Gruppetime 9
23.10.2025



Sørg for at alle sitter ved siden av noen



Velkommen til gruppetimen! ☺

Prosessor generasjoner

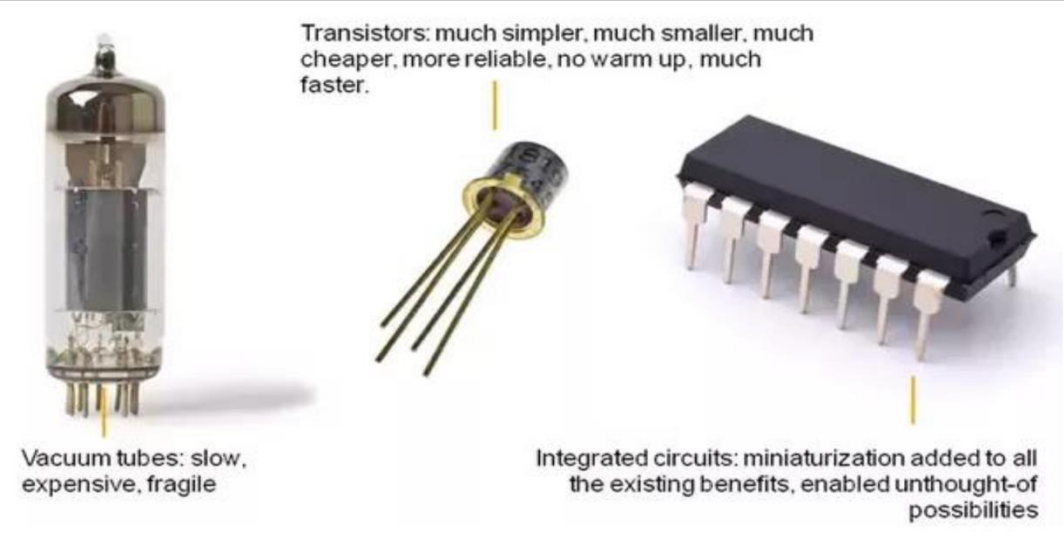


Generasjoner

- **1. Gen: Radiorør**
- **2. Gen: Transistorer**
- **3. Gen: Integrerte kretser**
- **4. Gen: Mikroprosessorer**

År	Teknologi	Størrelse	Instr/sek	Pris (2019kr)
1945-60	Radiorør	$10m^3$	2000	60 mill
1960-68	Transistorer	$500dm^3$	500 000	50 mill
1970-80	Integrerte kretser	$80dm^3$	300 000	200 000
1980-??	Mikroprosessorer	$0,1\text{-}20dm^3$	10^9	1-10 000

Overgangen


Transistors: much simpler, much smaller, much cheaper, more reliable, no warm up, much faster.
Vacuum tubes: slow, expensive, fragile
Integrated circuits: miniaturization added to all the existing benefits, enabled unthought-of possibilities

