SS TEGNOOR DEGREE COLLOGE

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Hardware

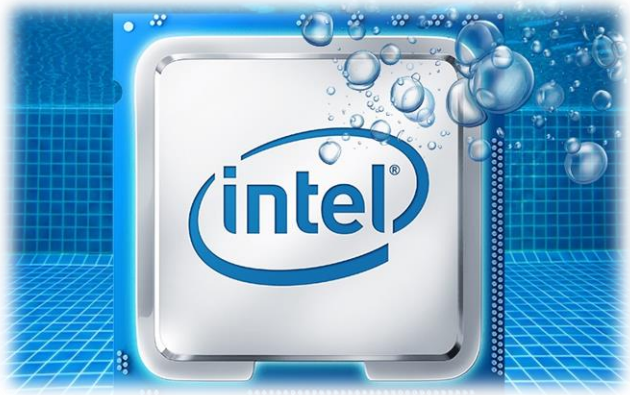
HARDWARE

Before studying HARDWARE chapters, first we should know these things

Types of Processors
RAM
Motherboard
Graphic cards
Hard disk
SSD
all types of cables
SMPS.

HARDWARE

The two most well-known **companies** for making **computer processors** are **Intel** and **AMD**



Intel Semiconductor company

Advanced Micro Devices

HARDWARE

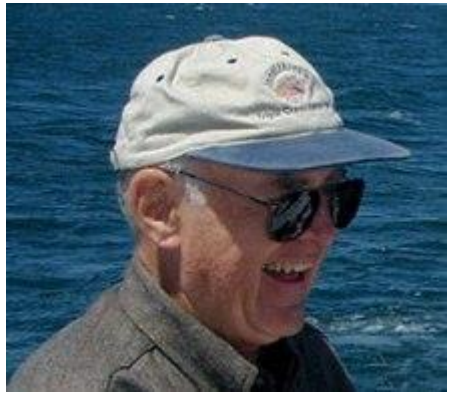
INTEL

Number of employees	1,10,600 (2020)

Intel Corporation is an American multinational corporation and technology company headquartered in Santa Clara, California. It is the world's largest semiconductor chip manufacturer by revenue. the processors found in most personal computers (PCs).

Intel supplies microprocessors for computer system manufacturers such as Lenovo, HP, and Dell. Intel also manufactures motherboard chipsets, network interface controllers and integrated circuits, flash memory, graphics chips, embedded processors and other devices related to communications and computing.

Intel was founded on July 18, 1968, by semiconductor pioneers Gordon Moore (of Moore's law) and Robert Noyce, and is associated with the executive leadership and vision of Andrew Grove



Gordon Moore

Robert Noyce

Andrew Grove

Andrew Stephen Grove was a Hungarian-American businessman, engineer, and CEO of Intel Corporation.

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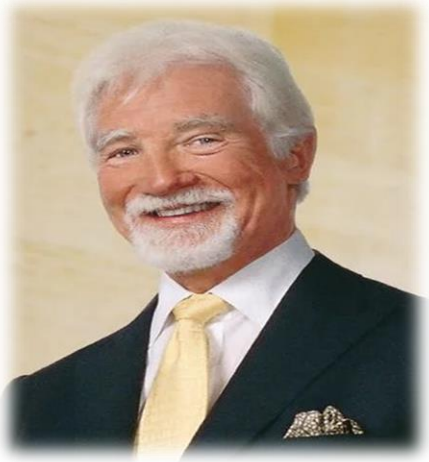
AMD

Advanced Micro Devices, Inc. (**AMD**) is an American multinational semiconductor company based in Santa Clara, California, that develops computer processors and related technologies for business and consumer markets. While it initially manufactured its own processors, the company later outsourced its manufacturing, a practice known as going fabless, after Global Foundries was spun off in 2009. AMD's main products include microprocessors, motherboard chipsets, embedded processors and graphics processors for servers, workstations, personal computers and embedded system applications.

