3. Hardware

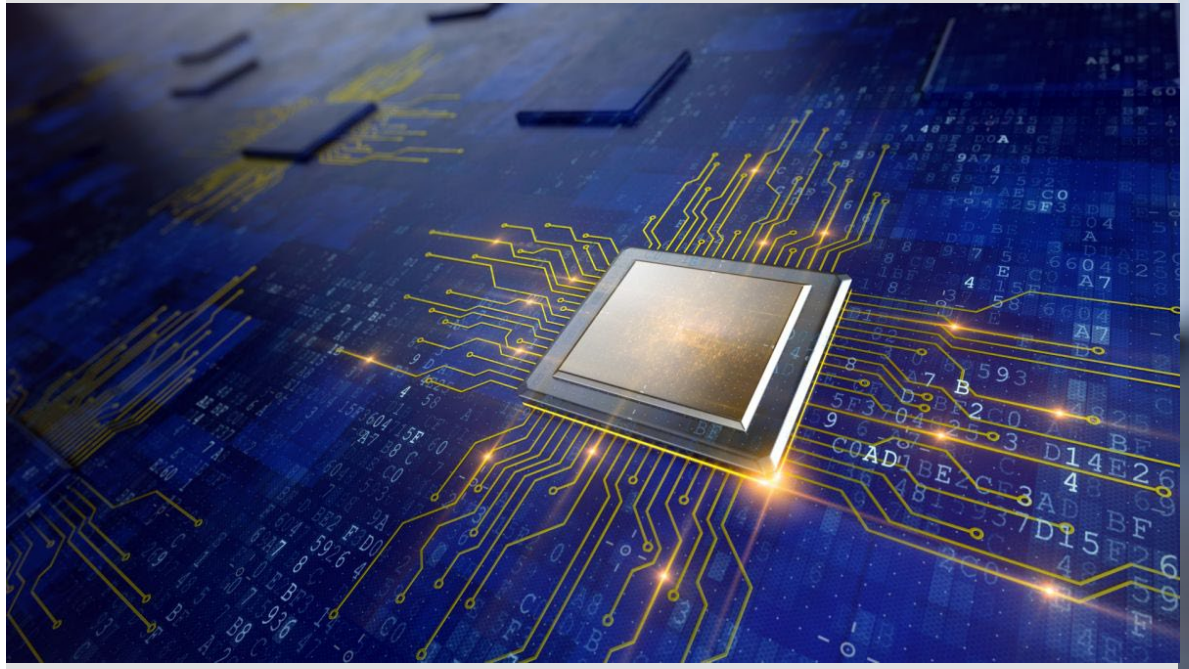
System Essentials Windows
22-23

Overzicht

1. Hardware componenten
2. System Requirements
3. Demo: Windows 11 – opvragen specificaties

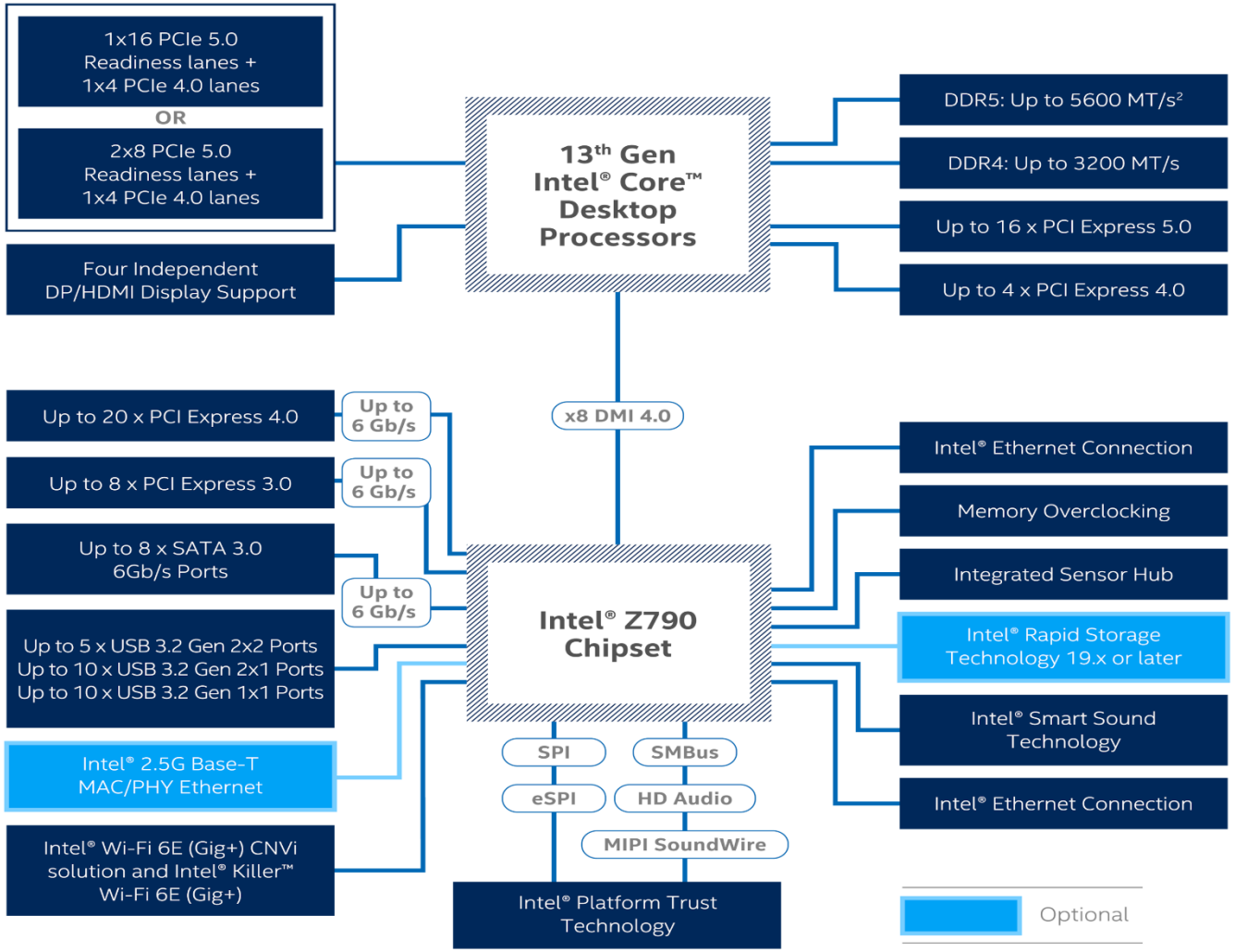
Overzicht Hardware

1. **Moederbord**
2. Processor
3. Geheugen
4. Opslag



1. Moederbord

- Functie: **verbinden** van alle componenten
  - Processor (CPU)
  - RAM
  - Uitbreidingspoorten/sloten
    - PCI-express
    - SATA
  - Chipset
    - Nortbridge - Southbridge
  - UEFI