Overgangen

https://www.youtube.com/watch?v=fEB6ZqQngBY

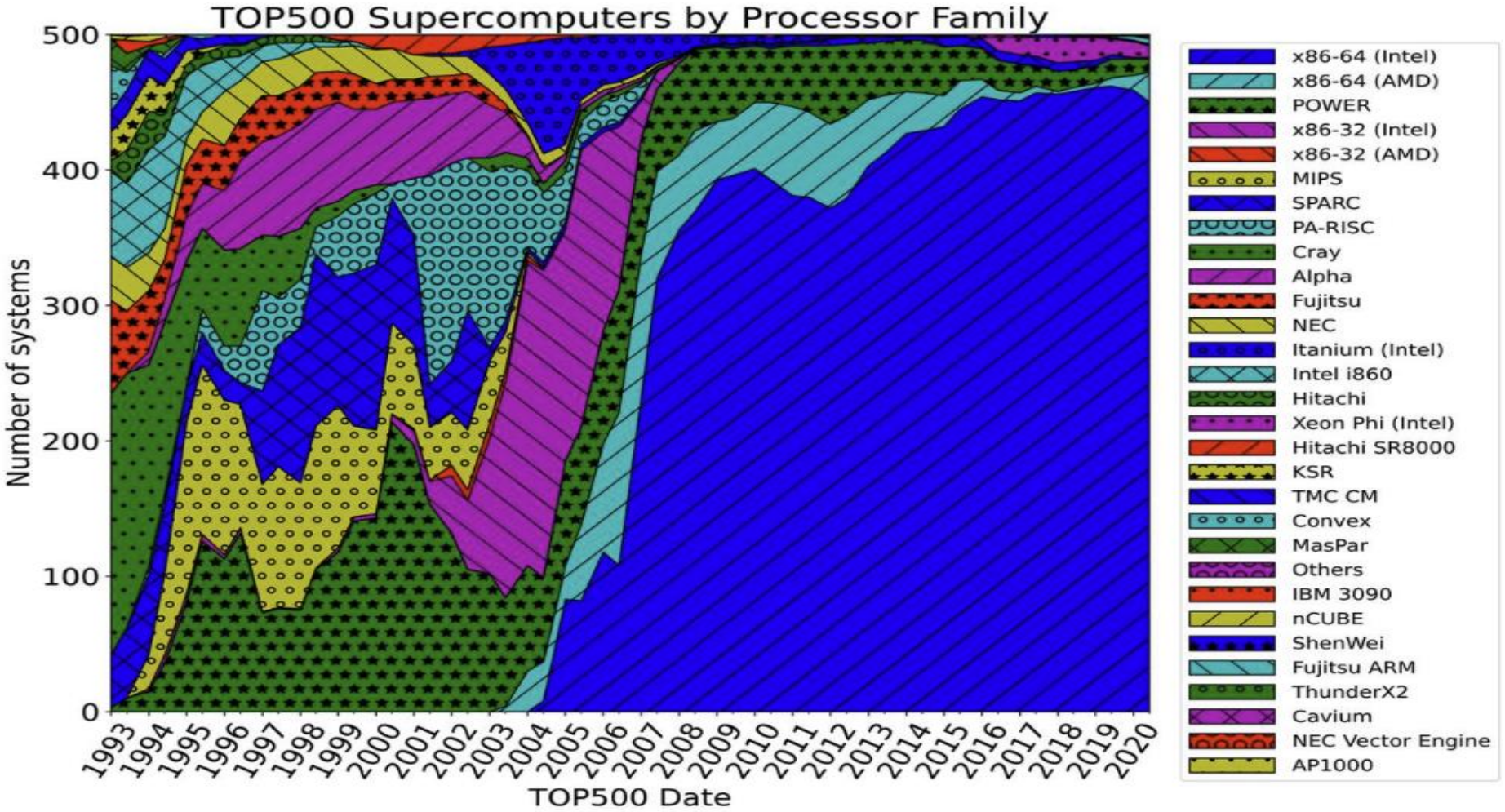
https://www.youtube.com/shorts/SVK8J0VW2uw

