BACK TO BASICS #3

HARDWARE

WHAT IS HARDWARE & SOFTWARE

Hardware

- Laptop / Desktop / Phone / Tablet
  - Central Processor Unit (CPU)
  - Random Access Memory (RAM)
  - Storage (Hard Disk / Solid State Disk)
  - Keyboard / Mouse
  - Monitor
  - Speaker
  - Router
  - Alexa / Google Home Hub
  - Cables

Software

- Operating System (Windows / macOS / Android / iOS)
- Programs running on your computer
- Applications running on your phone
- Games

Data

- Office Documents
- Emails
- Photos / Videos / Music
- Saved Games

CENTRAL PROCESSOR UNIT (CPU)

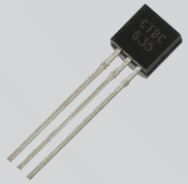
Intel Pentium processors are mainly made for the average office PC, even Adobe Photoshop runs good on Pentium processors. Intel Pentium processors are currently used only in the desktop area, some processors are marked with a **T** in the title and have a reduced clock rate, making them slower but more energy efficient.

Examples:

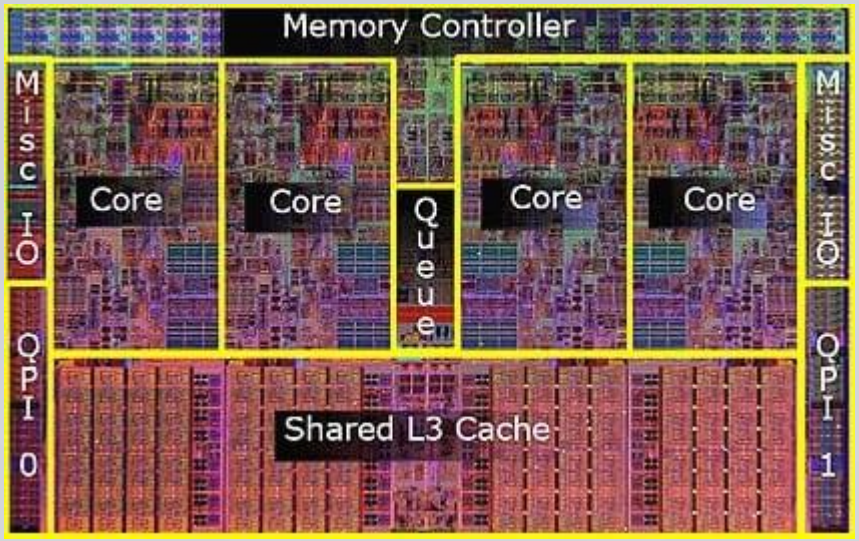
Intel Pentium 7505	2 Cores
Intel Pentium Gold 5405U	2 Cores
Intel Pentium Gold 6405U	2 Cores
Intel Pentium Gold G6420T	2 Cores
Intel Pentium Silver J5005	4 Cores
Intel Pentium D1507	2 Cores
Intel Pentium N3530	4 Cores

CENTRAL PROCESSOR UNIT (CPU)

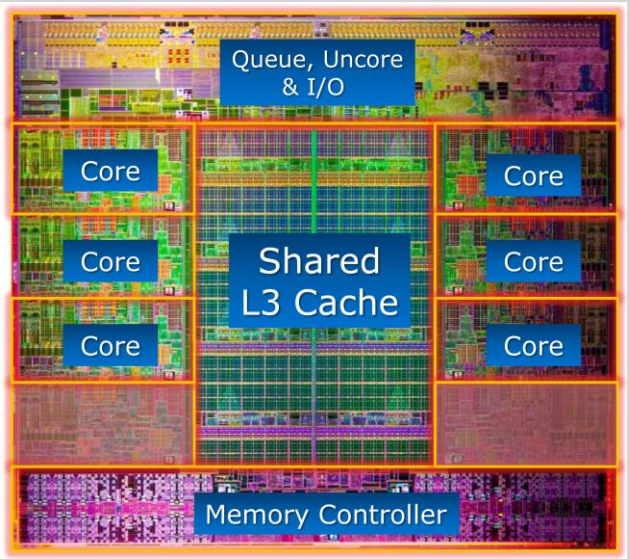
The original CPU's had a single core and performance was improved by increasing the speed of the CPU, 1MHz -> 200MHz -> 1.2GHz -> 2.4 GHz -> 3.2 GHz. Unfortunatly that could not continnue so it was necessery to increase the CPU count or Core count on the chip.