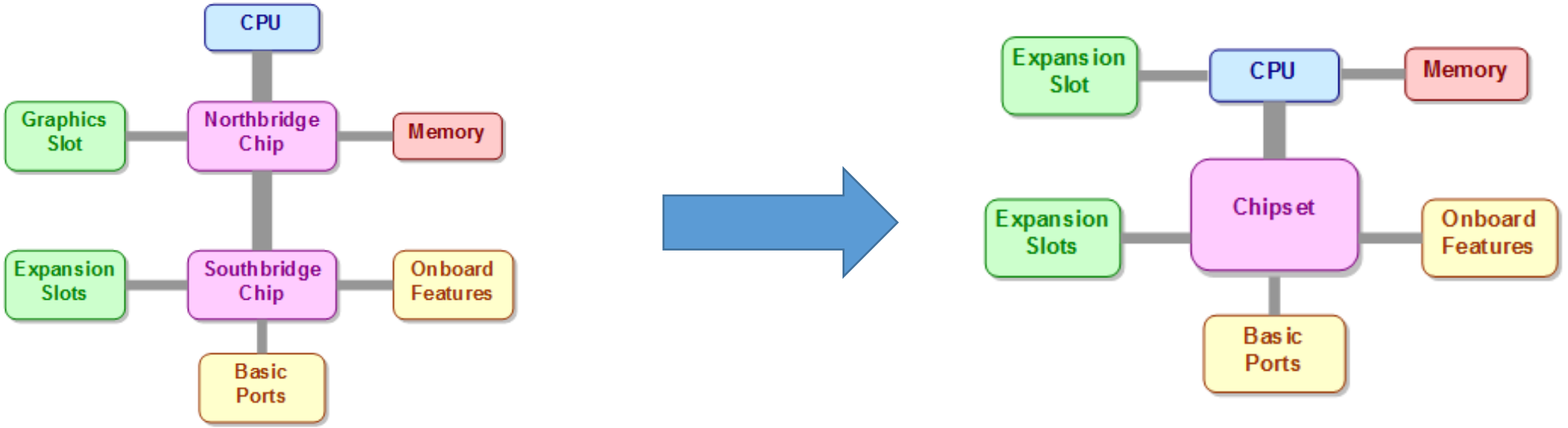


[Intel 13th Gen Core Raptor Lake Processors Impress In A Variety Of Workloads (forbes.com)]

1. Moederbord: UEFI

- Firmware
- **Opvolger** van BIOS
- Flash Memory op moederbord
- **Initialisatie** hardware
- **Boot** manager
- **Security** features: secure boot

1. Moederbord: chipset



1. Moederbord: chipset

CPU

Aansluiten ‘snelle componenten’

- Geheugen
- Grafische kaart

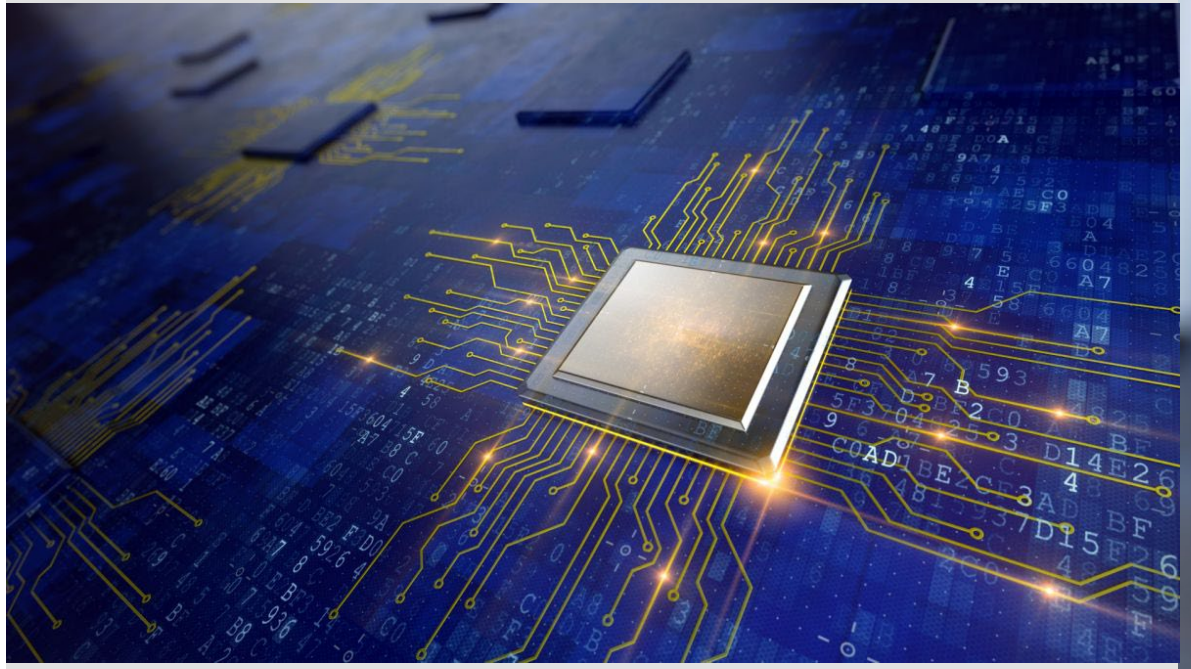
chipset

Aansluiten ‘trage componenten’