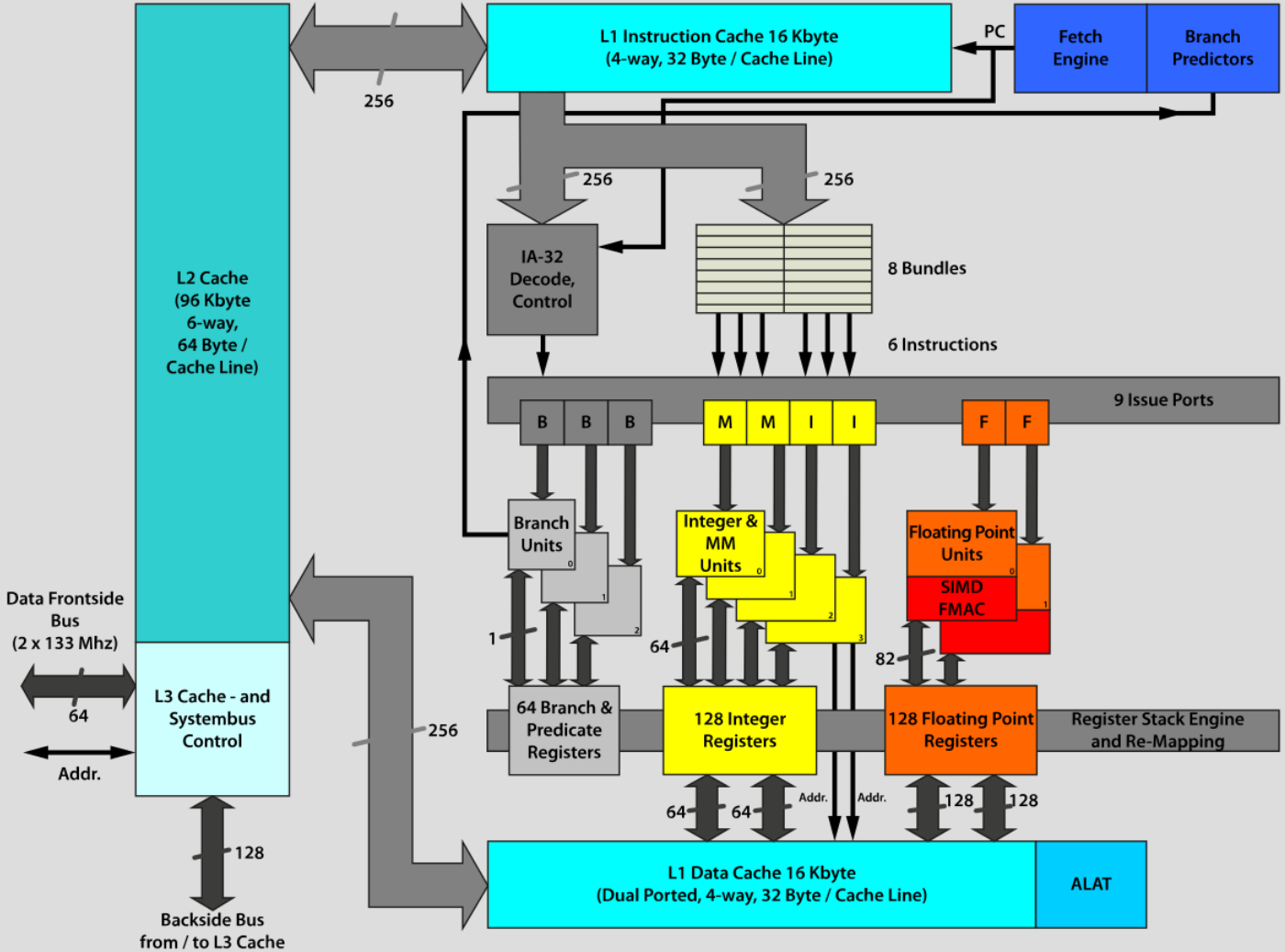
Prosessoren x86-64

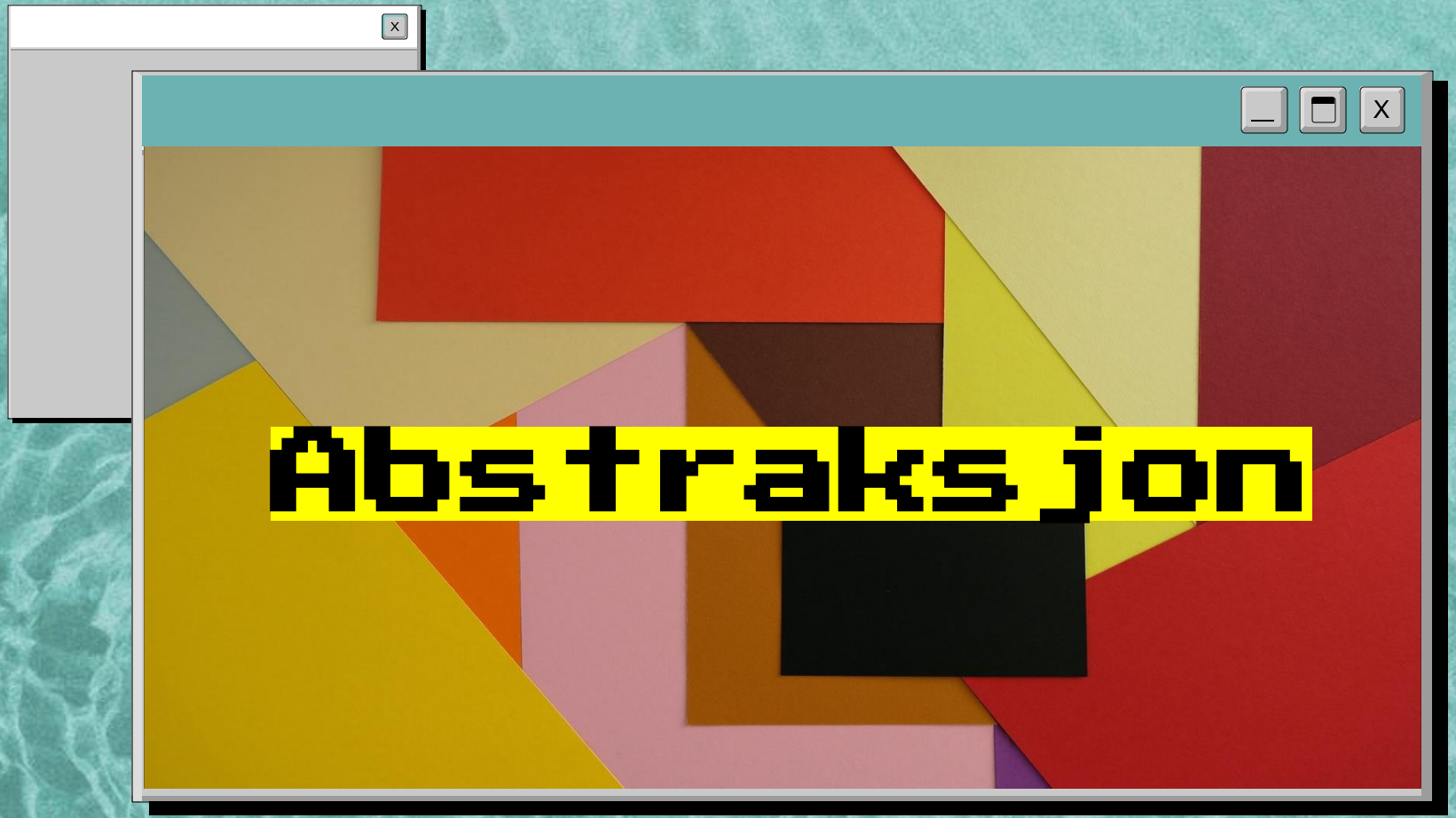
- Intels x86 har gått fra å være en av mange prosessorer til å bli den dominerende.

