cdot \overline{k}} + x \cdot \overline{y} \cdot \overline{z} \cdot \overline{k})\\
&\overset{A7}{=} (x \cdot y \cdot \overline{z} \cdot k + x \cdot \overline{y} \cdot z \cdot k + \overline{x} \cdot y \cdot z \cdot k + \boldsymbol{\overline{x} \cdot y \cdot z \cdot \overline{k}} + x \cdot y \cdot z \cdot \overline{k} + \boldsymbol{\overline{x} \cdot \overline{y} \cdot z \cdot \overline{k}} + \boldsymbol{\overline{x} \cdot \overline{y} \cdot \overline{z} \cdot \overline{k}}+\\
&\qquad + x \cdot \overline{y} \cdot \overline{z} \cdot \overline{k})\\
&\overset{A4}{=} (\overline{x} \cdot \overline{y} \cdot \overline{z} \cdot \overline{k} + \overline{x} \cdot \overline{y} \cdot z \cdot \overline{k} + \overline{x} \cdot y \cdot z \cdot \overline{k} + \overline{x} \cdot y \cdot z \cdot k + x \cdot \overline{y} \cdot \overline{z} \cdot \overline{k} + x \cdot \overline{y} \cdot z \cdot k + x \cdot y \cdot \overline{z} \cdot k+\\
&\qquad + x \cdot y \cdot z \cdot \overline{k})
\end{aligned}$$ [2]

1. Sono state omesse le combinazioni che si annullano per l'assioma $A7$
2. La semplificazione può procedere come si è già mostrato sopra per i minterm

Mappa di Karnaugh

x y

z k		00	01	11	10
	00	1	0	0	1
	01	0	0	1	0
z k	11	0	1	0	1
	10	1	1	1	0

La funzione ottenuta è la seguente:

$$\boldsymbol{f(x,y,z,k)} = (\overline{y} \cdot \overline{z} \cdot \overline{k}) + (x \cdot y \cdot \overline{z} \cdot k) + (x \cdot \overline{y} \cdot z \cdot k) + (\overline{x} \cdot y \cdot z) + (\overline{x} \cdot z \cdot \overline{k}) + (y \cdot z \cdot \overline{k})$$

Metodo tabellare di Quine - Mc Cluskey

Costruisco la tabella (ordinata secondo il numero di 1 all'interno del termine):

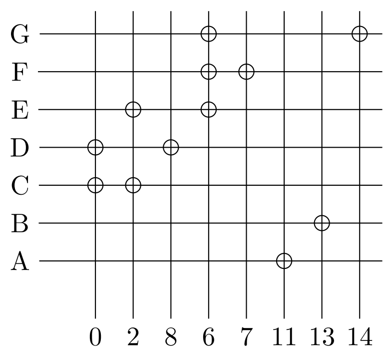
	Livello	**Numero**	**Termine**
✓	0	0	0000
✓	1	2	0010
✓	1	8	1000
✓	2	6	0110
✓	3	7	0111
A	3	11	1011
B	3	13	1101
✓	3	14	1110

Effettuate le semplificazioni, ottengo la seguente tabella.

	Livelli	**Implicanti**	**Termine**
C	0,1	0,2	00-0
D	0,1	0,8	-000
E	1,2	2,6	0-10
F	2,3	6,7	011-
G	2,3	6,14	-110

Non è possibile operare alcuna semplifiazione.

Costruisco il reticolo, in modo da poter valutare quali sono gli implicanti essenziali:



Per coprire il termine 2 posso scegliere l'implicante C oppure l'implicante E. Scegliendo l'implicante E mi riconduco all'espressione della funzione trovata con la mappa di Karnaugh.

Implicante	**Termini implicati**	**Espressione**
A	11	$x \cdot \overline{y} \cdot z \cdot k$
B	13	$x \cdot y \cdot \overline{z} \cdot k$
G	6,14	$y \cdot z \cdot \overline{k}$
F	6,7	$\overline{x} \cdot y \cdot z$
D	0,8	$\overline{y} \cdot \overline{z} \cdot \overline{k}$
E	0,2	$\overline{x} \cdot z \cdot \overline{k}$

