

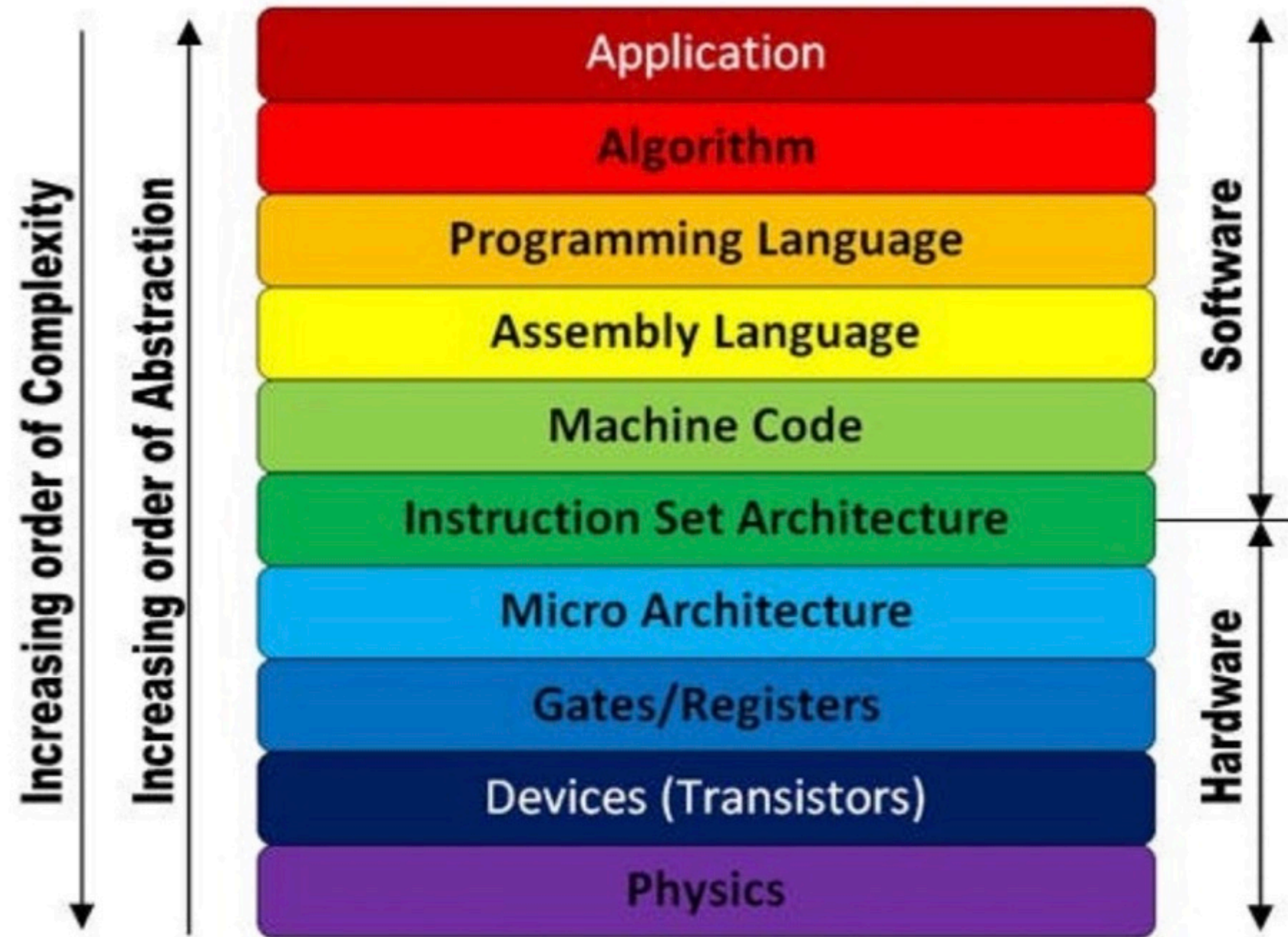
Gruppetime 6 i IN1020

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Plan for dagens gruppetime

- > Abstraksjonsnivå
- > Datamaskinarkitektur og ALU
- > Ukesoppgaver og kretsanalyse