  Noen grunner:

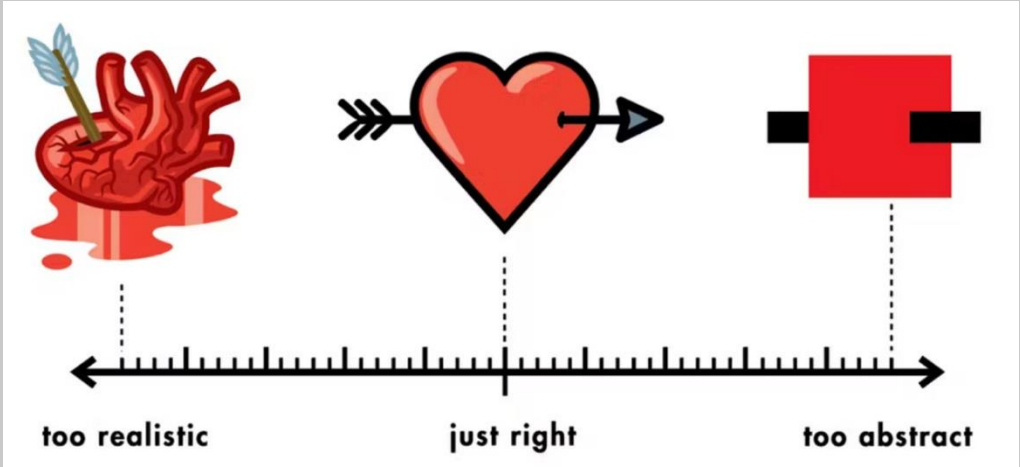
- - Tidlig ute med nyvinninger
- - Bakoverkompatibel
- - Samarbeid mellom MS og Intel – «Wintel», svært dominerende i en periode