- Opslag (SSD – HDD)
- Netwerkaansluitingen
- Geluid
- USB

Overzicht Hardware

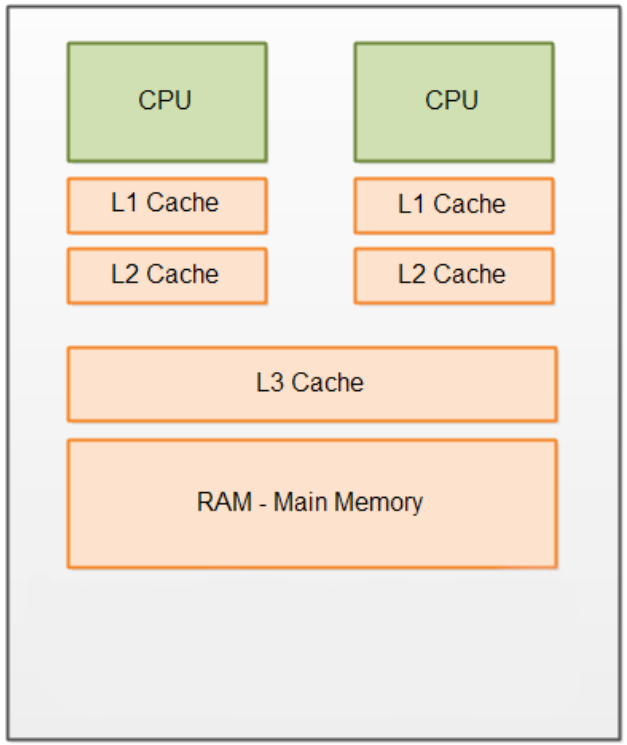
1. Moederbord
2. **Processor**
3. Geheugen
4. Opslag

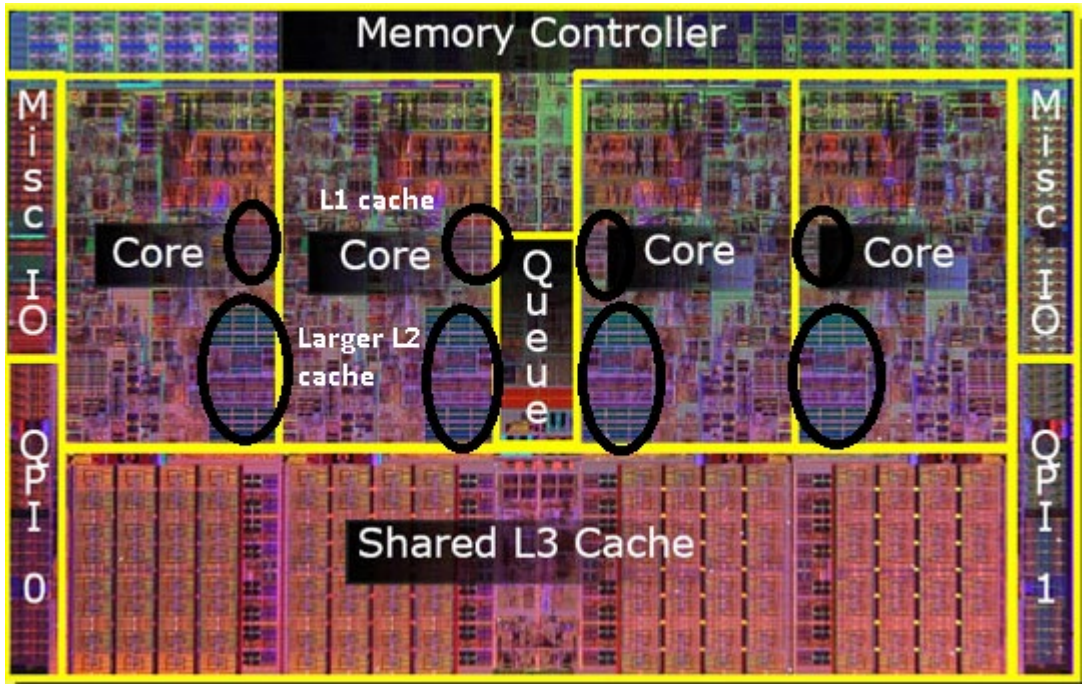


2. Processor

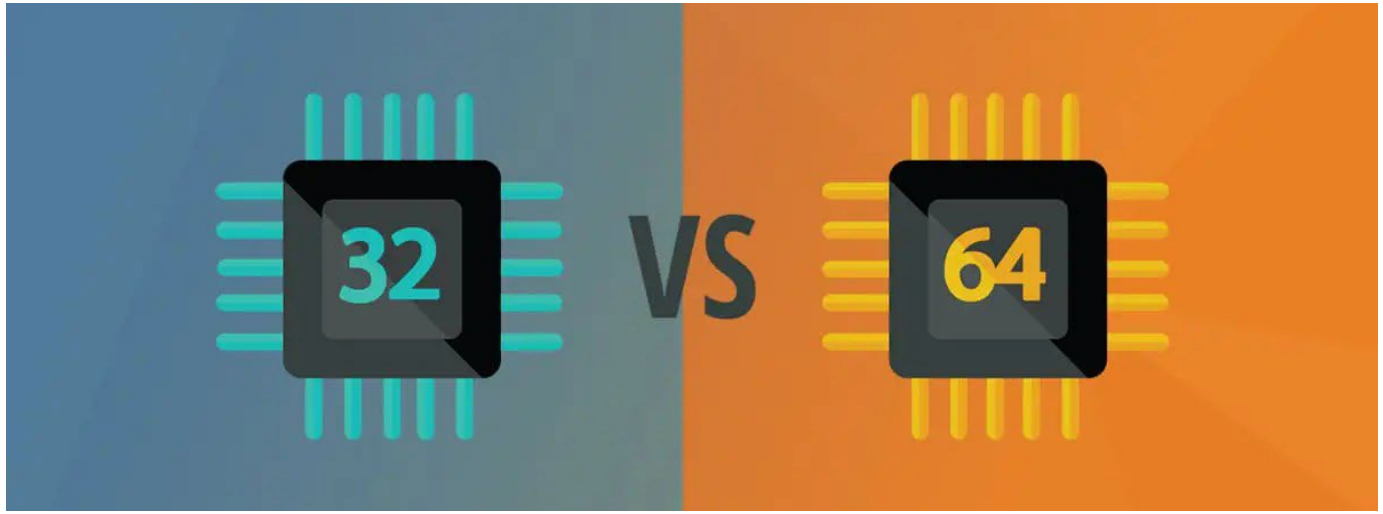
- Centrale verwerkingseenheid
- Snelheid uitgedrukt in: GHZ (1GHZ = 1.000.000.000 instructies/sec)
- Effectieve prestaties afhankelijk van diverse factoren