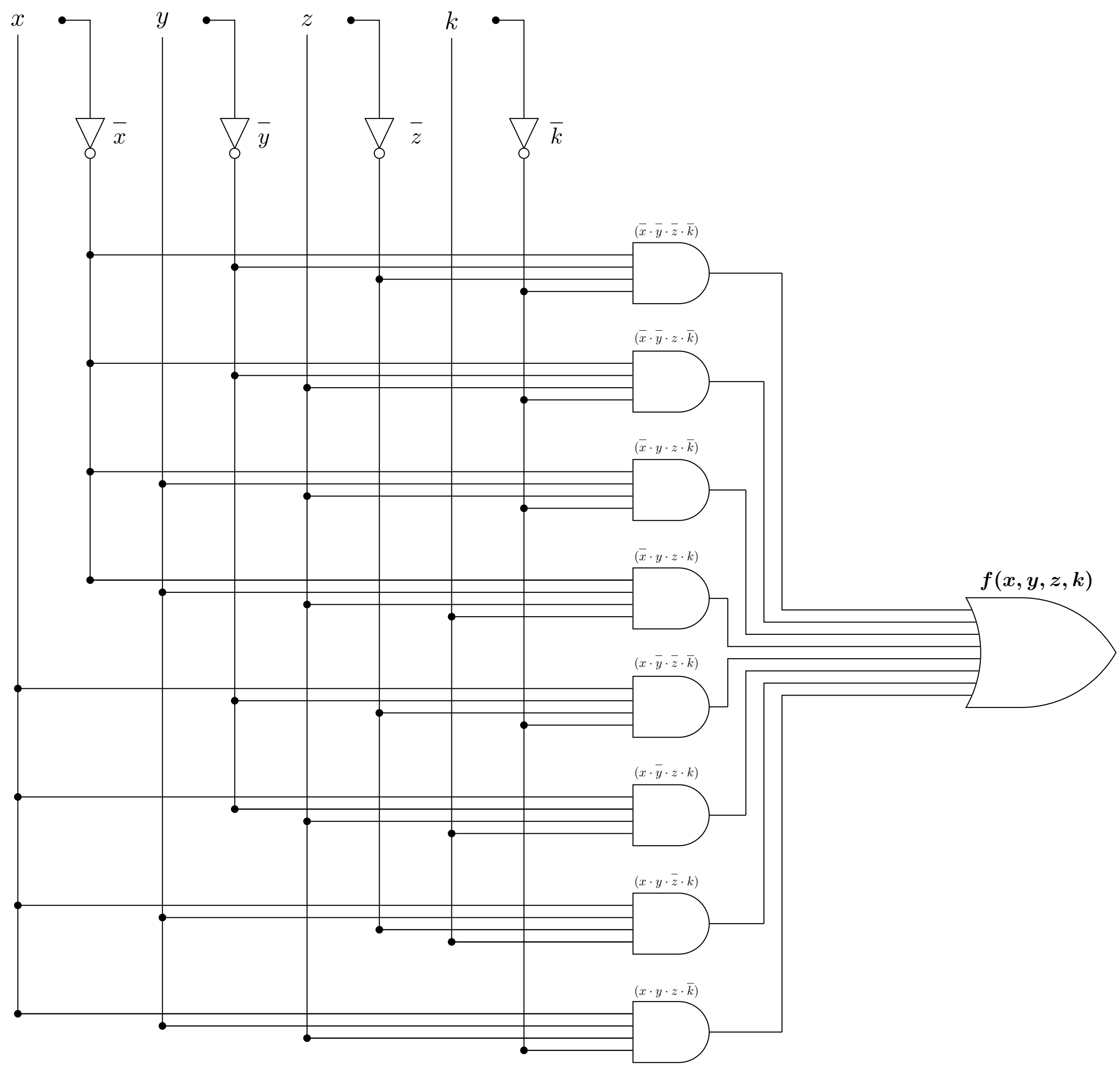
La funzione ottenuta è la seguente:

$$\boldsymbol{f(x,y,z,k)} = \underbrace{(\overline{y} \cdot \overline{z} \cdot \overline{k})}_{\text{D}} + \underbrace{(x \cdot y \cdot \overline{z} \cdot k)}_{\text{B}} + \underbrace{(x \cdot \overline{y} \cdot z \cdot k)}_{\text{A}} + \underbrace{(\overline{x} \cdot y \cdot z)}_{\text{F}} + \underbrace{(\overline{x} \cdot z \cdot \overline{k})}_{\text{E}} + \underbrace{(y \cdot z \cdot \overline{k})}_{\text{G}}$$