Single Transistor from 1980's



~3 billion Transistors



~7 billion Transistors

CENTRAL PROCESSOR UNIT (CPU)

- Intel
  - **Core M3** (8th Generation, 2 Cores) (< £35) - Equivalent **AMD A6**
    - Mobile Devices
  - **Core i3** (11th Generation, 2 Cores) (£35-£80) - Equivalent **AMD A8 / AMD Ryzen 3**
    - Email / Web Browsing
    - Office
    - Single Application
  - **Core i5** (11th Generation, 4 Cores) (£120-£220) - Equivalent **AMD A9 / AMD Ryzen 5**
    - Faster Start-up
    - Multiple Applications
    - 4K Graphics
  - **Core i7** (11th Generation, 4 Cores) (£220-£320) - Equivalent **AMD Ryzen 7**
    - High End Gaming
    - Multitasking
  - **Core i9** (11th Generation, 10 Cores) (> £370) - Equivalent **AMD Ryzen 9 /ThreadRipper**
    - Real Time Video Editing
    - Pro - level

INTEL CPU HISTORY

Intel Pentium Core 2 Duo - 2006

Intel Pentium Core 2 Quad - 2007 – 2010

Intel Atom - 2008

Intel i7 (1st Generation) - 2008

Intel i5 (1st Generation) - 2008

Intel i3 (1st Generation) - 2010

Intel i7 (11th Generation) - 2020

Intel i5 (11th Generation) - 2020

Intel i3 (11th Generation) - 2020

Intel i-series generations

Intel have used the i-series name for over a decade, roughly each year they release a new “generation” of CPU. You can identify your CPU generation from the CPU id

Intel(R) Core(TM) i7-6700K CPU @ 4.00GHz 4.01 GHz

^sixth generation

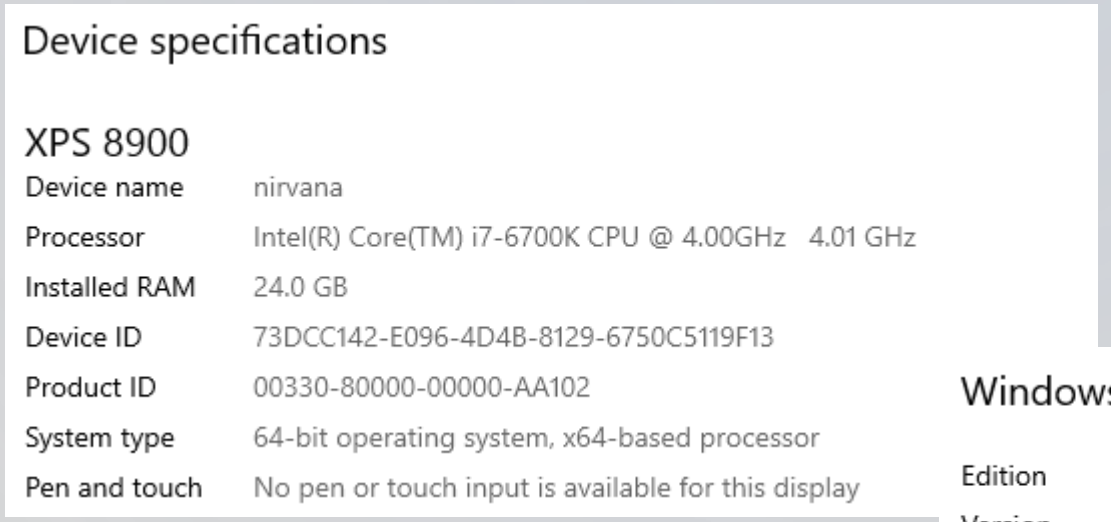
Intel(R) Core(TM) i5-2390T CPU @ 2.70GHz 2.70 GHz

^second generation

Note: if your CPU only has three digits it is probably a first generation Core i3-3xxUM, Core i5-5xxUM, Core i7-970

WHAT HARDWARE DO I HAVE?