2. Processor: cache





2. Processor: 32bit vs 64 bit



- 32 bit per clock cycle
- 4GB RAM
- x86

- 64 bit per clock cycle
- 16 exabyte RAM
- x64
- Backwards compatibel met 32bit

Overzicht Hardware

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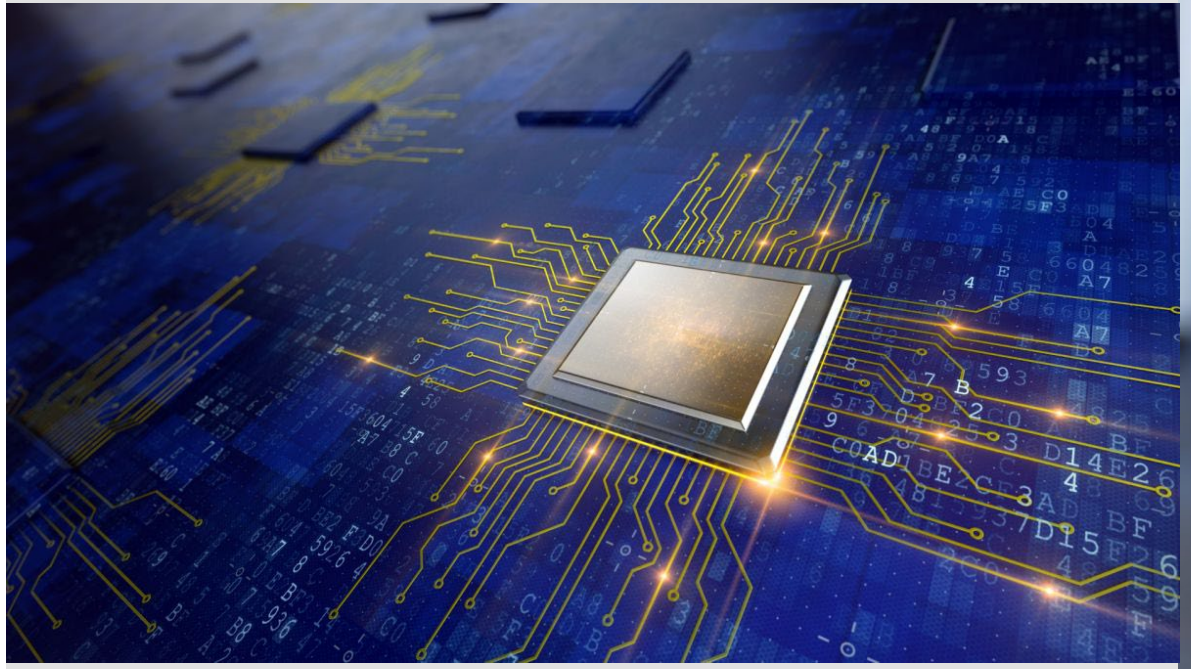


3. Geheugen

- DDR versies
- Snelheid
- Timings
- ECC non ECC
- DIMM So-DIMM

DIMM is for desktops,
SODIMM is for laptops

DDR4 RAM is the new standard in laptop computing,

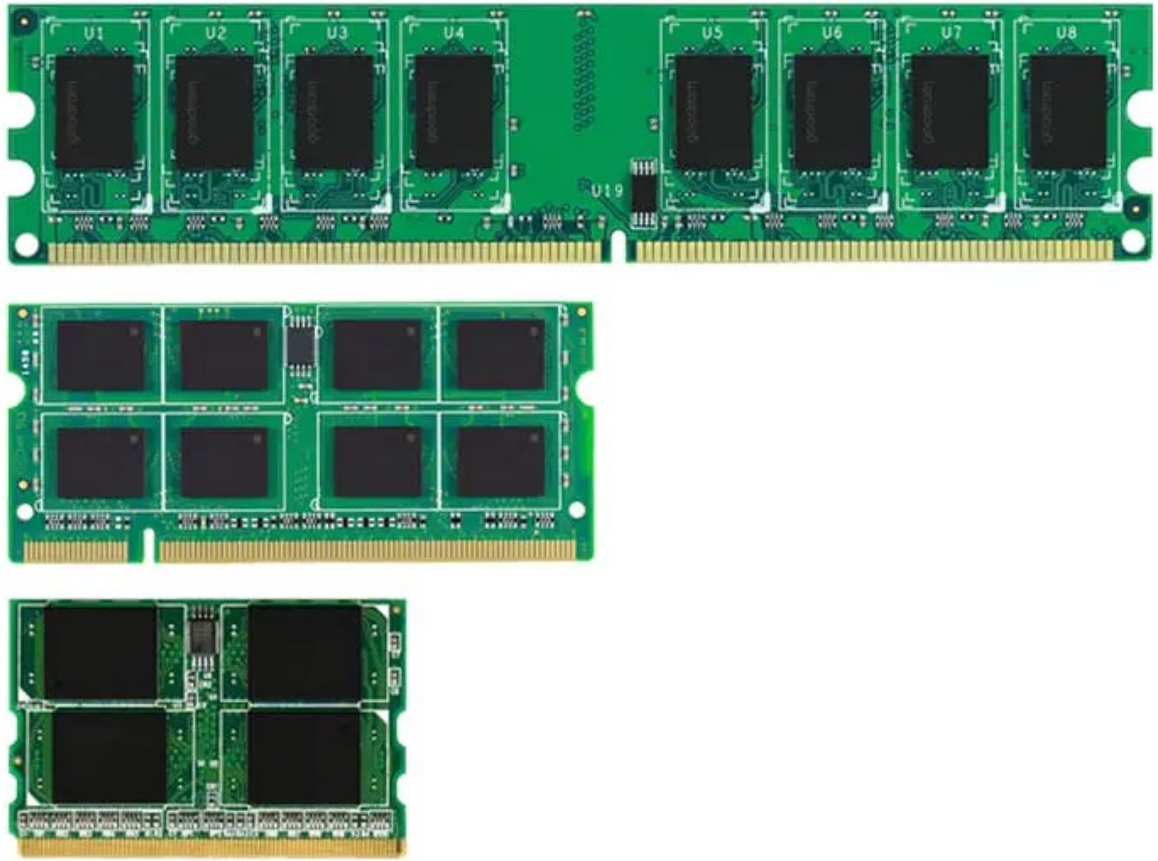
3. RAM

- Random Access Memory
- Werkgeheugen
- Tijdelijk en snelle opslag voor applicaties en OS