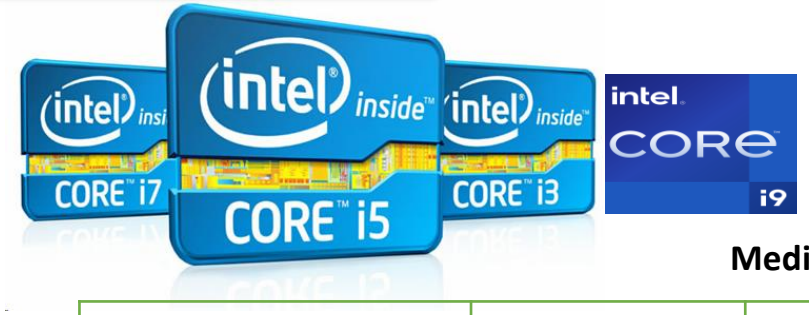


Walter Jeremiah Sanders III (born September 12, 1936) is an American businessman and is a co-founder and was a long-time CEO of the American semiconductor manufacturer Advanced Micro Devices (AMD).

Number of employees	12,600 (2020)

Processor supports for Computer / PC

PROCESSORS :



Basic Performance

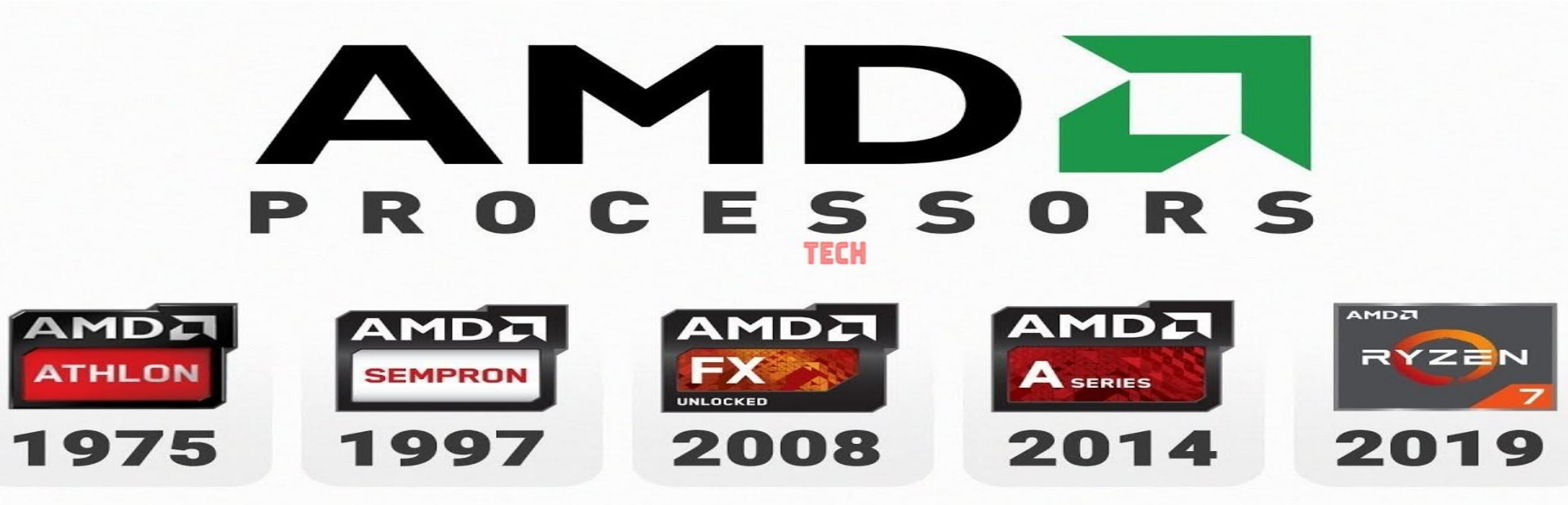
PROCESSOR	YEAR
Intel Pentium	1993 – 1999
Intel Pentium III	1999 – 2003
Pentium 4	2000 – 2008
Intel Celeron	1998 – present
Intel Atom	2008 – present
Intel Pentium Dual Core	2006 – 2009
Intel Core 2 Duo	2006 – 2011

Medium to Higher Performance

PROCESSOR	YEAR	Generation
i 3	2009 - present	1st to 11th gen
i 5	2009 - present	1st to 11th gen
i 7	2008 - present	1st to 11th gen
i 9	2017 - present	7th to 11th gen

In INTEL there are many other processors are available, these are the most processors used in all fields.

PROCESSORS :



In AMD there are many processor series are available, these are the most processors used in all fields.

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RAM (Random Access Memory)

RAM(**Random Access Memory**) is a part of computer's Main Memory which is directly accessible by CPU. RAM is used to Read and Write data into it which is accessed by CPU randomly. RAM is volatile in nature, it means if the power goes off, the stored information is lost.