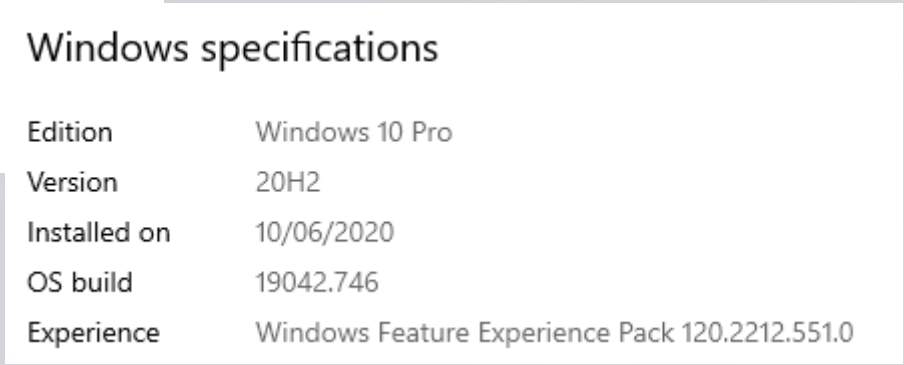
Windows: Right Click on the Windows “start button” and select system



Device specifications

XPS 8900

Device name	nirvana
Processor	Intel(R) Core(TM) i7-6700K CPU @ 4.00GHz 4.01 GHz
Installed RAM	24.0 GB
Device ID	73DCC142-E096-4D4B-8129-6750C5119F13
Product ID	00330-80000-00000-AA102
System type	64-bit operating system, x64-based processor
Pen and touch	No pen or touch input is available for this display