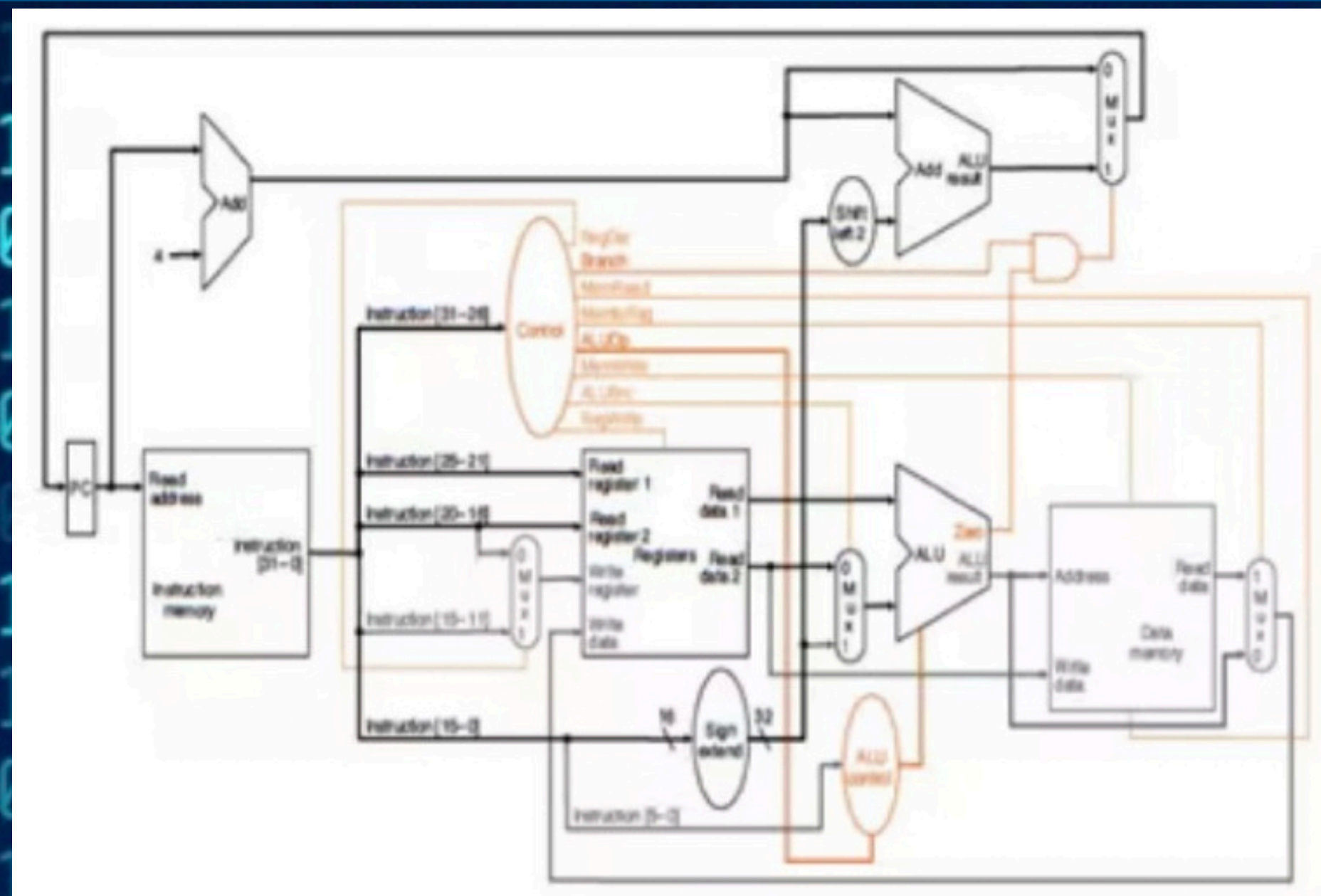
Abstraksjonsnivåer



Layers of Abstraction

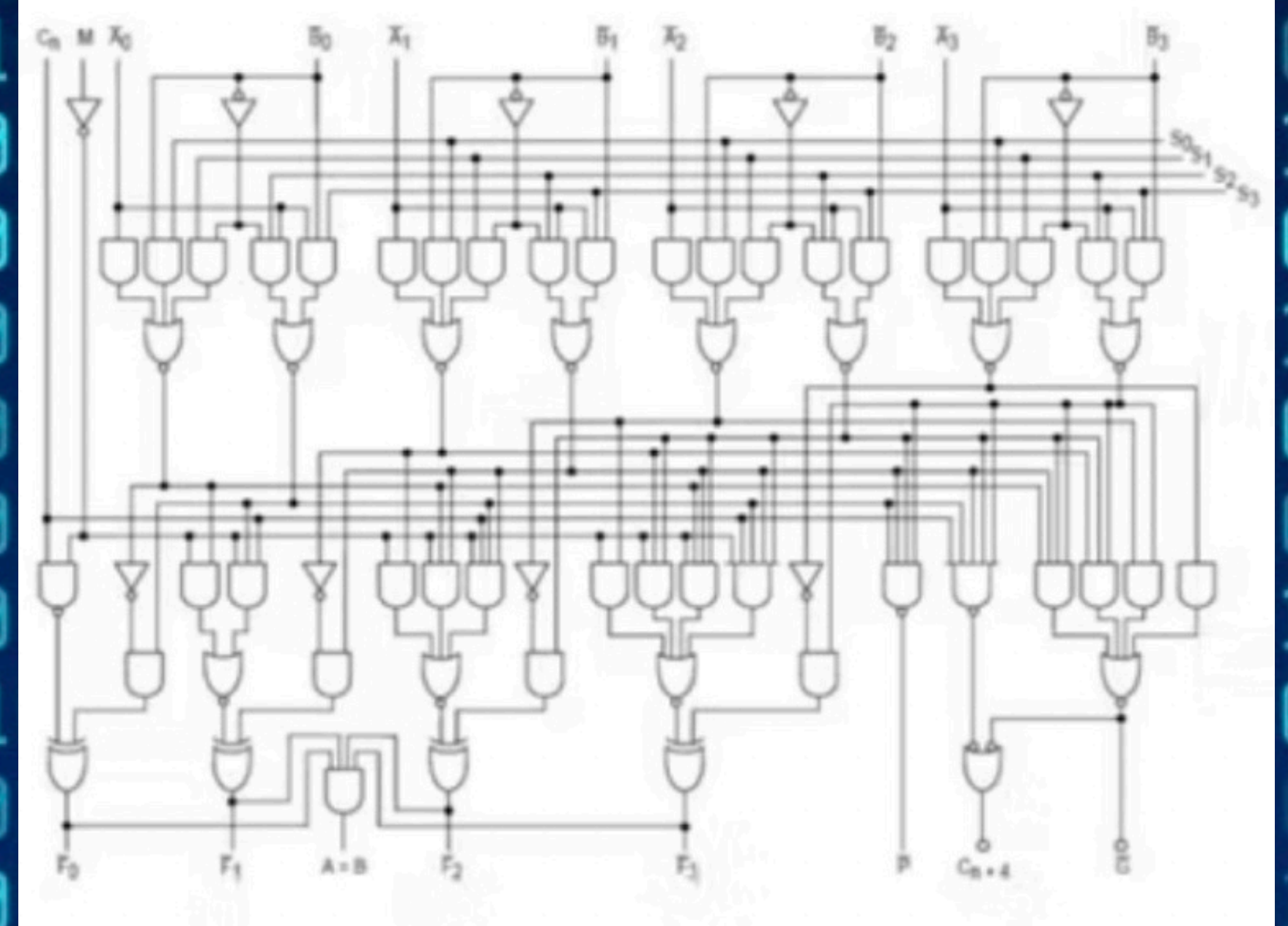
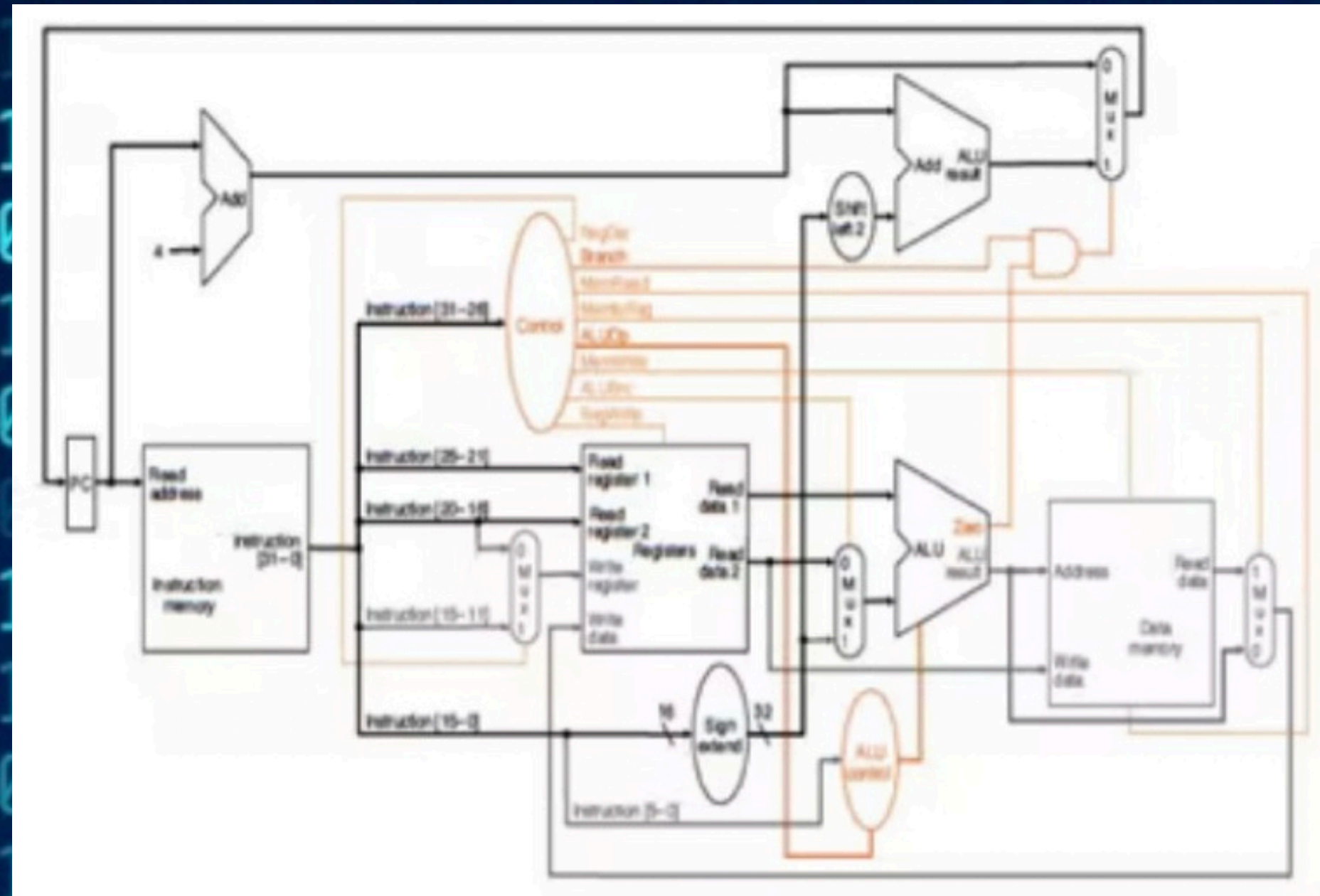
Abstraksjonsnivåer for datamaskin

CPU - lav abstraksjonsnivå



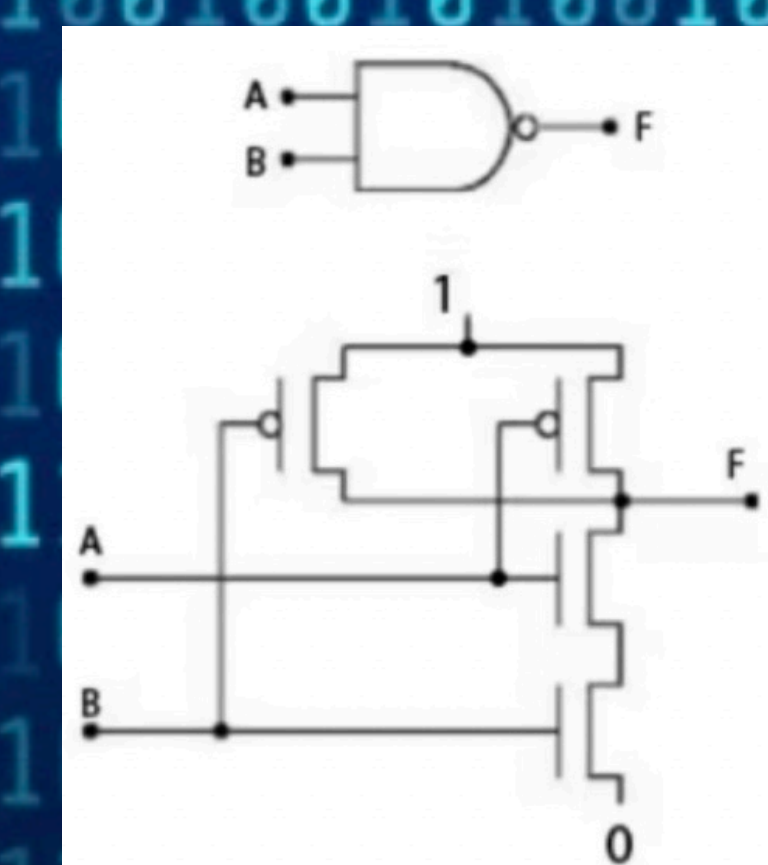
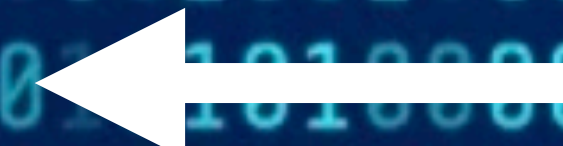
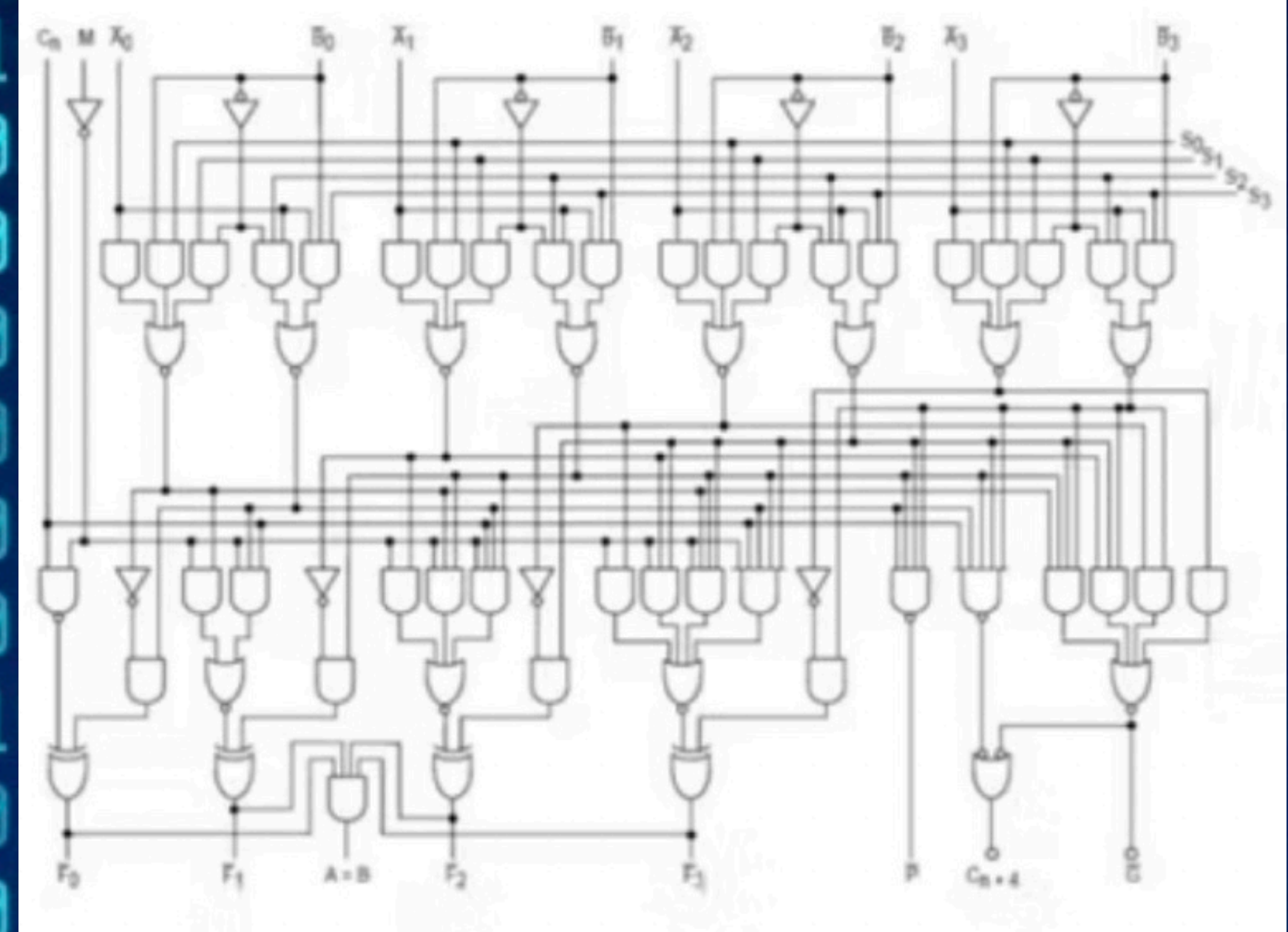
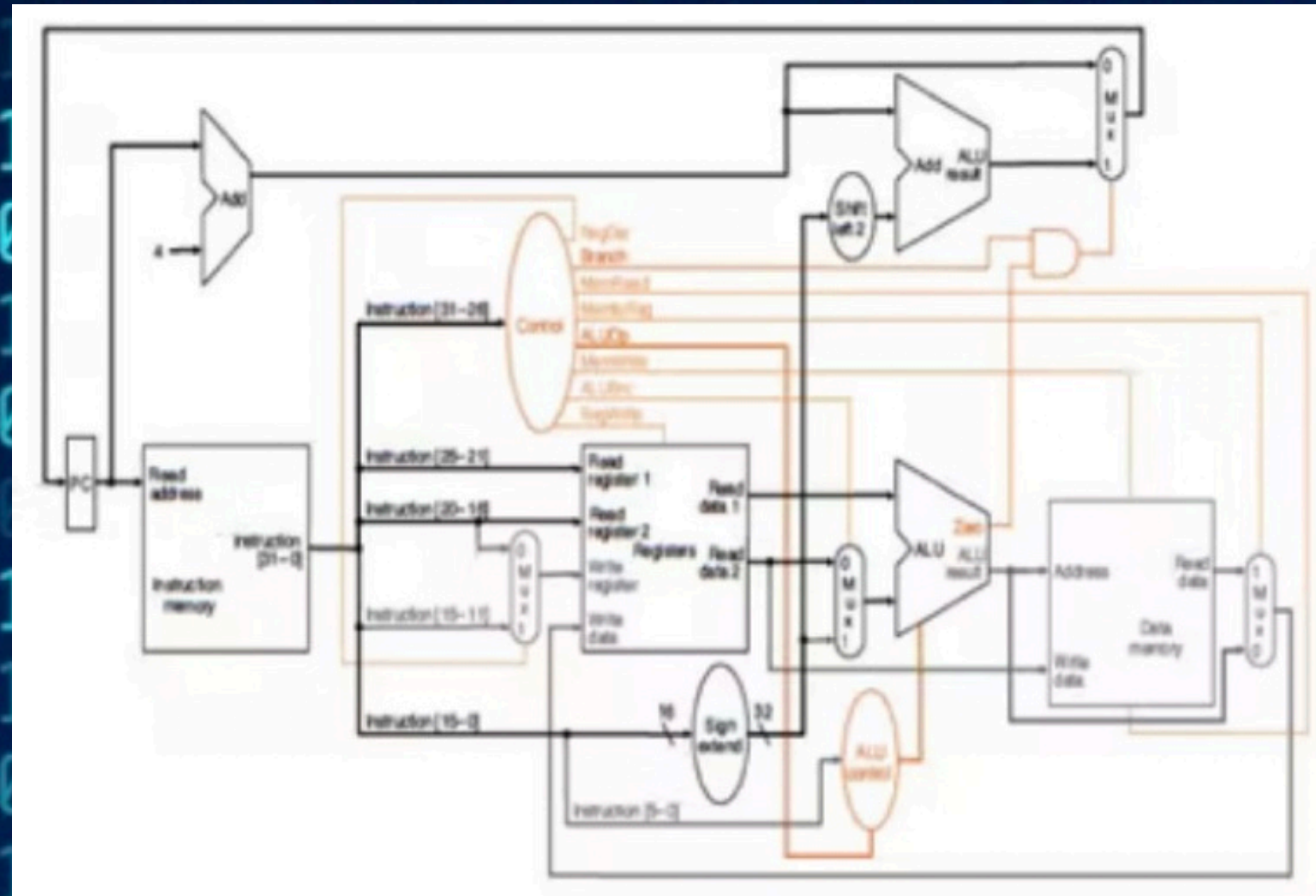
CPU - lav abstraksjonsnivå