3. RAM: snelheid

	DDR	DDR2	DDR3	DDR4	DDR5
Prefetch	2-bit	4-bit	8-bit	8-bit	16-bit
Max Data Rate (MT/s)	400	800	1600	5100	6400
Max Transfer Rate (GB/s)	3.2	6.4	14.9	25.6	51.2

3. RAM: formaat



DIMM

SoDIMM

MicroDIMM

Overzicht Hardware

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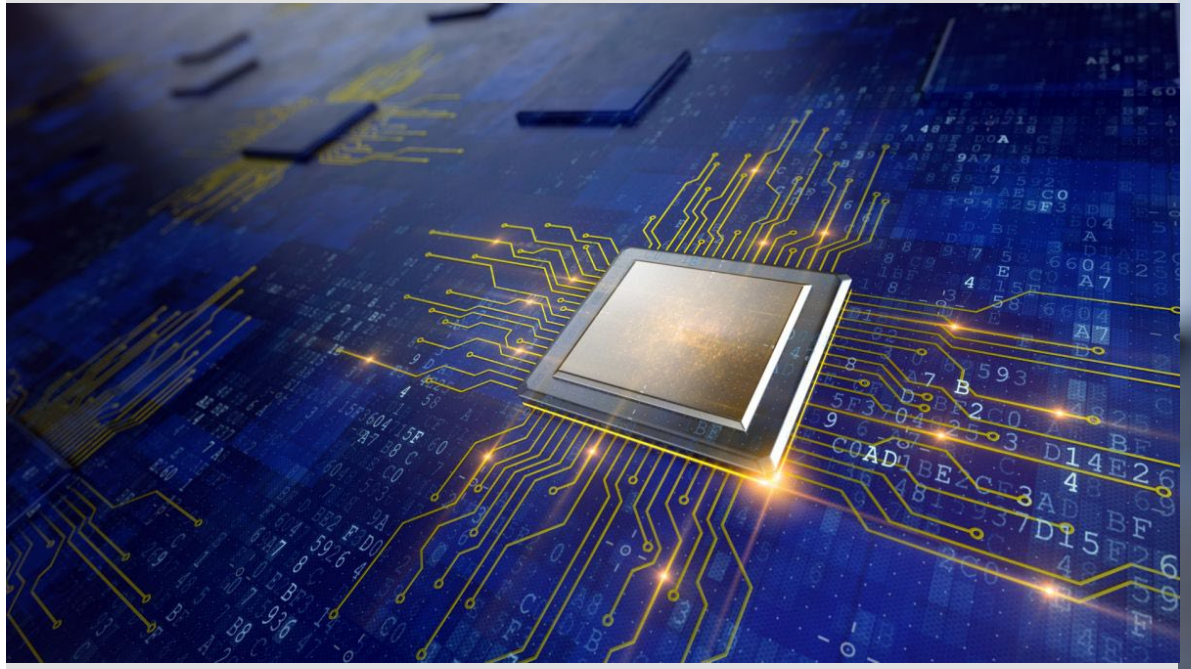
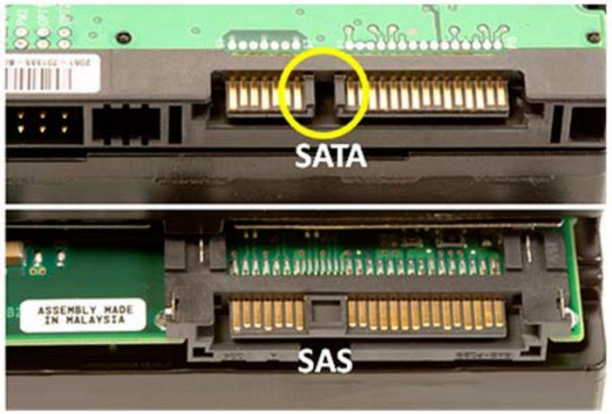
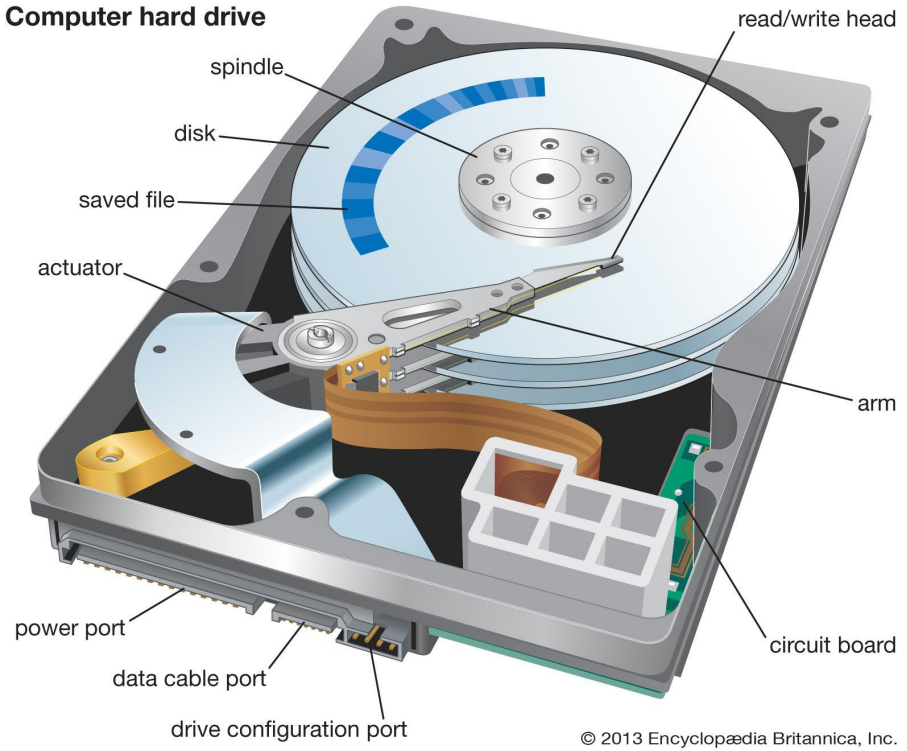
4. **Opslag**