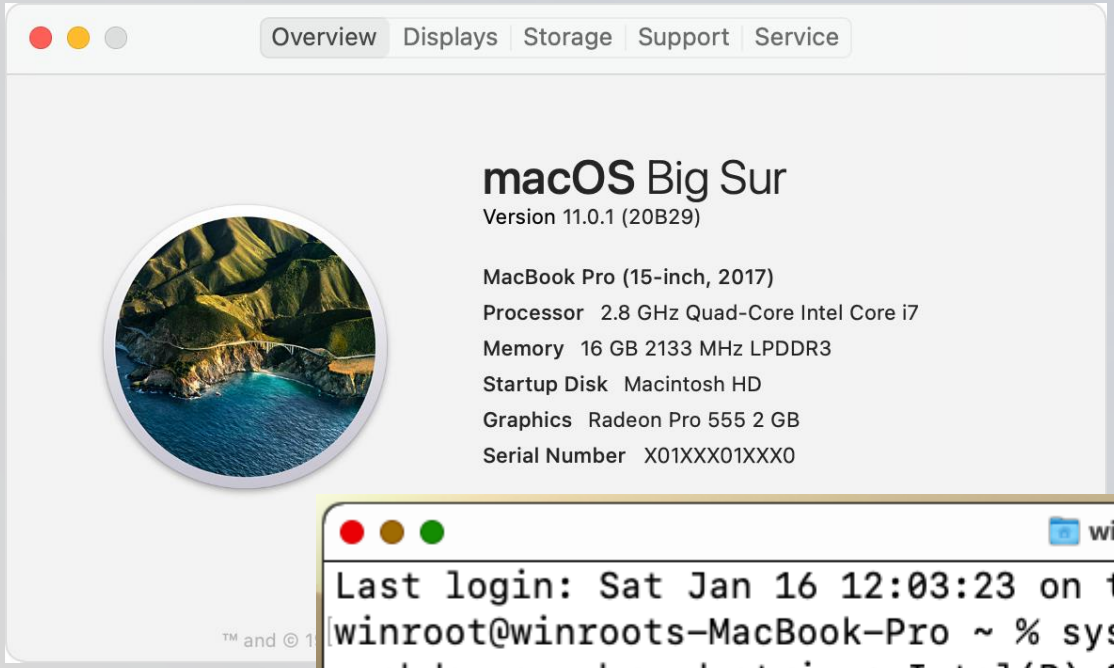


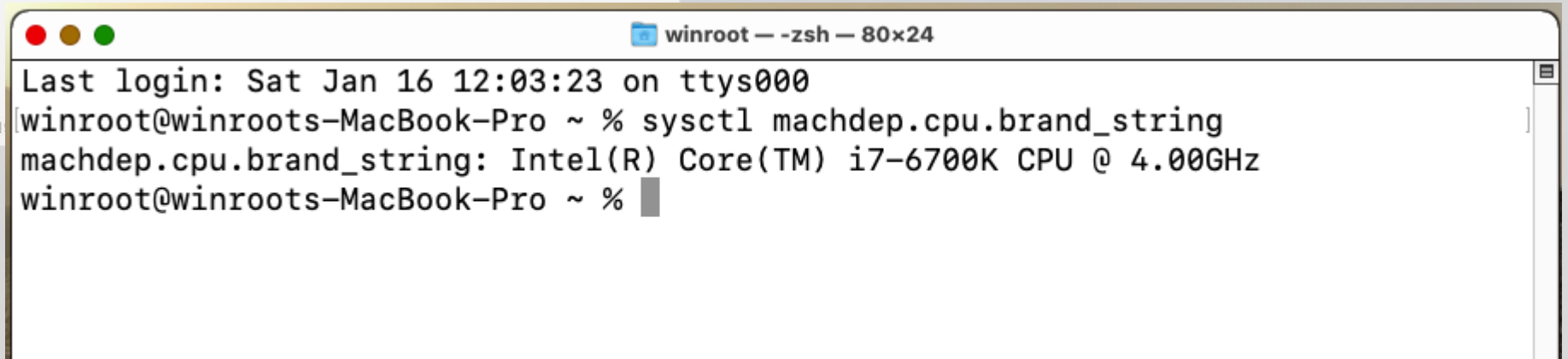
Windows specifications

Edition	Windows 10 Pro
Version	20H2
Installed on	10/06/2020
OS build	19042.746
Experience	Windows Feature Experience Pack 120.2212.551.0

WHAT HARDWARE DO I HAVE?

macOS: Click on the apple icon in the top left and select **About This Mac**. Run the command “sysctl machdep.cpu.brand_string” from the terminal to view the generation of the CPU.