ALU - lavere abstraksjonsnivå



CPU - lav abstraksjonsnivå

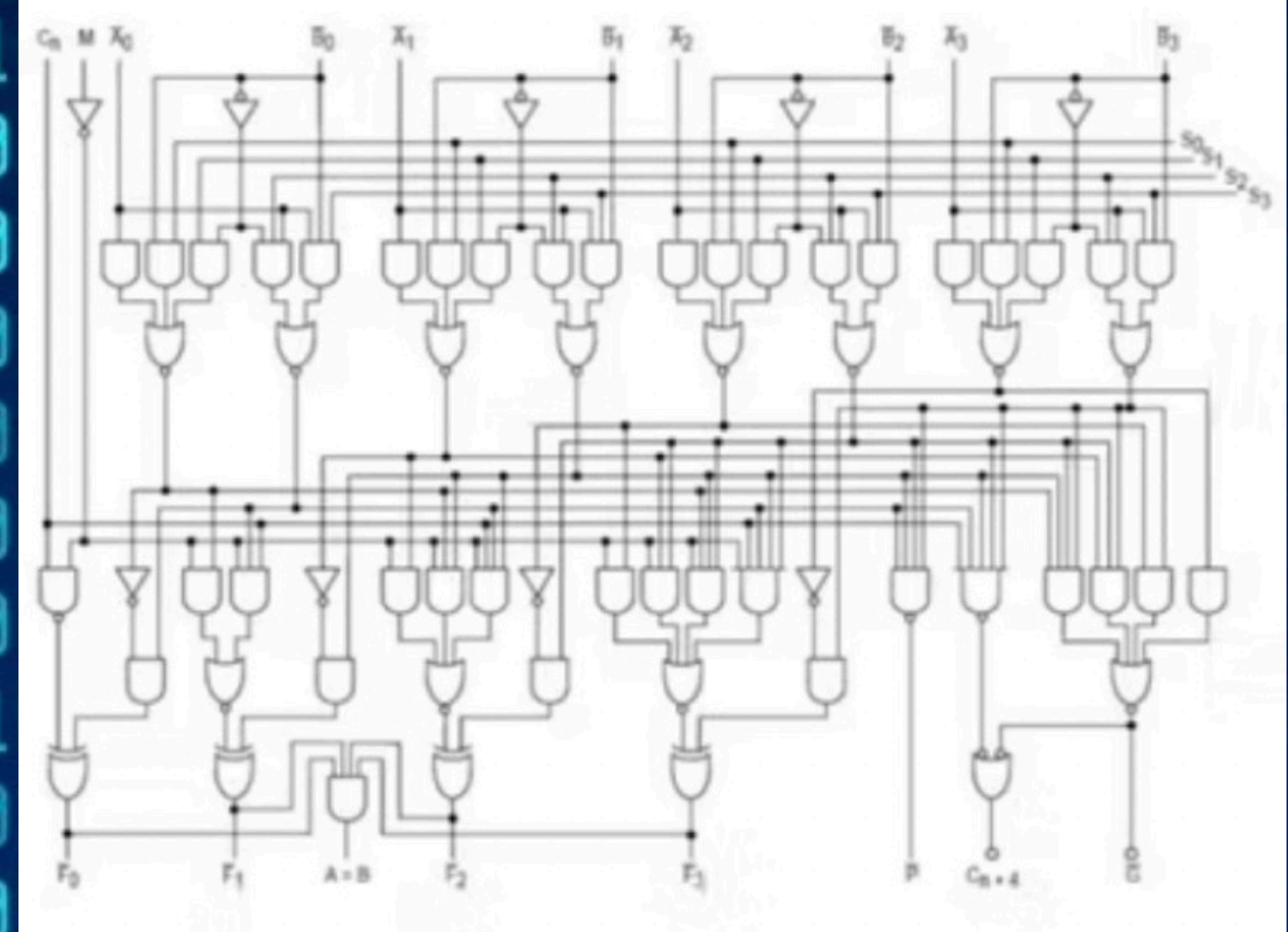
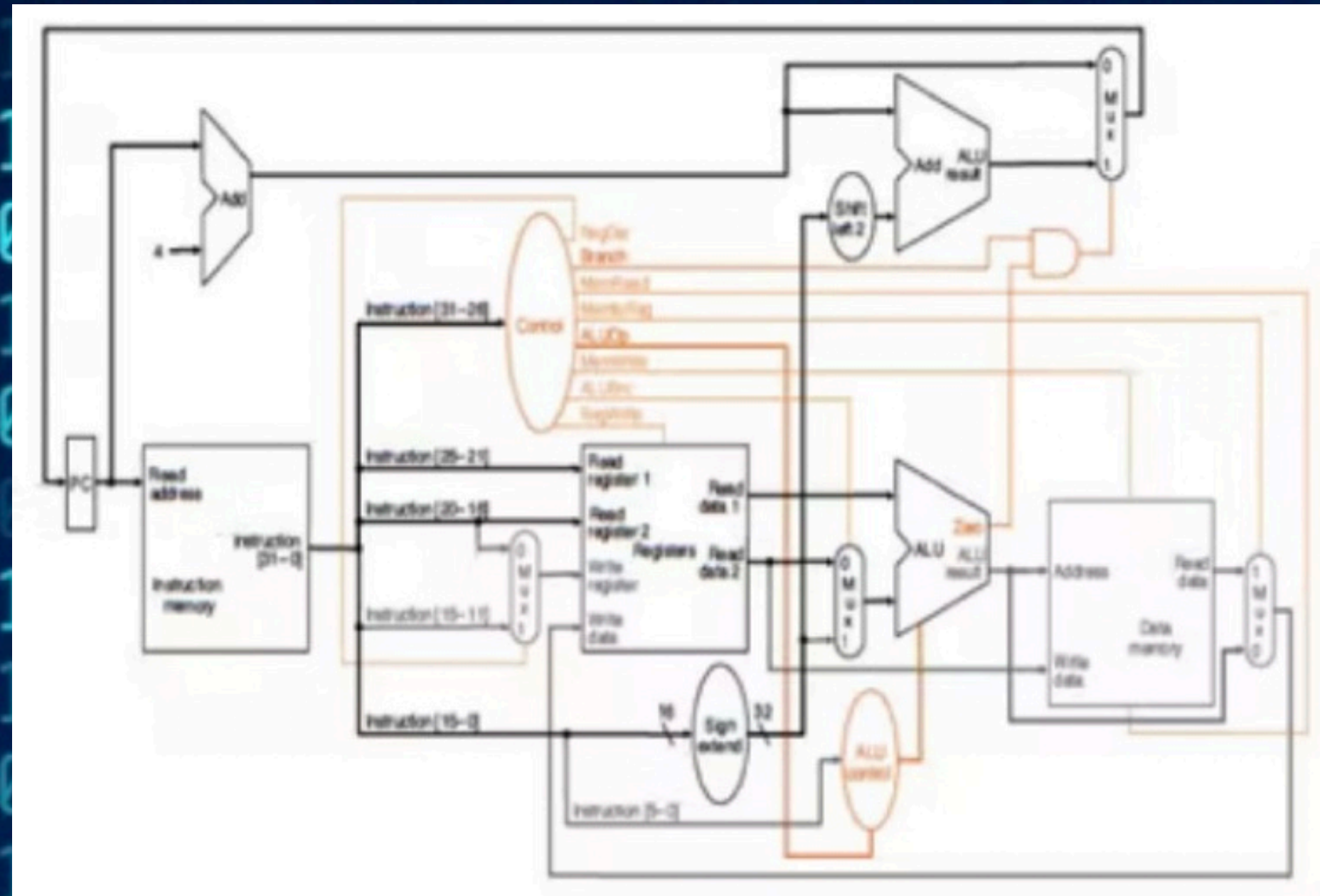
ALU - lavere abstraksjonsnivå