4. Opslag: Harde schijf

- 5400 – 7200 – 10.000 rpm
  15.000rpm
- Aansluitingen:
  SATA of SAS





4. Opslag: Harde schijf

- **Form factor:** 2,5”
- **interface:** **SATA**
- Speed: 600MB/s

- **Form factor:** M.2
- **interface:** **NVMe**
- **Speed:** 7000MB/s

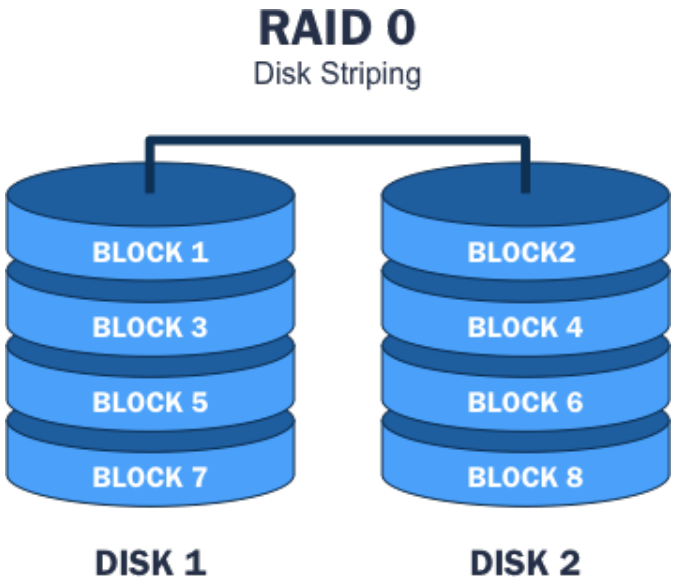
- **Form factor:** M.2
- **interface:** **SATA**
- **Speed:** 600MB/s

PCIe Generations Compared

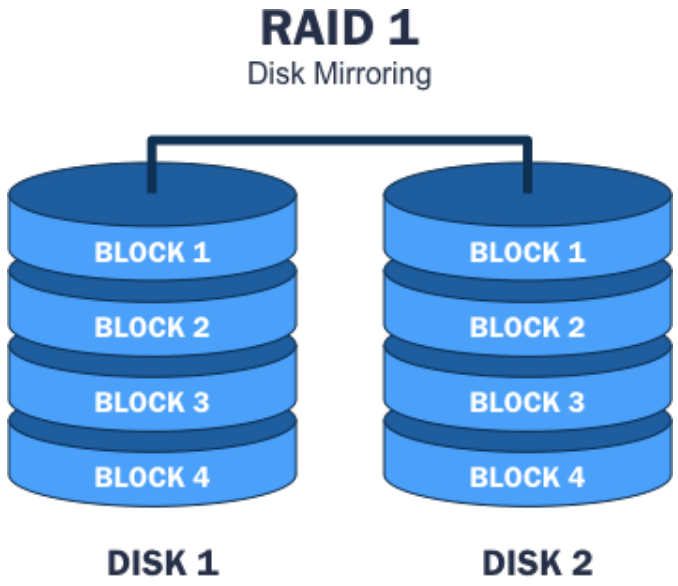
	Bandwidth	Gigatransfer	Frequency
PCIe 1.0	8 GB/s	2.5 GT/s	2.5 GHz
PCIe 2.0	16 GB/s	5 GT/s	5 GHz
PCIe 3.0	32 GB/s	8 GT/s	8 GHz
PCIe 4.0	64 GB/s	16 GT/s	16 GHz
PCIe 5.0	128 GB/s	32 GT/s	32 GHz
PCIe 6.0	256 GB/s	64 GT/s	32 GHz