History of RAM:

•The first type of RAM was introduced in 1947 with the Williams tube. It was used in CRT (cathode ray tube), and the data was stored as electrically charged spots on the face.

•The second type of RAM was a magnetic-core memory, invented in 1947. It was made of tiny metal rings and wires connecting to each ring. A ring stored one bit of data, and it can be accessed at any time.

•The RAM which we know today, as solid-state memory, was invented by Robert Dennard in 1968 at IBM Thomas J Watson Research Centre. It is specifically known as dynamic random access memory (DRAM) and has transistors to store bits of data. A constant supply of power was required to maintain the state of each transistor.

•In October 1969, Intel introduced its first DRAM, the Intel 1103. It was its first commercially available DRAM.

•In 1993, Samsung introduced the KM48SL2000 synchronous DRAM (SDRAM).

•In 1996, DDR SDRAM was commercially available.

•In 1999, RDRAM was available for computers.

•In 2003, DDR2 SDRAM began being sold.

•In June 2007, DDR3 SDRAM started being sold.

•In September 2014, DDR4 became available in the market.

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Types of RAM

SRAM (Static Random Access Memory)

Static random-access memory is a type of random-access memory that uses latching circuitry to store each bit. SRAM is volatile memory; data is lost when power is removed. The term static differentiates SRAM from DRAM which must be periodically refreshed.

DRAM (Dynamic Random Access Memory)

Dynamic random-access memory is a type of random-access semiconductor memory that stores each bit of data in a memory cell consisting of a tiny capacitor and a transistor, both typically based on metal-oxide-semiconductor technology.

Types of DRAM:

i) Asynchronous DRAM:

Asynchronous DRAM is **an older type of DRAM used in the first personal computers**. It is called "asynchronous" because memory access is not synchronized with the computer system clock. Modern PCs use SDRAM (synchronized DRAM) that responds to read and write operations in synchrony with the signal of the system clock.

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ii) Synchronous DRAM:

SDRAM (Synchronous DRAM) began to appear in late 1996. Synchronous dynamic random-access memory is any DRAM where the operation of its external pin interface is coordinated by an externally supplied clock signal. the CPU does not need for the memory accesses and thus the memory read and write speed can be increased. The SDRAM is also known as the single data rate SDRAM (SDR SDRAM).

iii) DDR SDRAM:

DDR-SDRAM stands for **Double Data Rate Synchronous Dynamic Random Access Memory**

There are different generations of DDR SDRAM which include DDR1, DDR2, DDR3, and DDR4. Today, the memory that we use inside the desktop, laptop, mobile, etc., is mostly either DDR3 or DDR4 RAM.

Types of DDR SDRAM.

DDR 1	released on **2000**
DDR 2	released on **2003**
DDR 3	released on **2007**
DDR 4	released on **2014**
DDR 5	released on **2020**

NOTE : These are the RAM available in market at present. For computer and laptop. DDR3, DDR4, DDR5.

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DDR SDRAM Standard	Internal rate (MHz)	Bus clock (MHz)	Prefetch	Data rate (MT/s)	Transfer rate (GB/s)	Voltage (V)
SDRAM	100-166	100-166	1n	100-166	0.8-1.3	3.3
DDR	133-200	133-200	2n	266-400	2.1-3.2	2.5/2.6
DDR2	133-200	266-400	4n	533-800	4.2-6.4	1.8
DDR3	133-200	533-800	8n	1066-1600	8.5-14.9	1.35/1.5
DDR4	133-200	1066-1600	8n	2133-3200	17-21.3	1.2

The clock speed of computers is usually measured in **megahertz** (MHz) or gigahertz (GHz). One megahertz equals one million ticks per second, and one gigahertz equals one billion ticks per second. **You can use clock speed as a rough measurement of how fast a computer is.**

Some companies that manufactures RAM and available in market

Corsair.
Kingston.
Zion.
Transcend.
Samsung.
ADATA.
Crucial

DDR1

184 pins

DDR2

240 pins

DDR3

240 pins

DDR4

288 pins

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DRAM	SRAM
1. Constructed of tiny capacitors that leak electricity.	1.Constructed of circuits similar to D flip-flops.
2.Requires a recharge every few milliseconds to maintain its data.	2.Holds its contents as long as power is available.
3.Inexpensive.	3.Expensive.
4. Slower than SRAM.	4. Faster than DRAM.
5. Can store many bits per chip.	5. Can not store many bits per chip.
6. Uses less power.	6.Uses more power.
7.Generates less heat.	7.Generates more heat.
8. Used for main memory.	8. Used for cache.