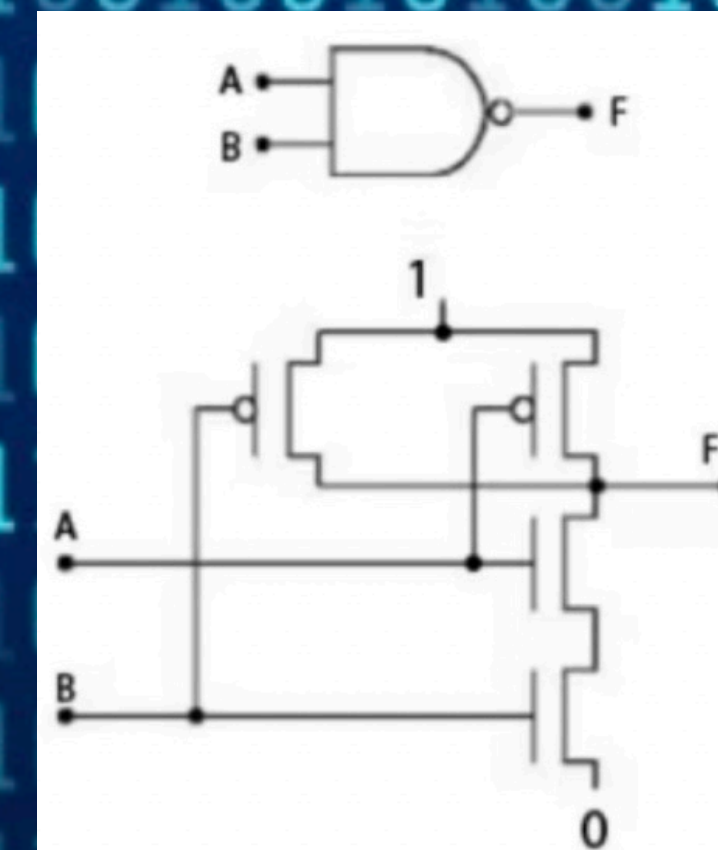
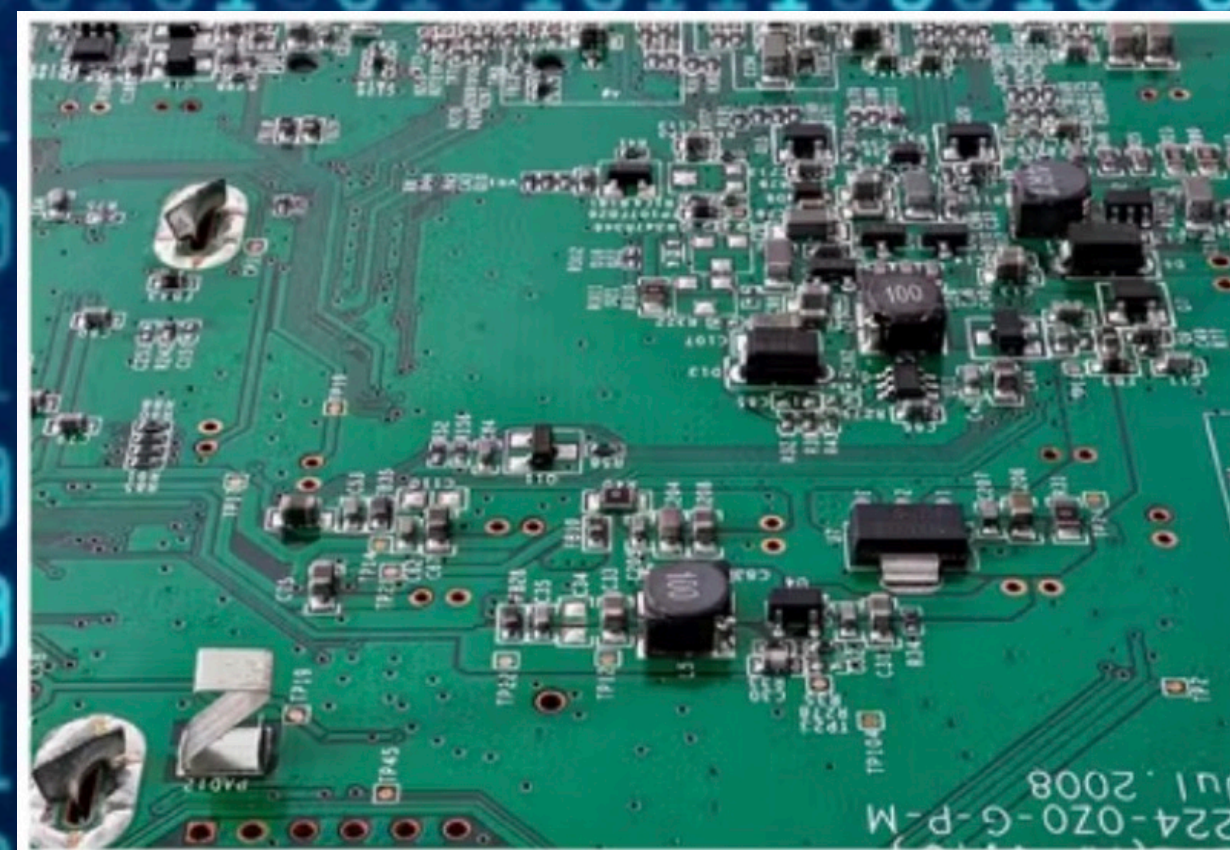
Logiske porter