3 Schema logico

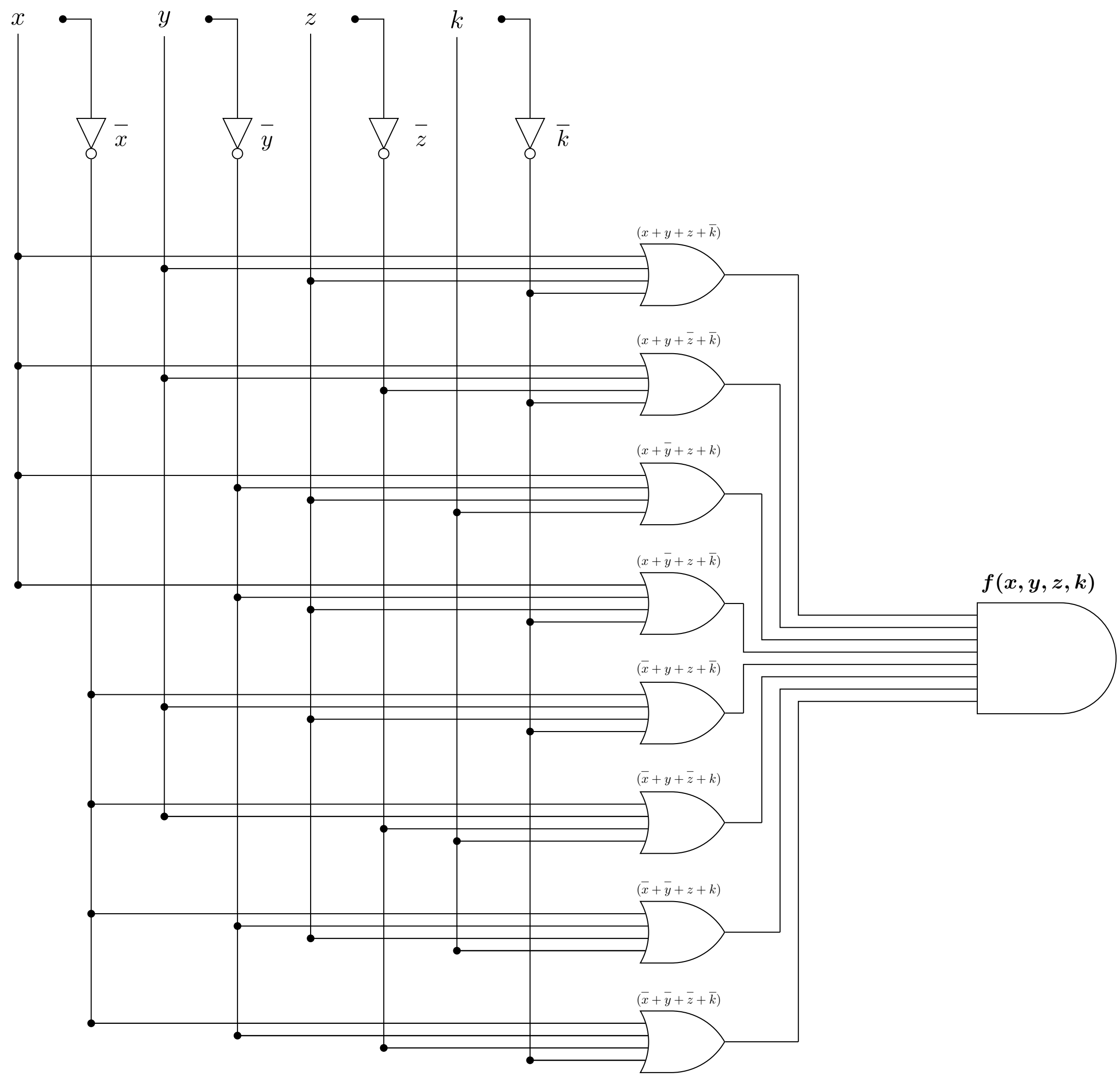
Minterm:

$$\boldsymbol{f(x,y,z,k)} = (\overline{x} \cdot \overline{y} \cdot \overline{z} \cdot \overline{k}) + (\overline{x} \cdot \overline{y} \cdot z \cdot \overline{k}) + (\overline{x} \cdot y \cdot z \cdot \overline{k}) + (\overline{x} \cdot y \cdot z \cdot k) + (x \cdot \overline{y} \cdot \overline{z} \cdot \overline{k}) + (x \cdot \overline{y} \cdot z \cdot k) +$$
$$+ (x \cdot y \cdot \overline{z} \cdot k) + (x \cdot y \cdot z \cdot \overline{k})$$



Maxterm:

$$\boldsymbol{f(x,y,z,k)} = (x+y+z+\overline{k})\cdot(x+y+\overline{z}+\overline{k})\cdot(x+\overline{y}+z+k)\cdot(x+\overline{y}+z+\overline{k})\cdot(\overline{x}+y+z+\overline{k})\cdot$$
$$\cdot(\overline{x}+y+\overline{z}+k)\cdot(\overline{x}+\overline{y}+z+k)\cdot(\overline{x}+\overline{y}+\overline{z}+\overline{k})$$



Funzione semplificata:

$$\boldsymbol{f(x,y,z,k)} = (\overline{y} \cdot \overline{z} \cdot \overline{k}) + (x \cdot y \cdot \overline{z} \cdot k) + (x \cdot \overline{y} \cdot z \cdot k) + (\overline{x} \cdot y \cdot z) + (\overline{x} \cdot z \cdot \overline{k}) + (y \cdot z \cdot \overline{k})$$