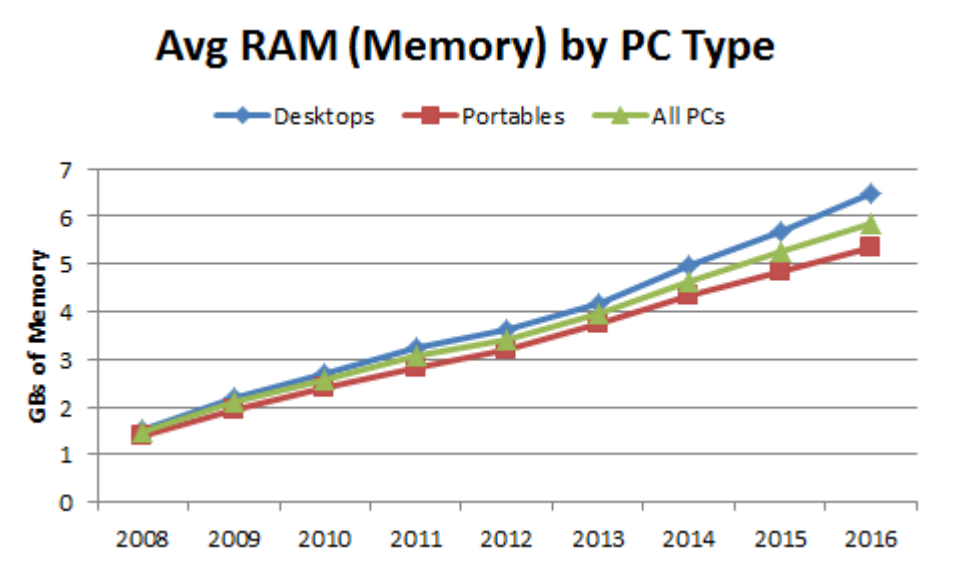


CPU GENERATION DOES IT MATTER?

Generally No, but somethings may not work…..

Zoom Virtual Background on Windows and macOS requires a Intel i5, i7, i9 - 2 cores or higher, gen 6 or higher

RAM (RANDOM ACCESS MEMORY)



Affects of low memory

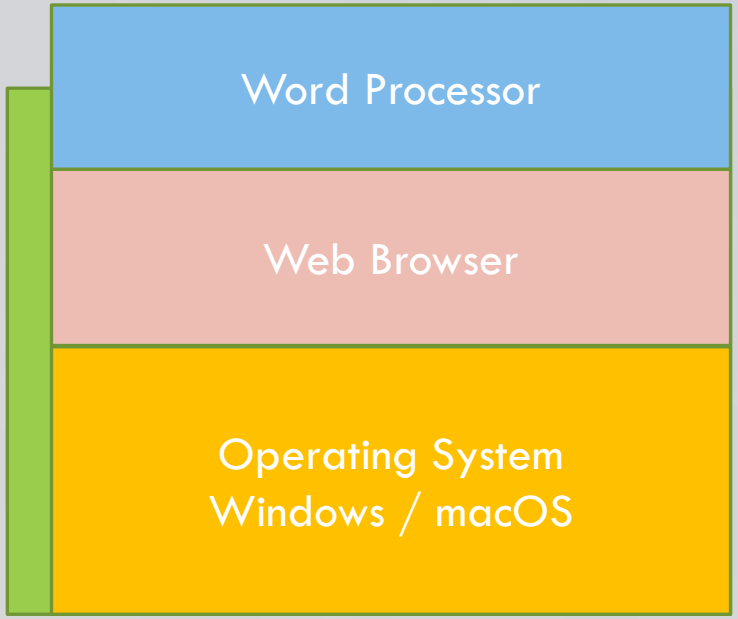
- Programs as slow to load
- Computer slows down as programs are opened
- Memory error messages
- Web sites are slow to load