CPU - lav abstraksjonsnivå

ALU - lavere abstraksjonsnivå

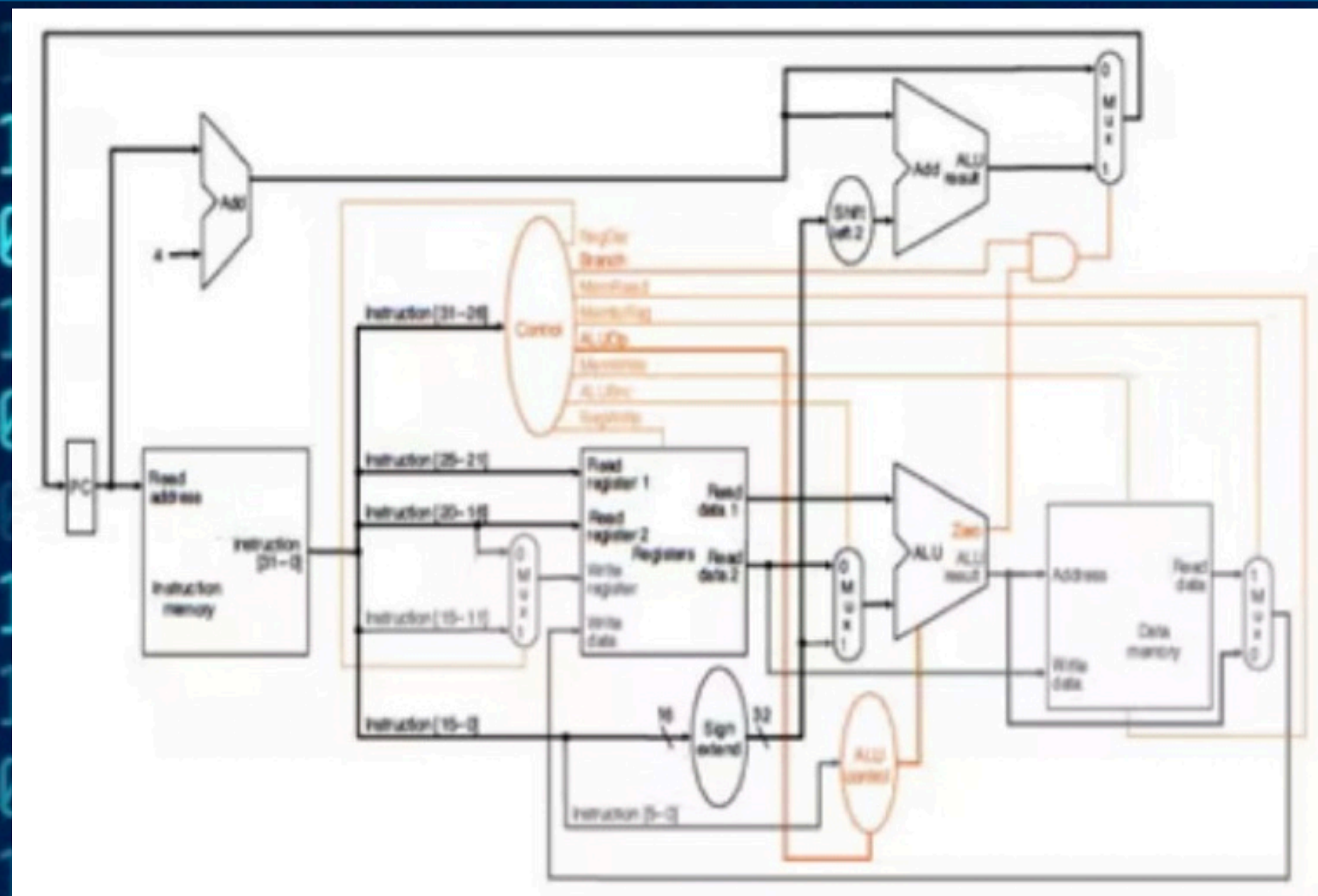


Transistorer

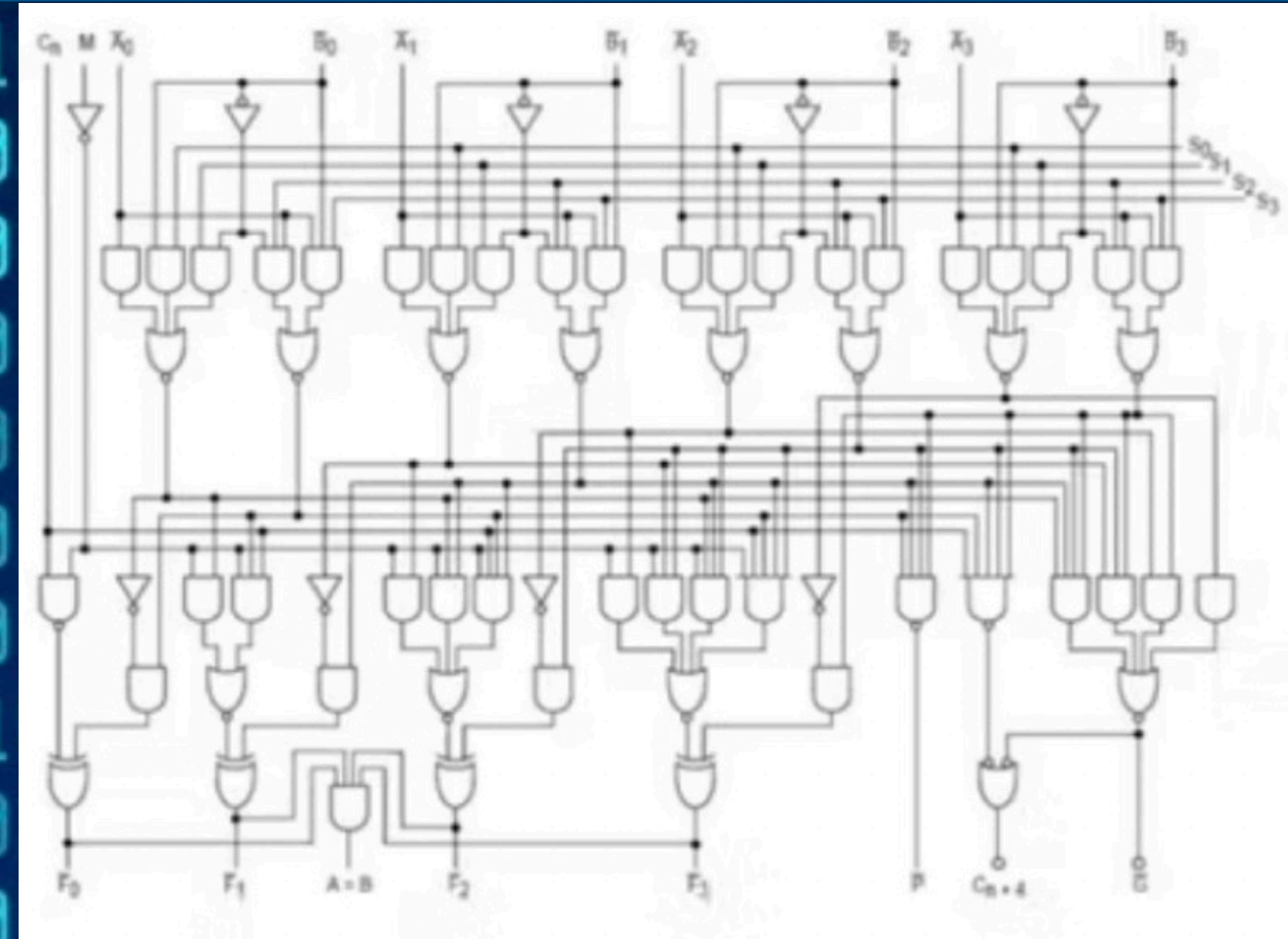


Logiske porter

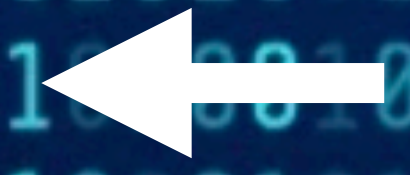
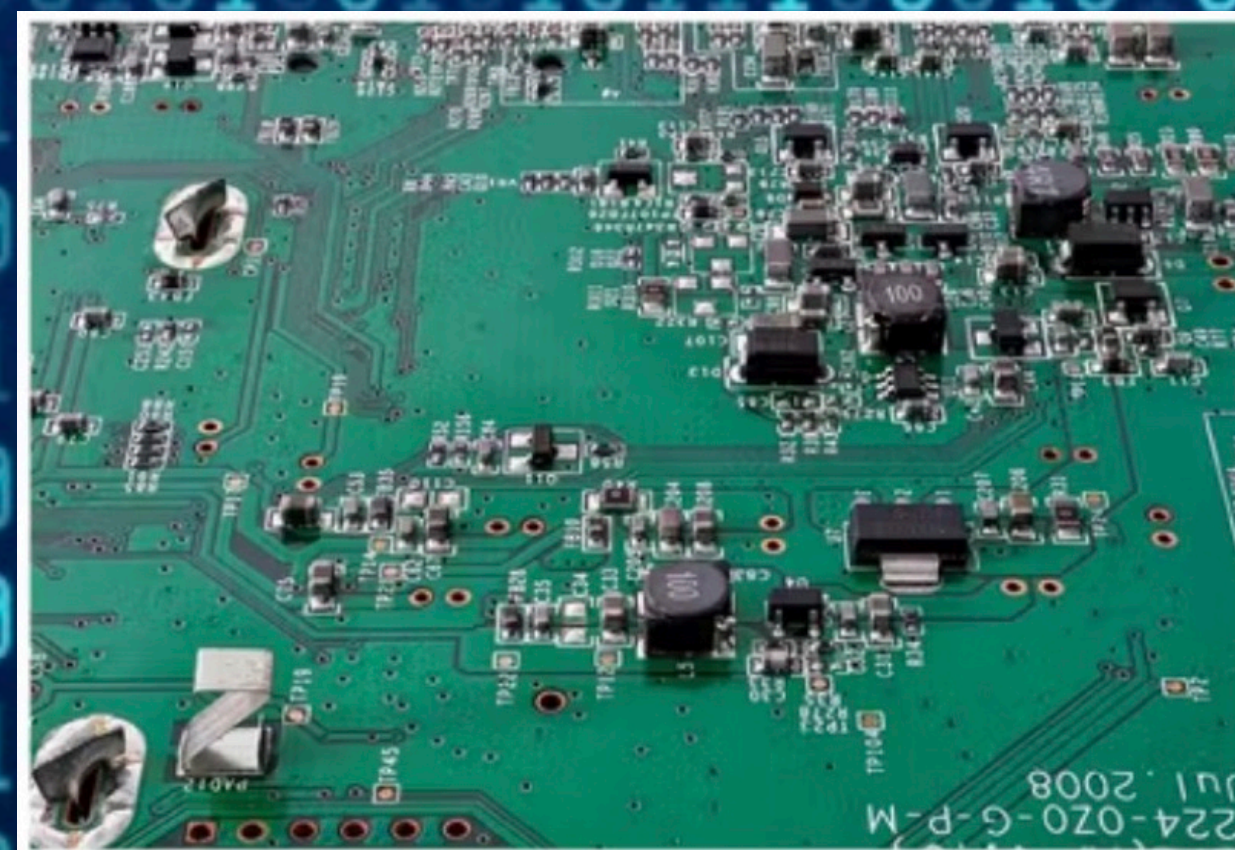
CPU - lav abstraksjonsnivå