- **Form factor:** mSATA
- **interface:** **SATA**
- **Speed:** 600MB/s

4. Opslag: RAID



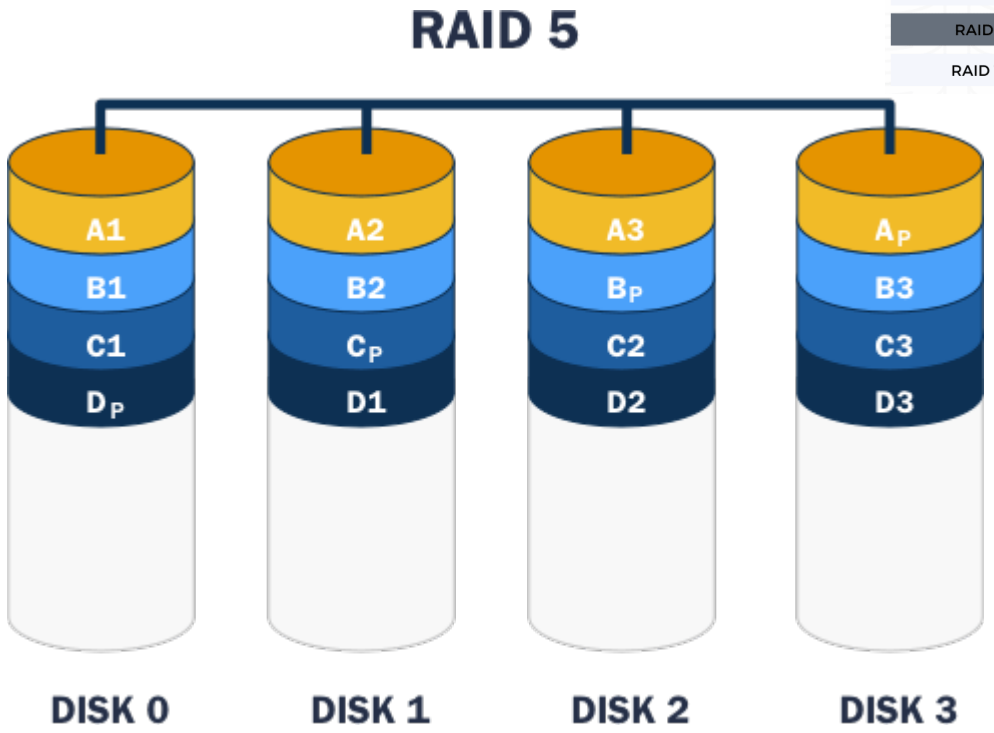
Performantie



Betrouwbaarheid

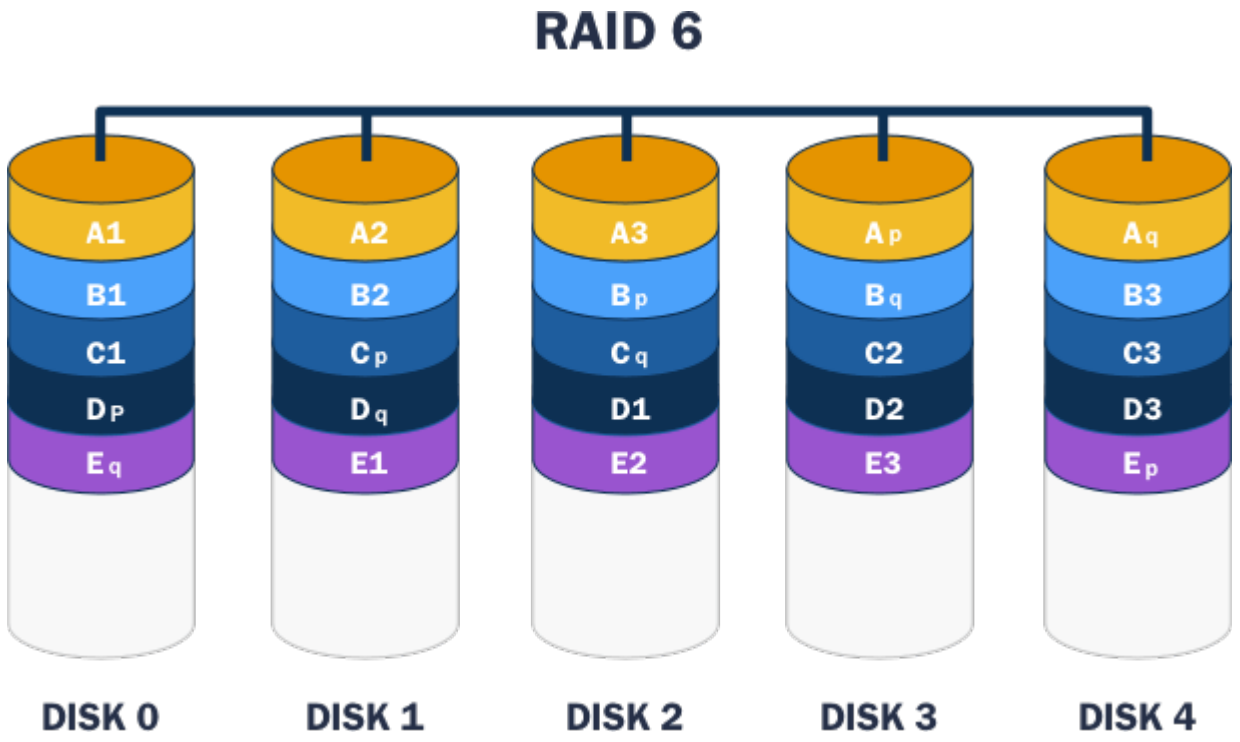
4. Opslag: RAID

RAID LEVEL	DATA DISTRIBUTION TECHNIQUE	MINIMUM DISKS REQUIRED	BEST FOR
RAID 0	Striping	2	Performance
RAID 1	Mirroring	2	Reliability
RAID 5	Striping + Parity	3	Security
RAID 6	Striping + Double Parity	4	Reliability + Storage Capacity
RAID 10	Striping + Mirroring	4	Performance + Security