Benefits of more memory

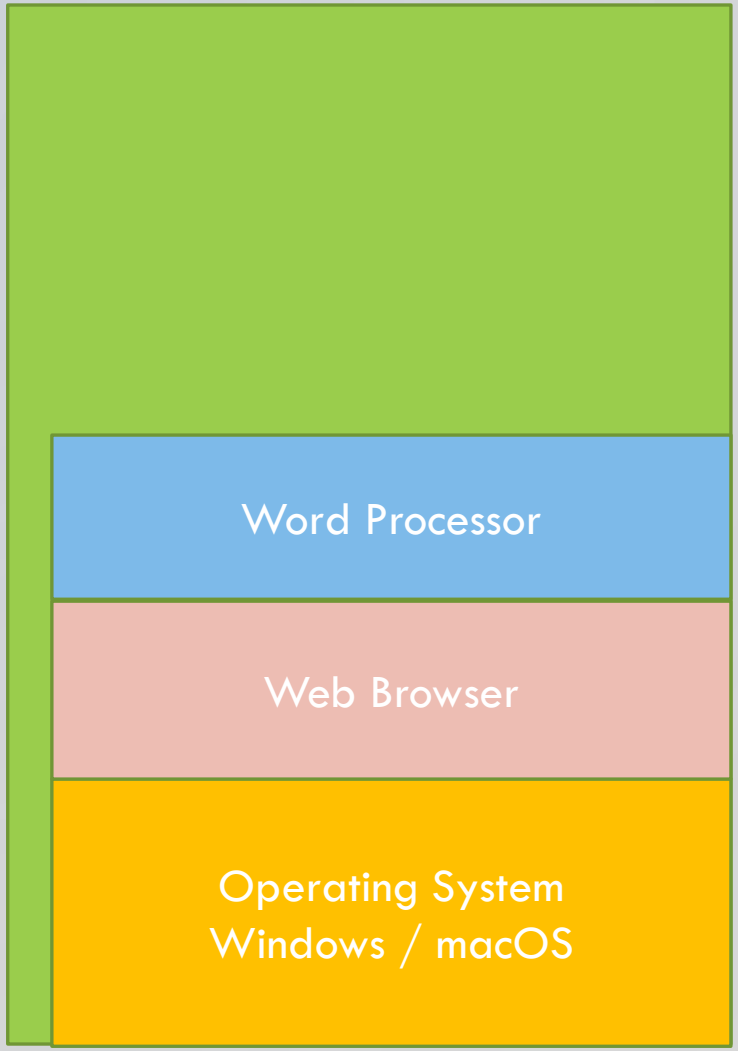
- Run more programs running at the same time
- Have more browser tabs open
- Faster load times
- Faster to start up and shutdown
- Less crashing