TOP500 Supercomputers by Processor Family
Number of systems
TOP500 Date
0
100
200
300
400
500
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
x86-64 (Intel)
x86-64 (AMD)
POWER
x86-32 (Intel)
x86-32 (AMD)
MIPS
SPARC
PA-RISC
Cray
Alpha
Fujitsu
NEC
Itanium (Intel)
Intel i860
Hitachi
Xeon Phi (Intel)
Hitachi SR8000
KSR
TMC CM
Convex
MasPar
Others
IBM 3090
nCUBE
ShenWei
Fujitsu ARM
ThunderX2
Cavium
NEC Vector Engine
AP1000

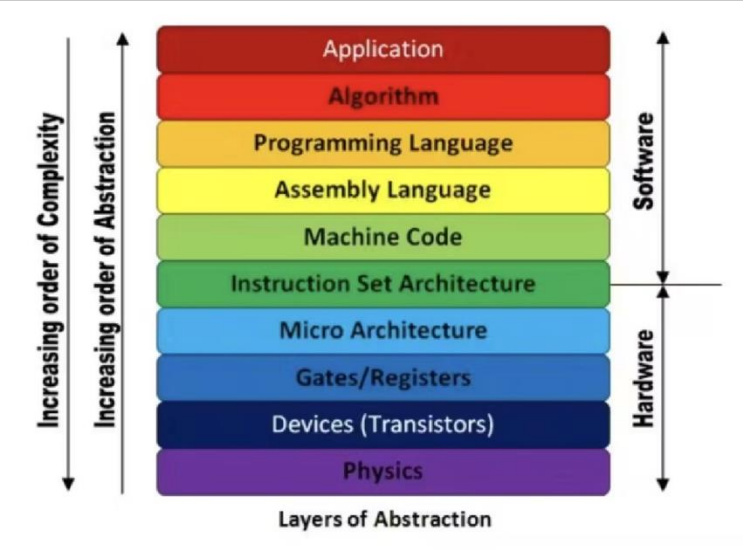

L1 Instruction Cache 16 Kbyte
(4-way, 32 Byte / Cache Line)
PC
Fetch Engine
Branch Predictors
256
256
256
L2 Cache
(96 Kbyte
6-way,
64 Byte /
Cache Line)
IA-32
Decode,
Control
8 Bundles
6 Instructions
9 Issue Ports
B
B
B
M
M
I
I
F
F
Branch Units
Integer & MM Units
Floating Point Units
SIMD FMAC
1
64
82
64 Branch & Predicate Registers
128 Integer Registers
128 Floating Point Registers
Register Stack Engine and Re-Mapping
64
64
Addr.
Addr.
128
128
Data Frontside Bus
(2 x 133 Mhz)
64
Addr.
L3 Cache - and Systembus Control
256
128
Backside Bus
from / to L3 Cache
L1 Data Cache 16 Kbyte
(Dual Ported, 4-way, 32 Byte / Cache Line)
ALAT