ALU - lavere abstraksjonsnivå



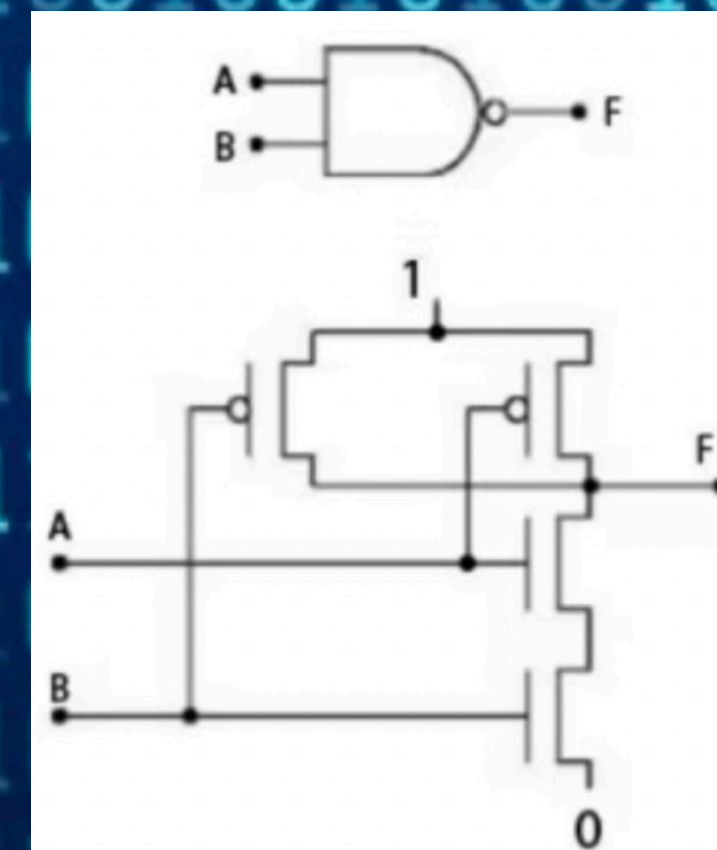
Transistorer

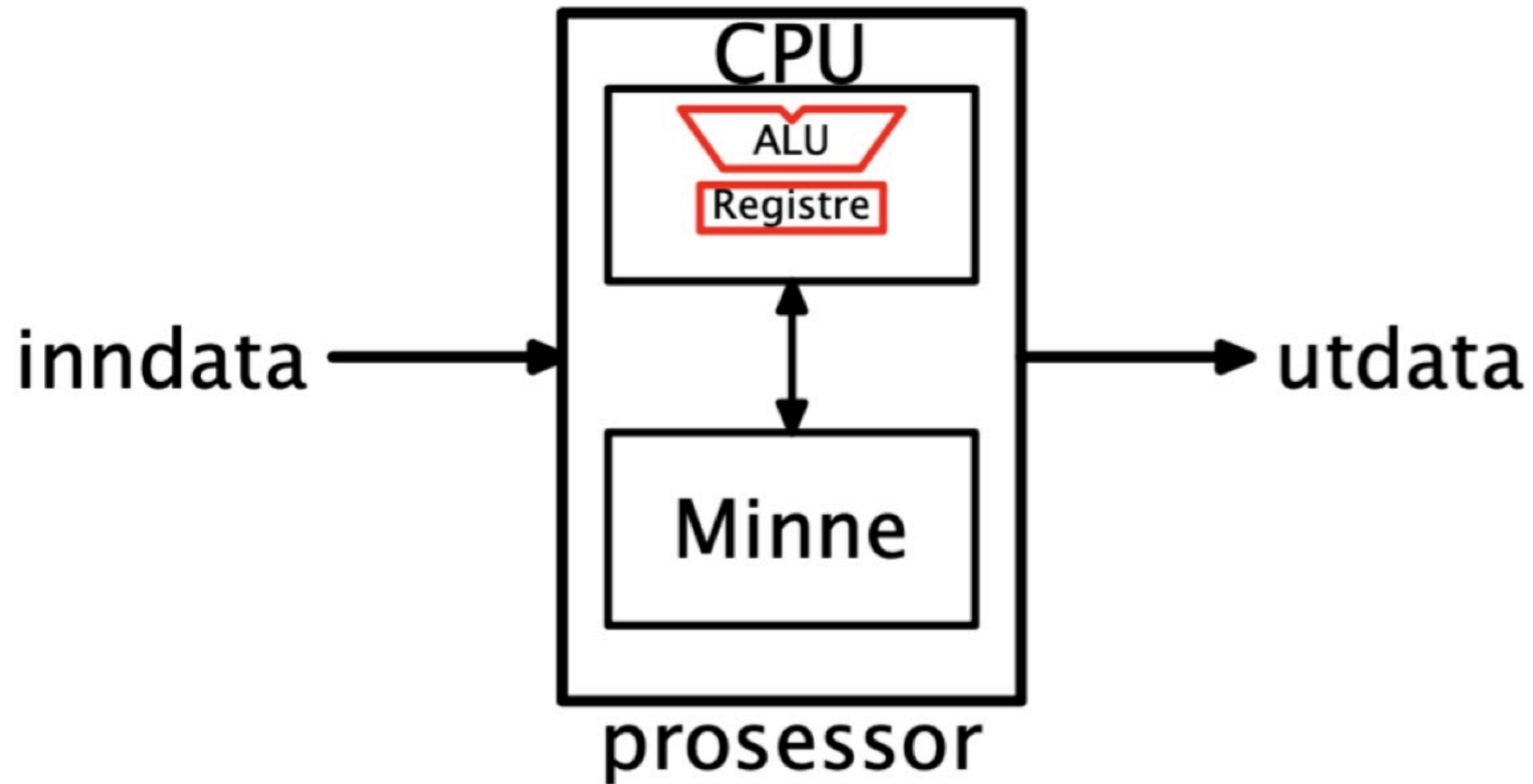


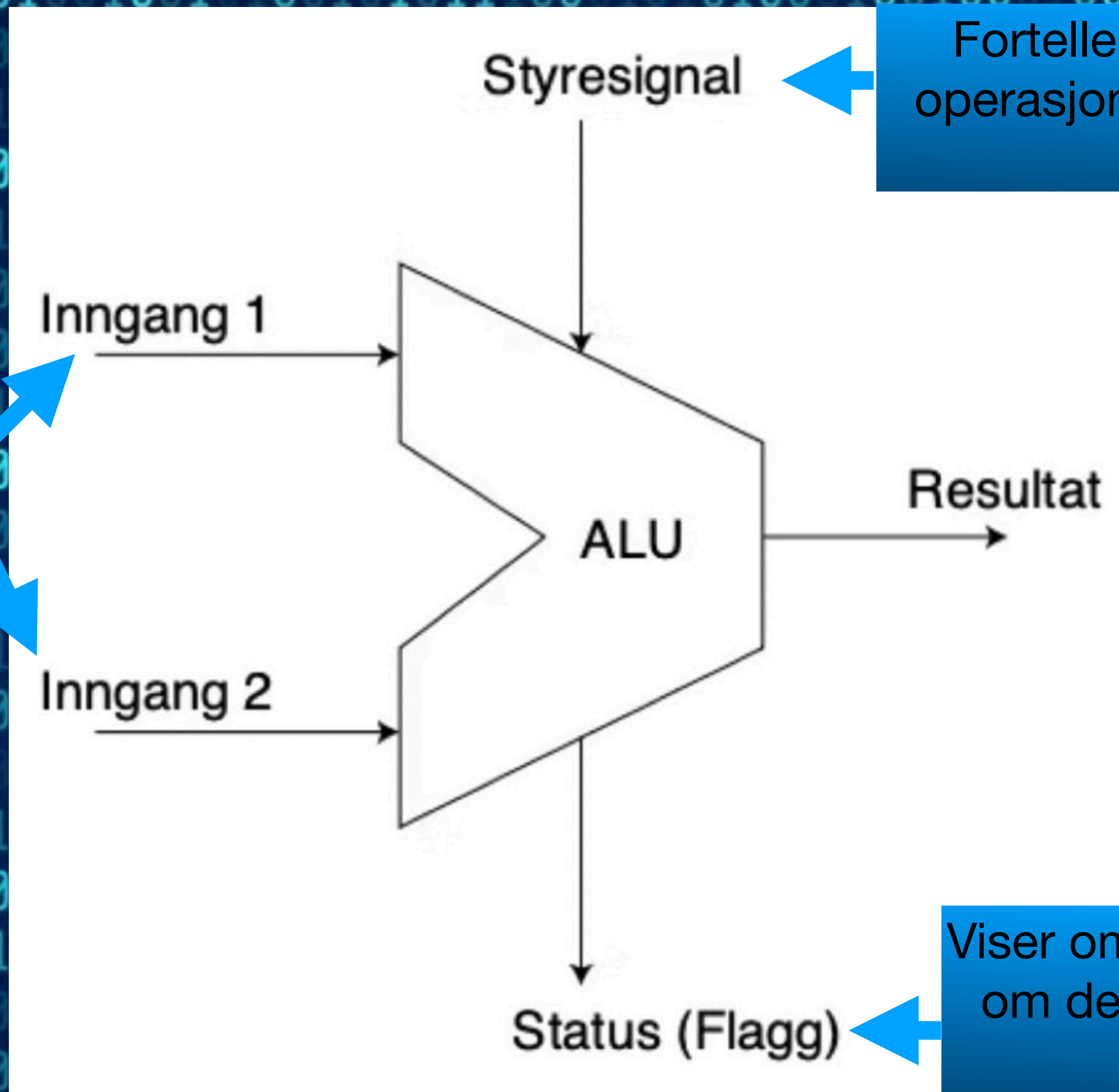
Strøm



Logiske porter



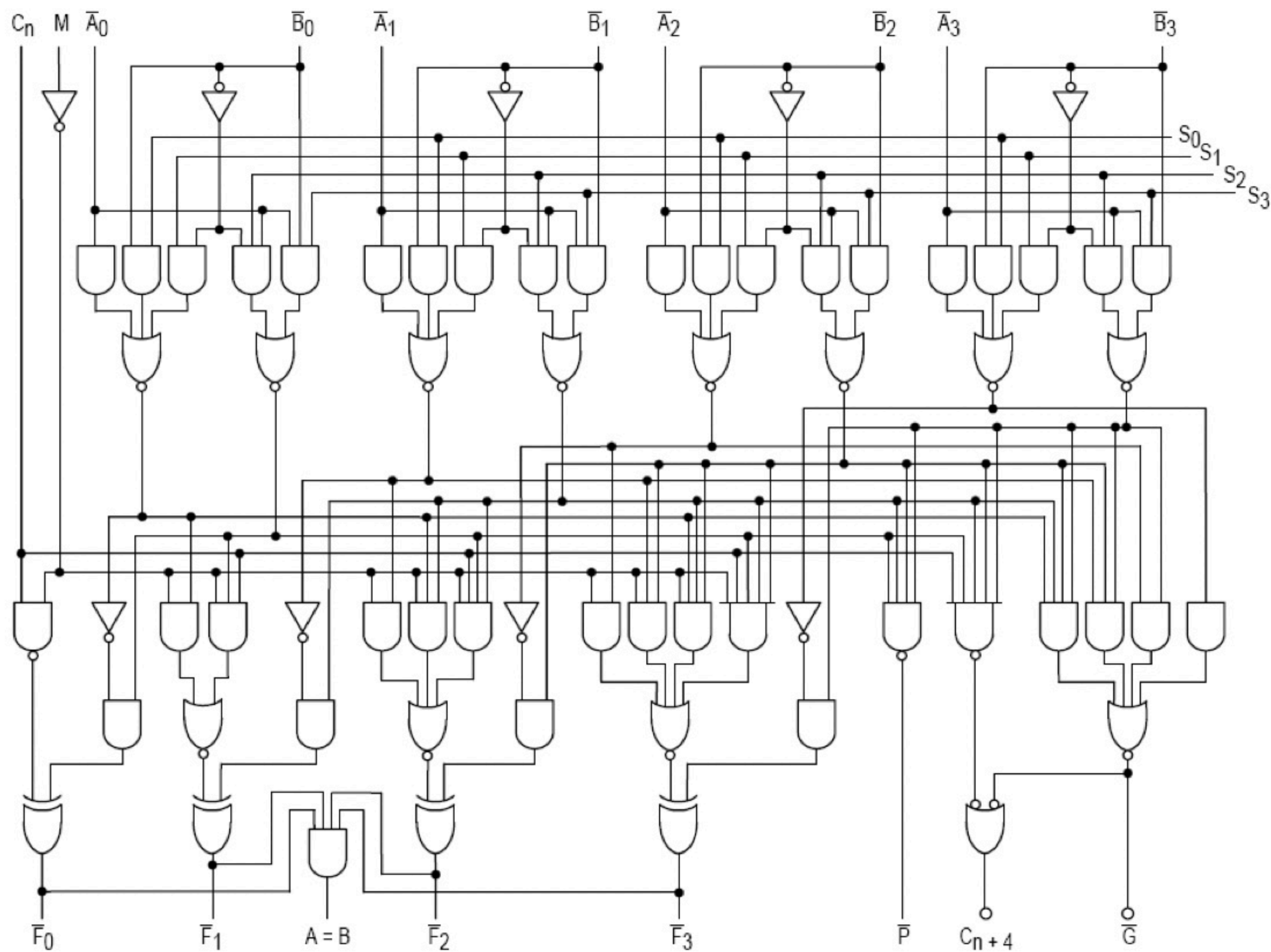




Forteller ALU-en hvilken operasjon skal utføres (1xx, 5xx...)

Binære tall som vi skal gjøre noe med

Viser om resultatet er negativt, om det er overflow eller om det er mente

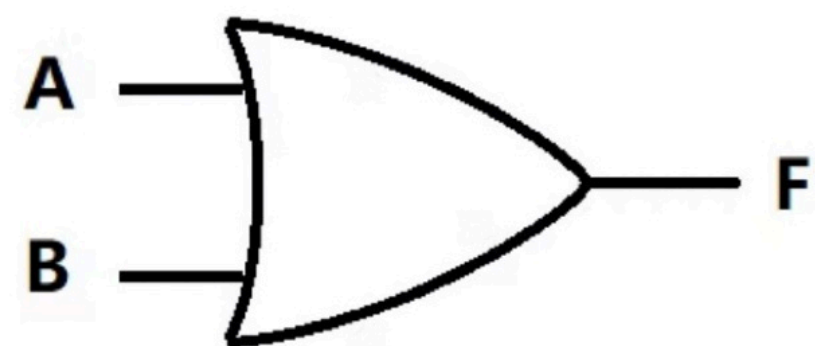


Portene brukes for å gjøre avanserte beregninger, som addisjon, subtraksjon, deling, multiplikasjon, divisjon, osv.