RAM

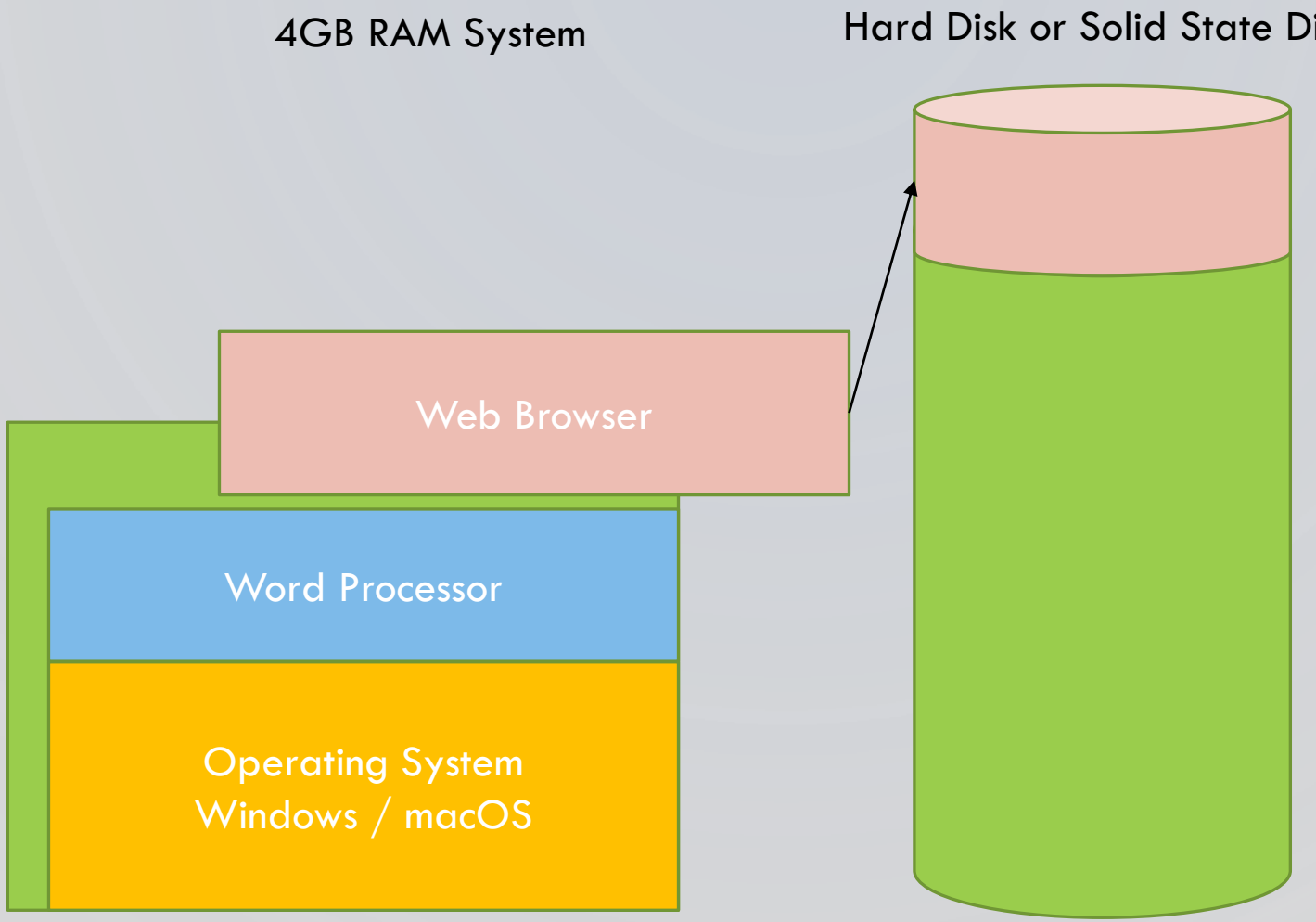
4GB RAM System



8GB RAM System



MEMORY (PAGING)



STORAGE TYPES

HDD
Hard Disk Drive

eMMC
embedded Multi-Media Card

SSD
Solid State Disk

NVMe
Non-Volatile Memory Express

SSD vs HDD

Usually 10 000 or 15 000 rpm SAS drives

0.1 ms	**Access times** SSDs exhibit virtually no access time	**5.5 ~ 8.0 ms**
SSDs deliver at least **6000 io/s**	**Random I/O Performance** SSDs are at least 15 times faster than HDDs	HDDs reach up to **400 io/s**
SSDs have a failure rate of less than **0.5 %**	**Reliability** This makes SSDs 4 - 10 times more reliable	HDD"s failure rate fluctuates between **2 ~ 5 %**
SSDs consume between **2 & 5 watts**	**Energy savings** This means that on a large server like ours, approximately 100 watts are saved	HDDs consume between **6 & 15 watts**
SSDs have an average I/O wait of **1 %**	**CPU Power** You will have an extra 6% of CPU power for other operations	HDDs' average I/O wait is about **7 %**
the average service time for an I/O request while running a backup remains below **20 ms**	**Input/Output request times** SSDs allow for much faster data access	the I/O request time with HDDs during backup rises up to **400~500 ms**
SSD backups take about **6 hours**	**Backup Rates** SSDs allows for 3 - 5 times faster backups for your data	HDD backups take up to **20~24 hours**

STORAGE COSTS

Samsung 860 EVO 250 GB SATA 2.5 Inch Internal Solid State Drive (SSD)

★★★★★ ˇ 69,631

£38.99 ~~£75.06~~

prime FREE One-Day
Get it **Tomorrow, Jan 17**

More buying choices
£33.64 (33 used & new offers)

Generic Hard Disk Drive 250GB SATA II - 1 Year Warranty

★★★★☆ ˇ 284

£13.50

prime FREE One-Day
Get it **Tomorrow, Jan 17**
Only 5 left in stock.

SanDisk SSD PLUS 1 TB Sata III 2.5 Inch Internal SSD, Up to 535 MB/s

★★★★★ ˇ 27,734

Limited time deal

£84.99 ~~£110.99~~
Or £17.00/month for 5 months (no fees or interest)

prime FREE One-Day
Get it **Tomorrow by 1PM**

More buying choices
£80.35 (7 used & new offers)

Seagate BarraCuda 1 TB Internal Hard Drive HDD – 2.5 Inch SATA 6 Gb/s Laptop (ST1000LM048)

★★★★½ ˇ 2,870

£38.97 ~~£41.99~~

FREE Delivery for Prime members

More buying choices
£29.23 (12 used & new offers)