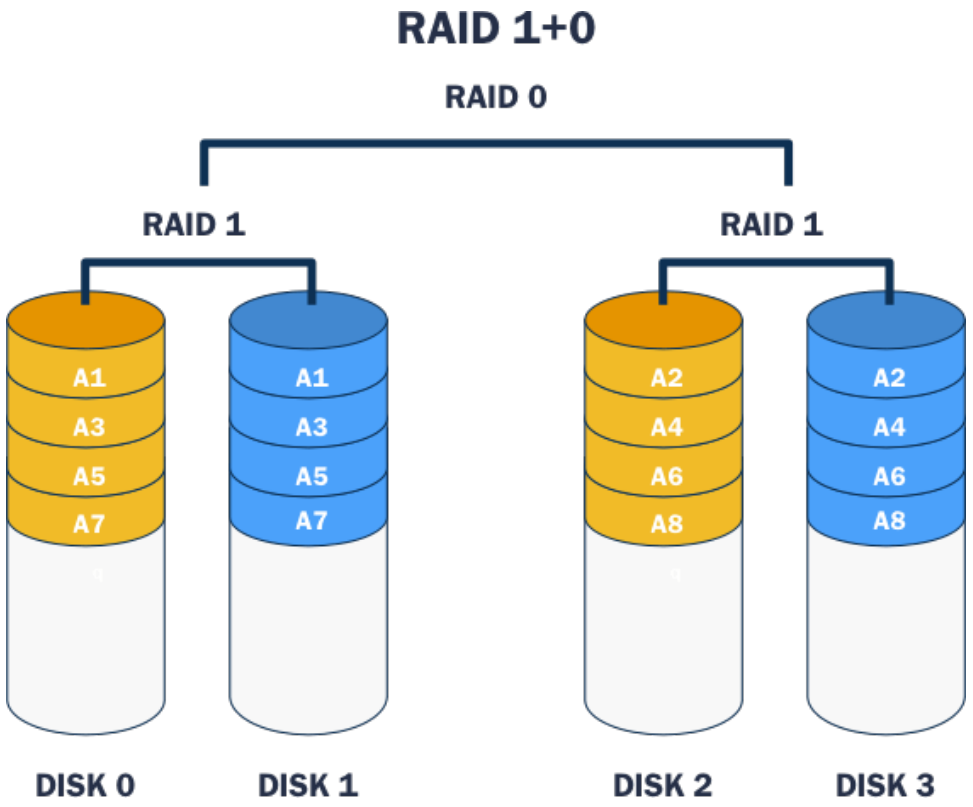
Performantie en betrouwbaarheid

4. Opslag: RAID



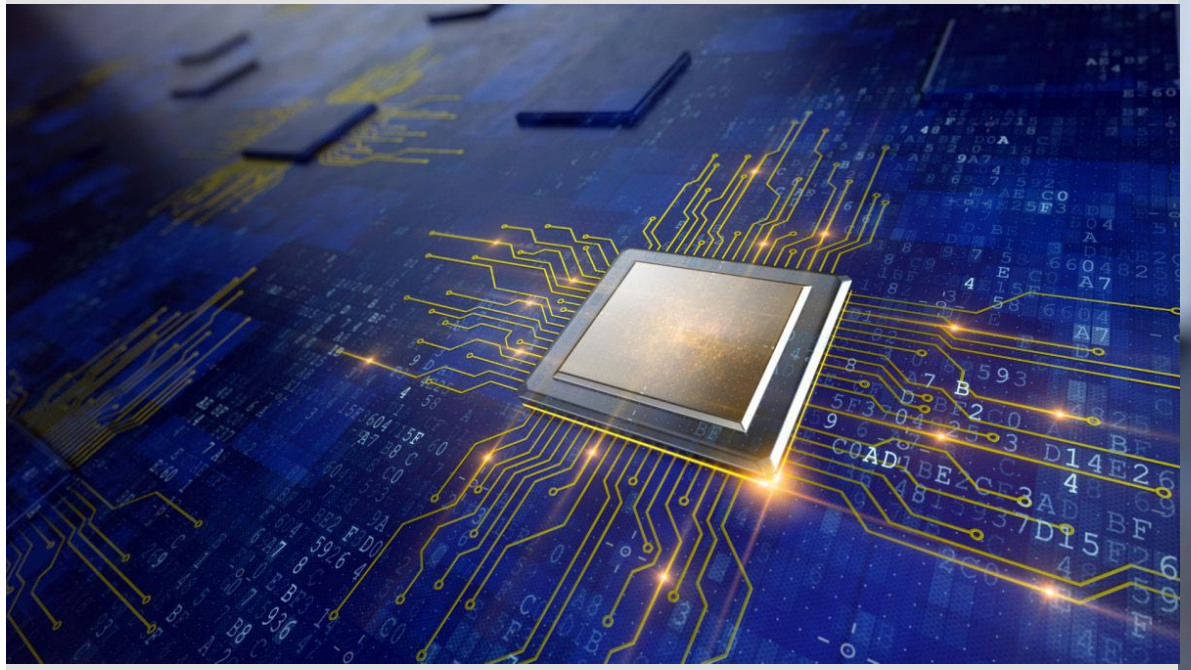
Performantie en betrouwbaarheid

4. Opslag: RAID



System Requirements

1. Windows Desktop
2. Windows Server
3. Linux
4. Applicatie



1. Windows 10

• Processor	1 Ghz - 32/64bit
• Geheugen	1 GB for 32-bit 2 GB for 64-bit
• Opslag	16 GB for 32-bit 20 GB for 64-bit
• Grafisch	DirectX 9

2. Windows 11

• Processor	1 Ghz - Dual core - 64bit Intel gen 8 - AMD Zen 2
• Geheugen	4 GB
• Opslag	64 GB
• Grafisch	DirectX12
• Overig	UEFI – secure boot en encrypted disk TPM 2

UEFI - TPM

- TPM chip
  - Hardware chip moederbord
  - Opslaan cryptografische sleutels – gevoelige informatie
  - Vb. Bitlocker - face recognition – virtualisatie security
- UEFI
  - Flash memory moederbord
  - Secure boot

3. Windows server 2022

• Processor	1.4 Ghz - 64bit Intel gen 8 - AMD Zen 2
• Geheugen	Core: 512 MB ECC GUI: 2GB
• Opslag	32 GB
• Overig	UEFI 2.3.1c TPM 2

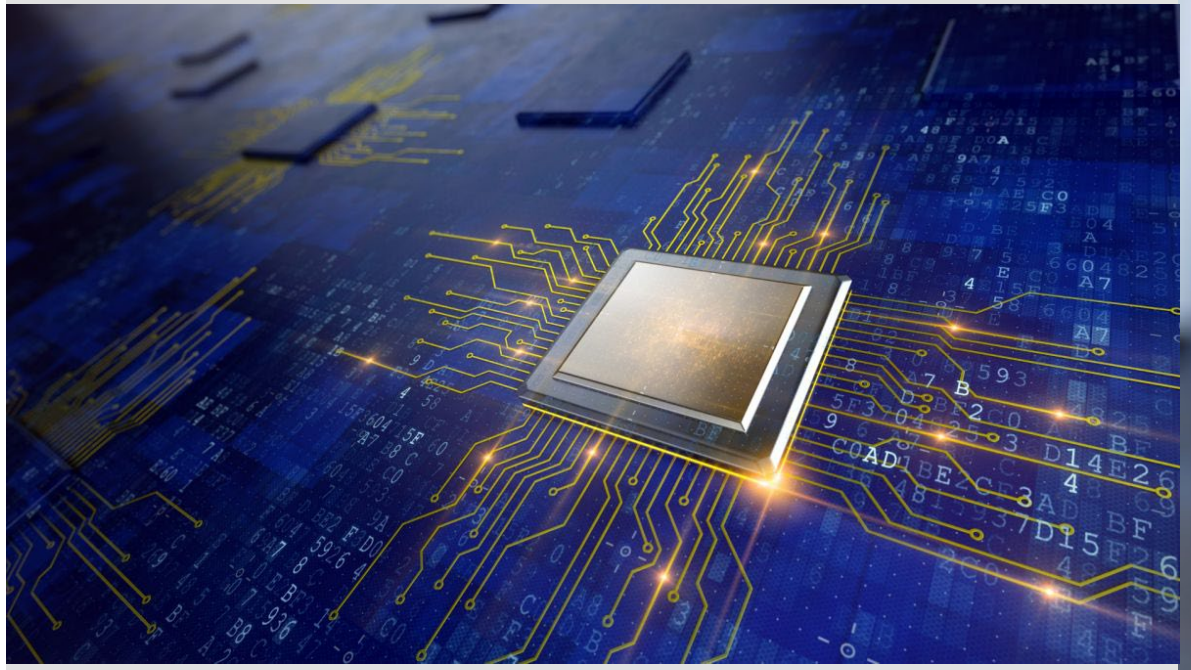
3. Ubuntu server 22.04 LTS

- Processor 1 Ghz
- Geheugen 1 Gb
- Opslag 2.5 GB

4. Visual Studio 2022

- Processor — 1.8 Ghz x64 quad core
- Geheugen — 4 Gb (recommended: 16GB)
- Opslag — 20 – 50GB typical

Demo Windows 11



Laptop research

1. Moederbord: welke chipset?
2. Processor: merk en welke generatie?
3. Geheugen: hoeveel GB en welke DDR versie
4. SSD: hoeveel GB en welke interface