OR - port

$$F = A + B$$

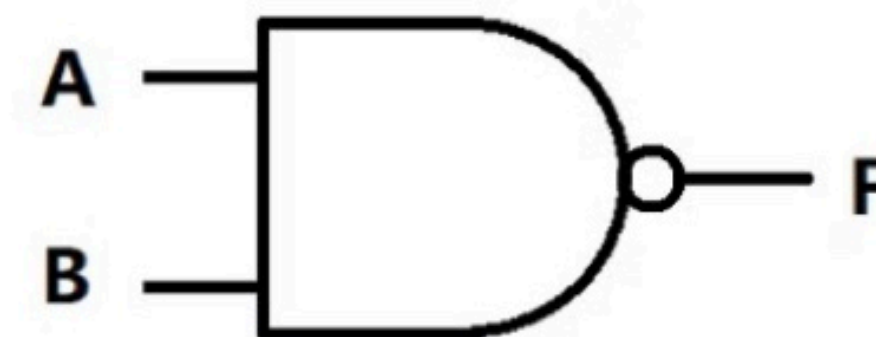
A	B	F
0	0	0
0	1	1
1	0	1
1	1	1



NAND - port

$$F = (AB)'$$

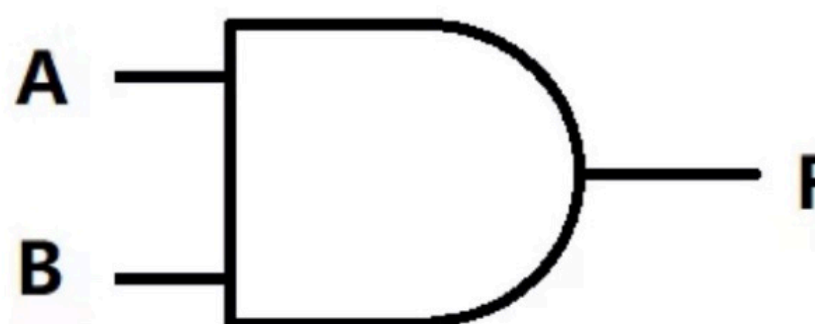
A	B	F
0	0	1
0	1	1
1	0	1
1	1	0



AND - port

$$F = AB$$

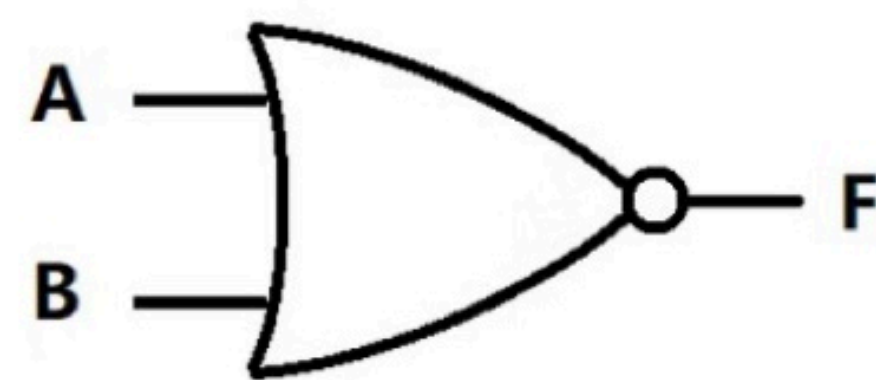
A	B	F
0	0	0
0	1	0
1	0	0
1	1	1



NOR - port

$$F = (A + B)'$$

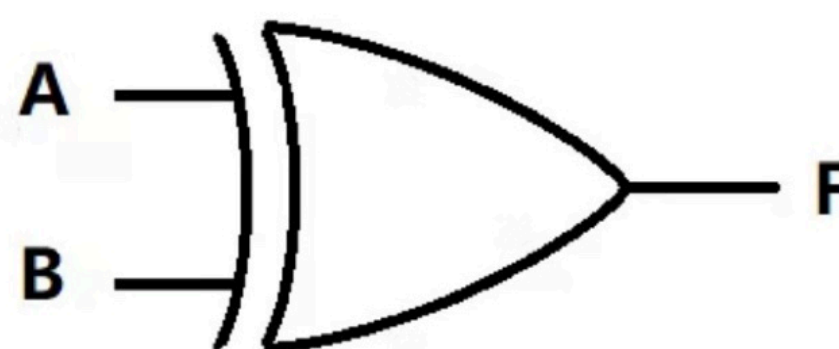
A	B	F
0	0	1
0	1	0
1	0	0
1	1	0



XOR - port

$$F = A \oplus B$$

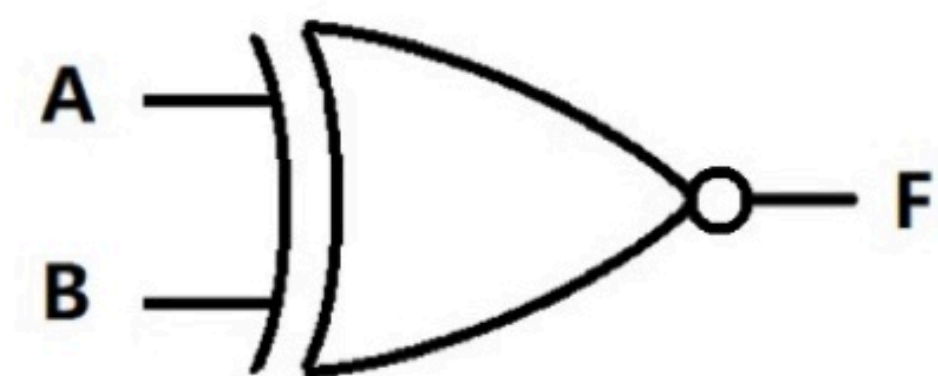
A	B	F
0	0	0
0	1	1
1	0	1
1	1	0



XNOR - port

$$F = (A \oplus B)'$$

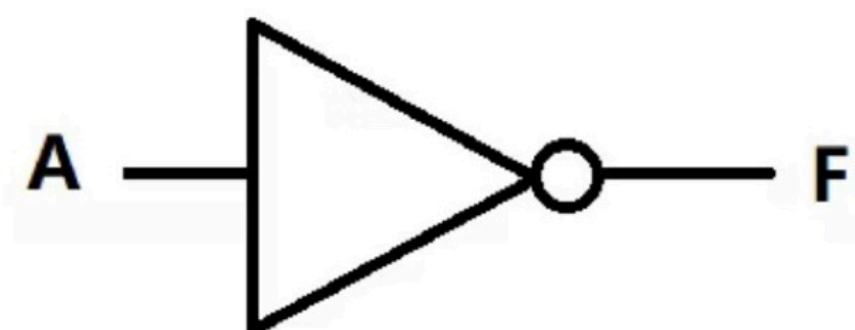
A	B	F
0	0	1
0	1	0
1	0	0
1	1	1



INV - port

$$F = A'$$

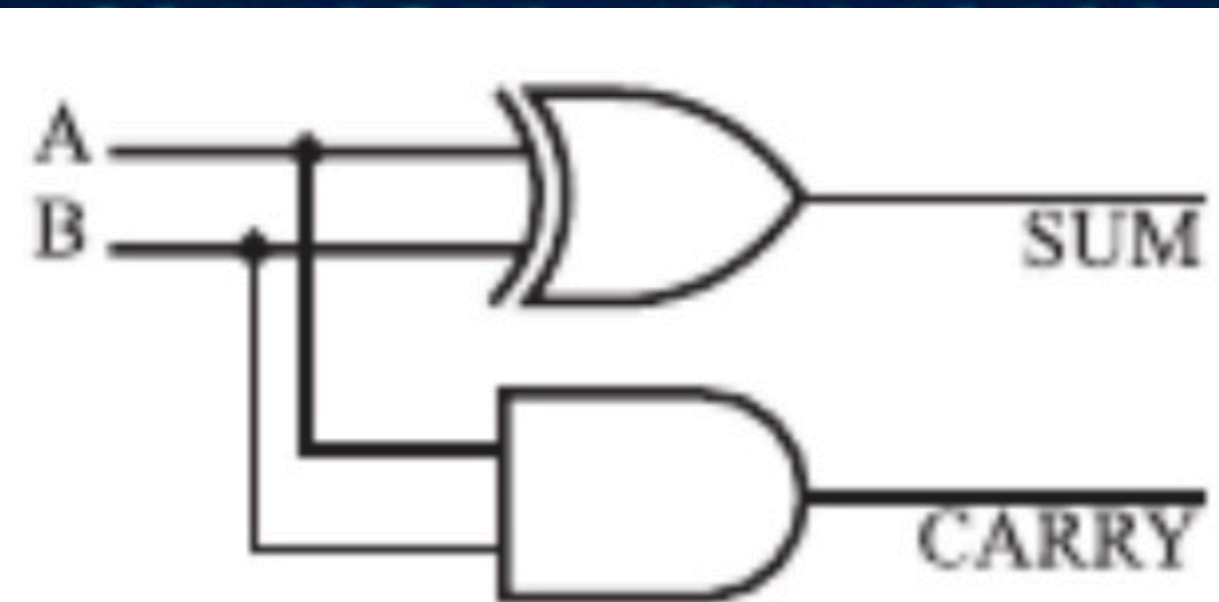
A	F
0	1
1	0



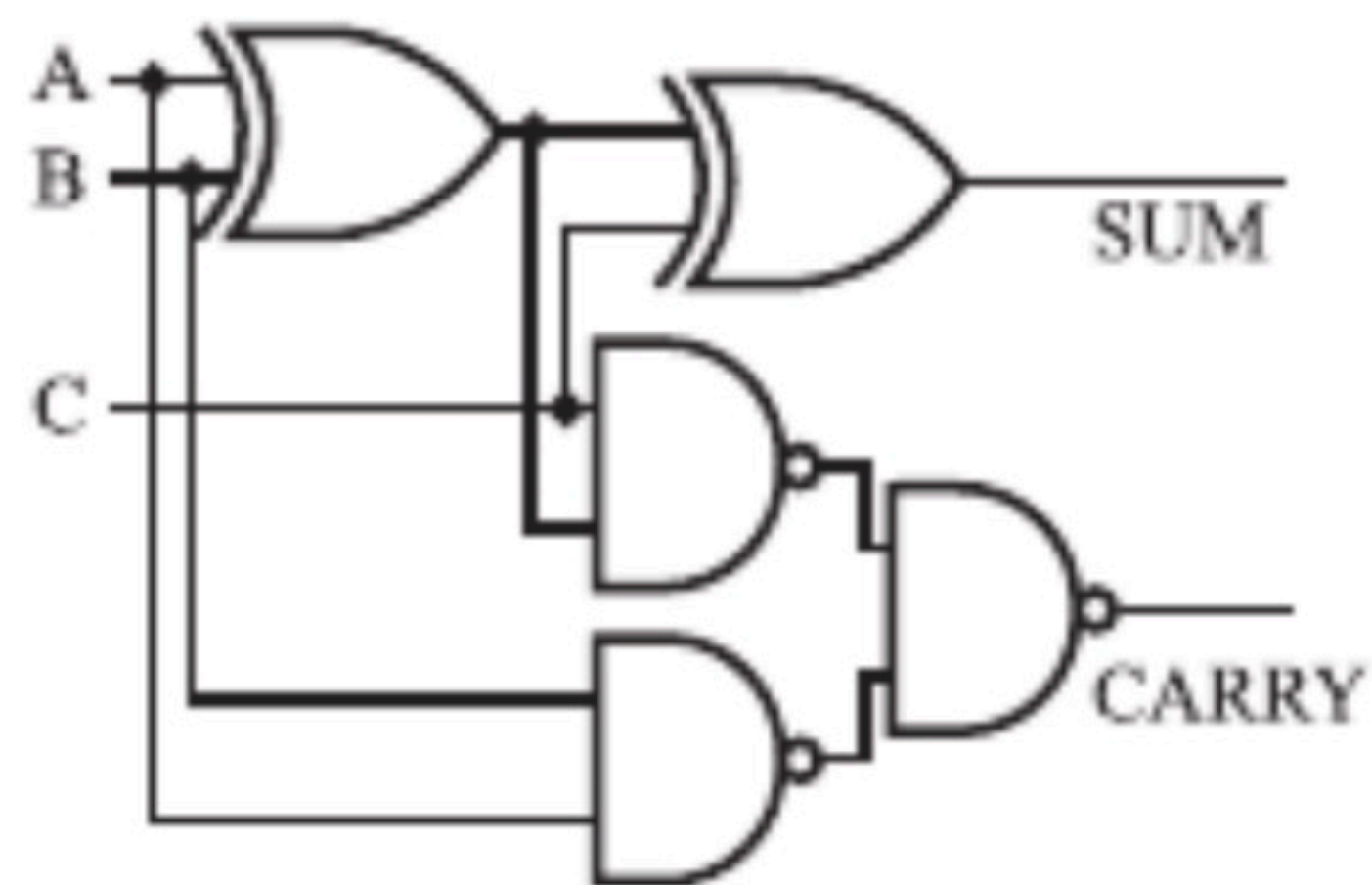