Amazon's Choice

SanDisk Ultra 3D SSD 4TB Up To 560MB/S Read/ Up To 530MB/S Write

★★★★★ ˇ 15,205

£482.39
Or £96.48/month for 5 months (no fees or interest)

prime FREE One-Day
Get it **Tomorrow by 1PM**

Toshiba X300 4TB 7200RPM 128MB 3.5" SATA, Sliver

★★★★½ ˇ 738

£100.47
Or £20.10/month for 5 months (no fees or interest)

prime FREE One-Day
Get it **Tomorrow by 1PM**

HP 24-df0064na 23.8” All-in-one-PC, Intel Core i5-10400T, 8GB RAM, 256GB SSD, 16GB Intel Optane, Full HD, White
£549.00

1 year guarantee included

2020 Apple iMac 21.5 All-in-One, Intel Core i5 7th Gen, 8GB RAM, 256GB SSD, Intel Iris Plus Graphics 640, Silver
£1,099.00

1 year guarantee included

Dell Inspiron 14 5000, Intel Core i5-113571, 8GB RAM, 256GB NVMe Drive, Intel Iris Xe Graphics, Silver
£598.99

1 year guarantee included

Dell XPS 15, Intel Core i7-9750H, 16GB RAM, 512GB NVMe Drive, Nvidia GTX1650 GPU, Silver
£1,649.00

1 year guarantee included

2020 Apple MacBook Air 13.3" Retina Display, M1 Processor, 8GB RAM, 256GB SSD, Silver
£997.97

2 year guarantee included

2020 Apple MacBook Pro 13" Retina Display, Touch Bar, M1 Processor, 8GB RAM, 512GB SSD, Silver
£1,369.97

2 year guarantee included

Bottom of the Barrell

£249.00

HP Stream 14s-fq0508sa 14" AMD 3020e, 4GB RAM, Windows 10s, 64 GB eMMC, Black

- AMD 3020e – 2 Cores, 1.2GHz
- Windows 10s – Can only run applications downloaded from Windows Store
- 4 GB RAM – Single Application
- 64 GB eMMc – Limited Storage, remember that Windows will take up to 16GB of the storage
- Will come full of Bloatware

Bottom of the Barrell

£199.00

LENOVO IdeaCentre 3 Desktop PC - AMD Athlon Silver, 1 TB HDD, Grey

- AMD Athlon Silver 3050U Processor – 2 Cores, 2.3GHz
- Windows10 Home
- 4 GB RAM – Single Application
- 1TB HDD – Lots of slow storage
- Will come full of Bloatware
- Includes Keyboard & Mouse
- Monitor Extra

Bottom of the Barrell

£369.00

HP 22-df0008na 21.5" All-in-One PC - Intel® Celeron®, 128 GB SSD, White

- Intel® Celeron® J4025 Processor – 2 Cores, 2.0GHz
- Windows10 Home
- 4 GB RAM – Single Application
- 128GB SDD – Small Fast Drive
- Will come full of Bloatware
- Includes Keyboard & Mouse and Monitor

"Act In Haste, Repent At Leisure"

Processor :	Intel Atom® x5-Z8350 Processor(2M Cache, up to 1.92 GHz)
GPU :	Intel HD Graphics
System :	Windows 10 Pro
Memory :	4GB DDR3
Storage :	64GB eMMC, 120GB SSD
Wireless Connectivity :	Intel 802.11ac Dual-Band Wi-Fi,BT 4.2
	Video Output: 1*HDMI 1.4(4K@30HZ), 1*VGA
	Audio Port: Headphone/Mic Combo Interface
Peripherals Interface :	RJ-45 Gigabit Ethernet. 2* USB 3.0 Port,
	2*USB 2.0 Port. 1* Micro SD Card(up to 128GB)

£127.29

Intel Next Unit of Computing (NUC) Barebone Kit

- Intel Pentium Silver J5005 Processor
- 8GB RAM
- 256 GB SSD

£199.99