Abstraks jon

ABSTRACT-O-METER

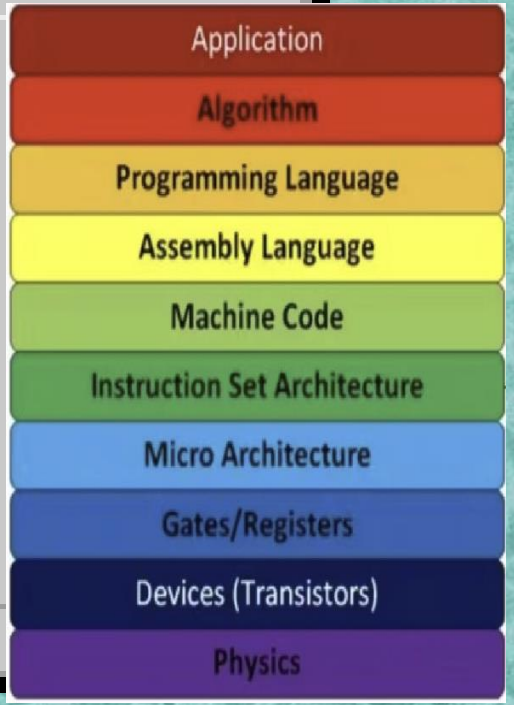


Abstraksjonsnivåer



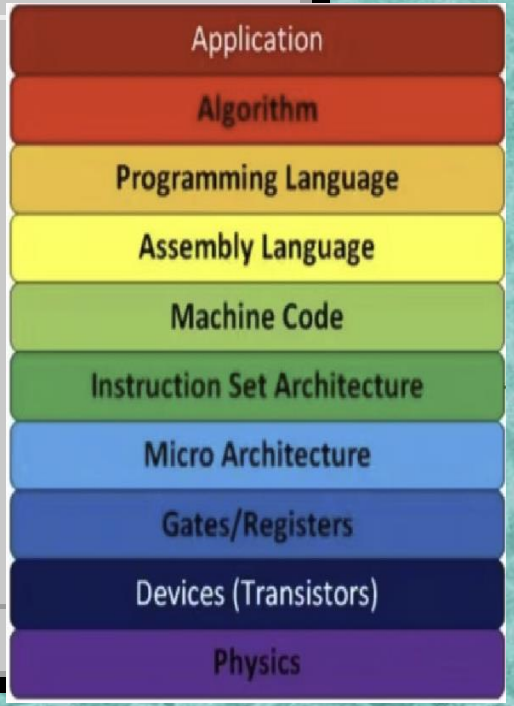
Abstraksjons-nivåene (fra bunn)

- **Fysikk:** Elektroner som flyter i materialer
- **Transistorer:** Små brytere som styrer strøm (1 og 0)
- **Logiske porter / mikroarkitektur:** Hvis strøm her -> strøm der,
- **Maskinkode:** 1- og 0-instruksjoner CPU forstår
- **Assembly:** Mer lesbart – symbolske navn for instruksjoner
- **Programmeringsspråk:** Python, Java – lettere for mennesker å lese
- **Algoritmer og applikasjoner:** Programmer, spill, apper



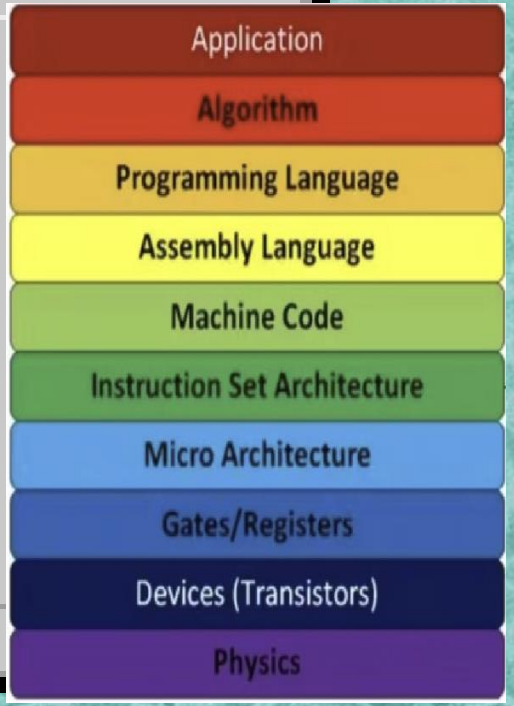
Hvorfor abstraksjon?

- Skjule kompleksitet, for å få til noe stort!
- Lar oss bygge på andres arbeid
- Abstraksjon fremmer lav kobling og høy kohesjon



Eksempler

- Skytjenester
- API-er
- Nettlesere
- Operativsystemet
- TCP/IP modellen



Spørsmål?

Jobbe med oblig? ☺