Binær addisjon

Akkurat på samme måte, men her er det i det binære tallsystemet

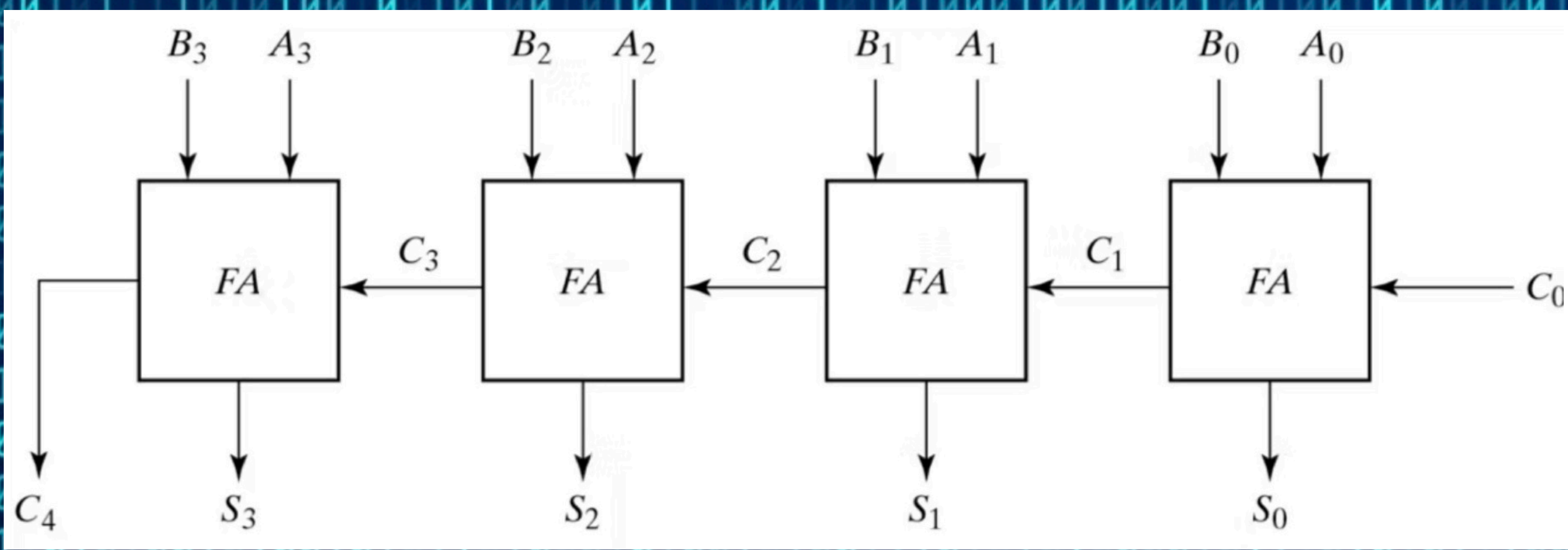
$$\begin{array}{r} 10 \\ + 01 \\ \hline 11 \end{array} \quad \begin{array}{r} \overset{1}{0}1 \\ + 01 \\ \hline 10 \end{array} \quad \begin{array}{r} \overset{1}{0}1 \\ + 11 \\ \hline 100 \end{array}$$

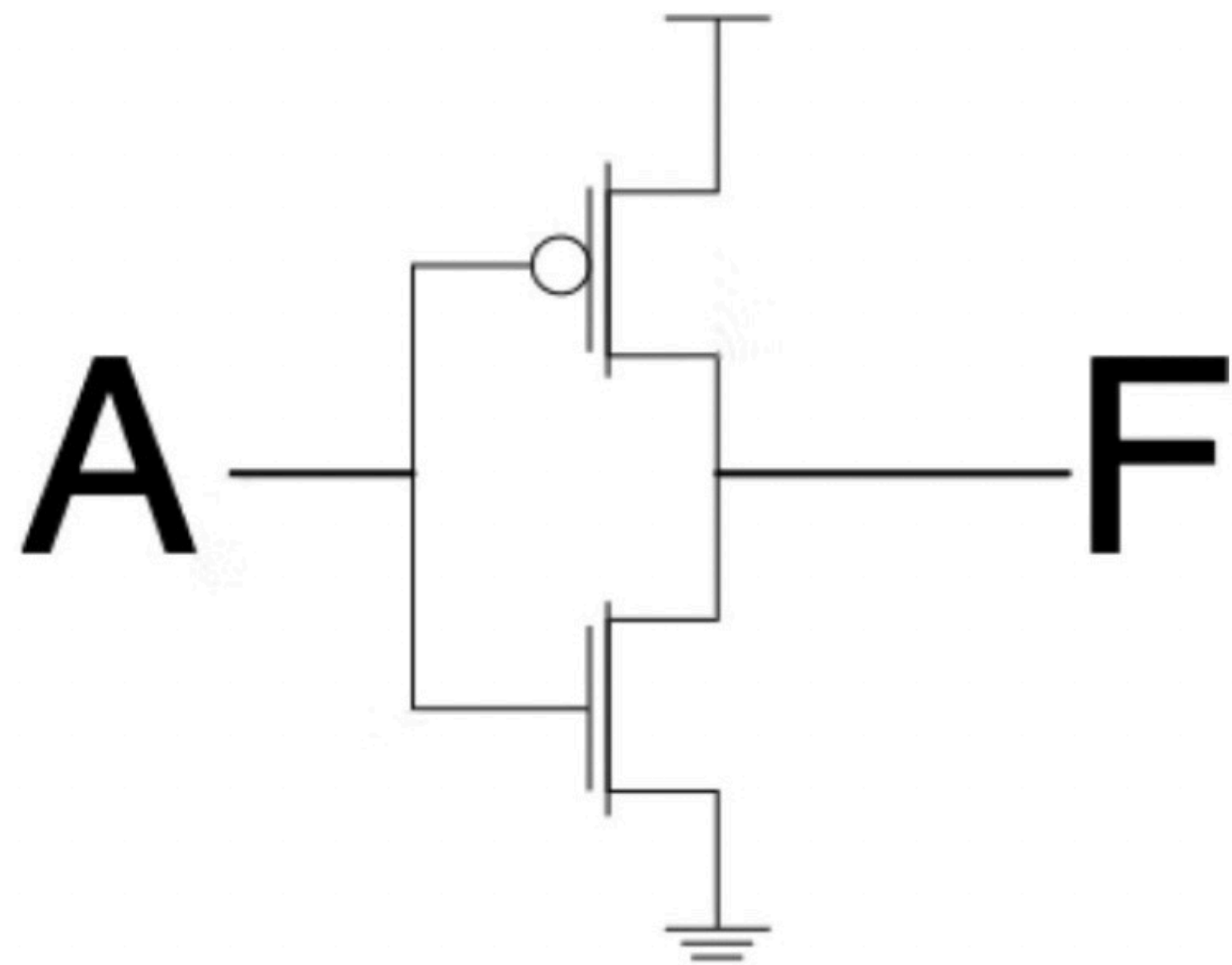
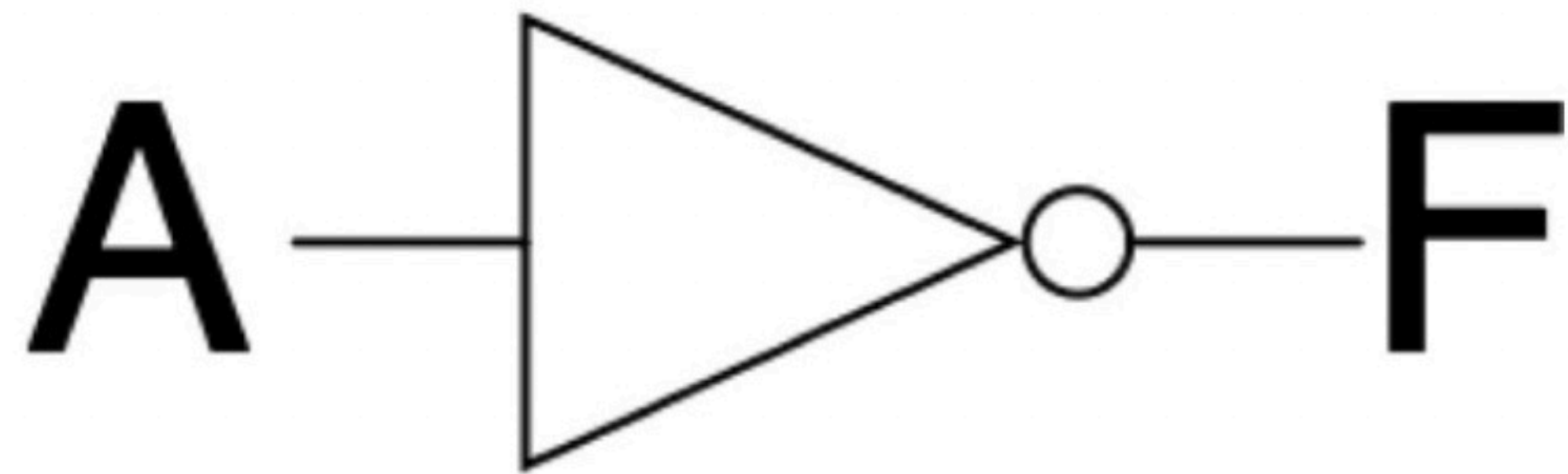


(a) Half-adder

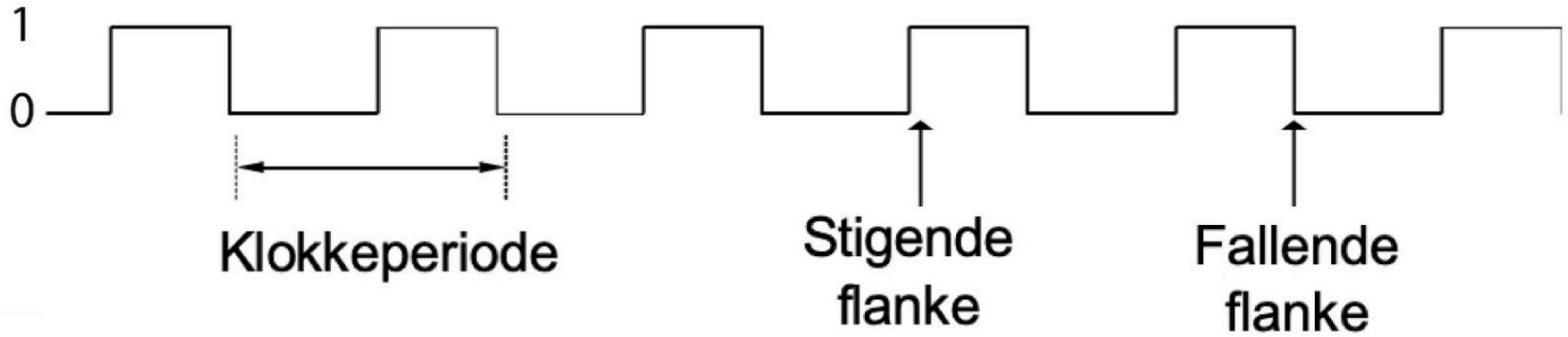


(b) Full-adder





Et klokkesignal er et digitalt signal som veksler mellom '0' og '1' med fast takt



$$frekvens = \frac{1}{klokkeperioden}$$

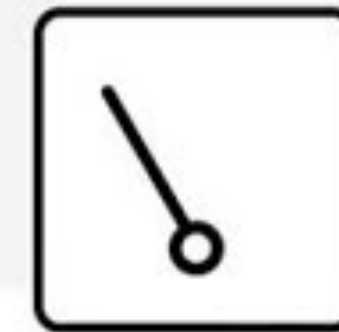
THE BASICS

CPU

PROGRAMME
COUNTER

INSTRUCTION
REGISTER

ACCUMULATOR



CLOCK