Difference between SRAM and DRAM

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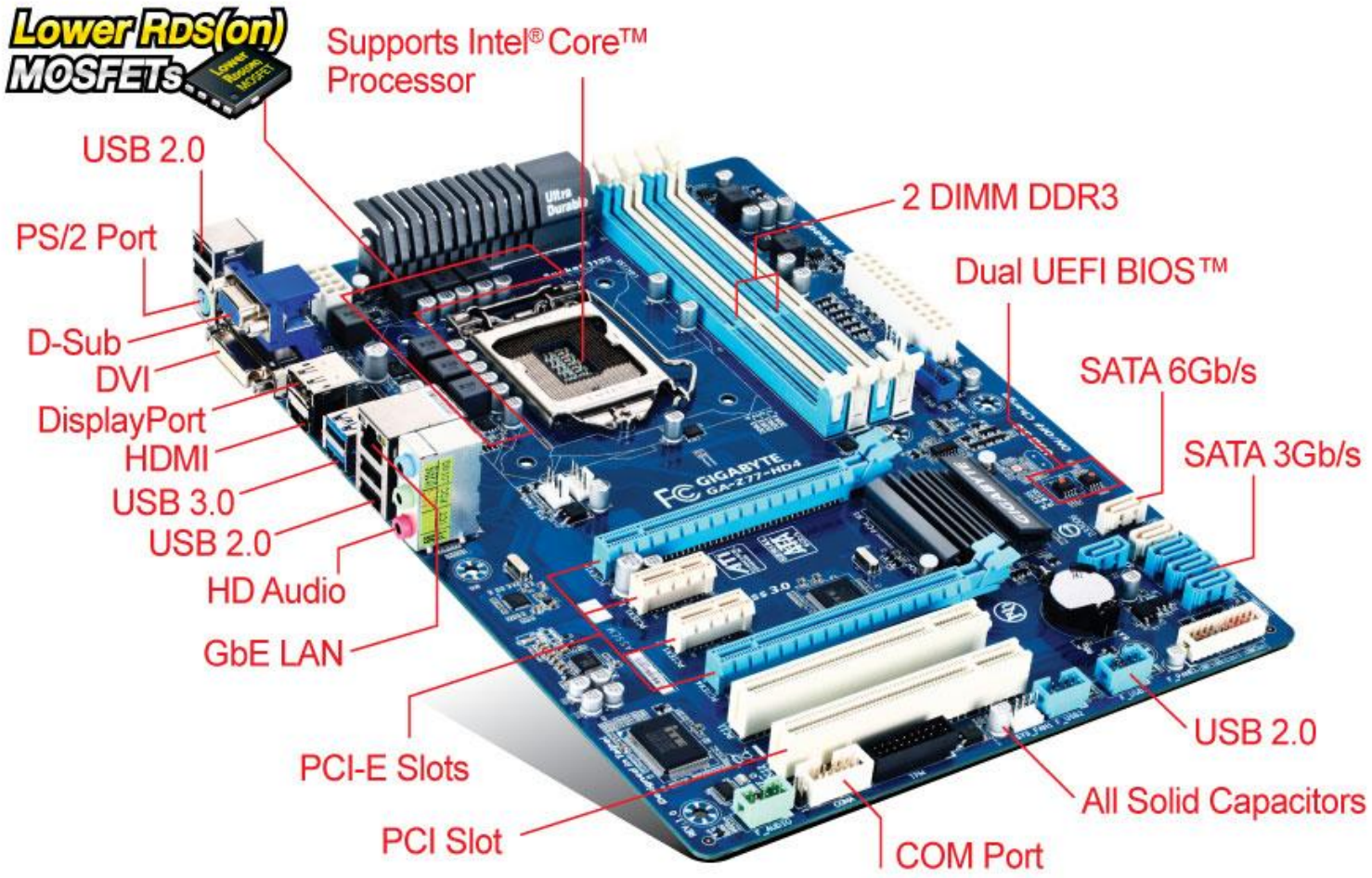
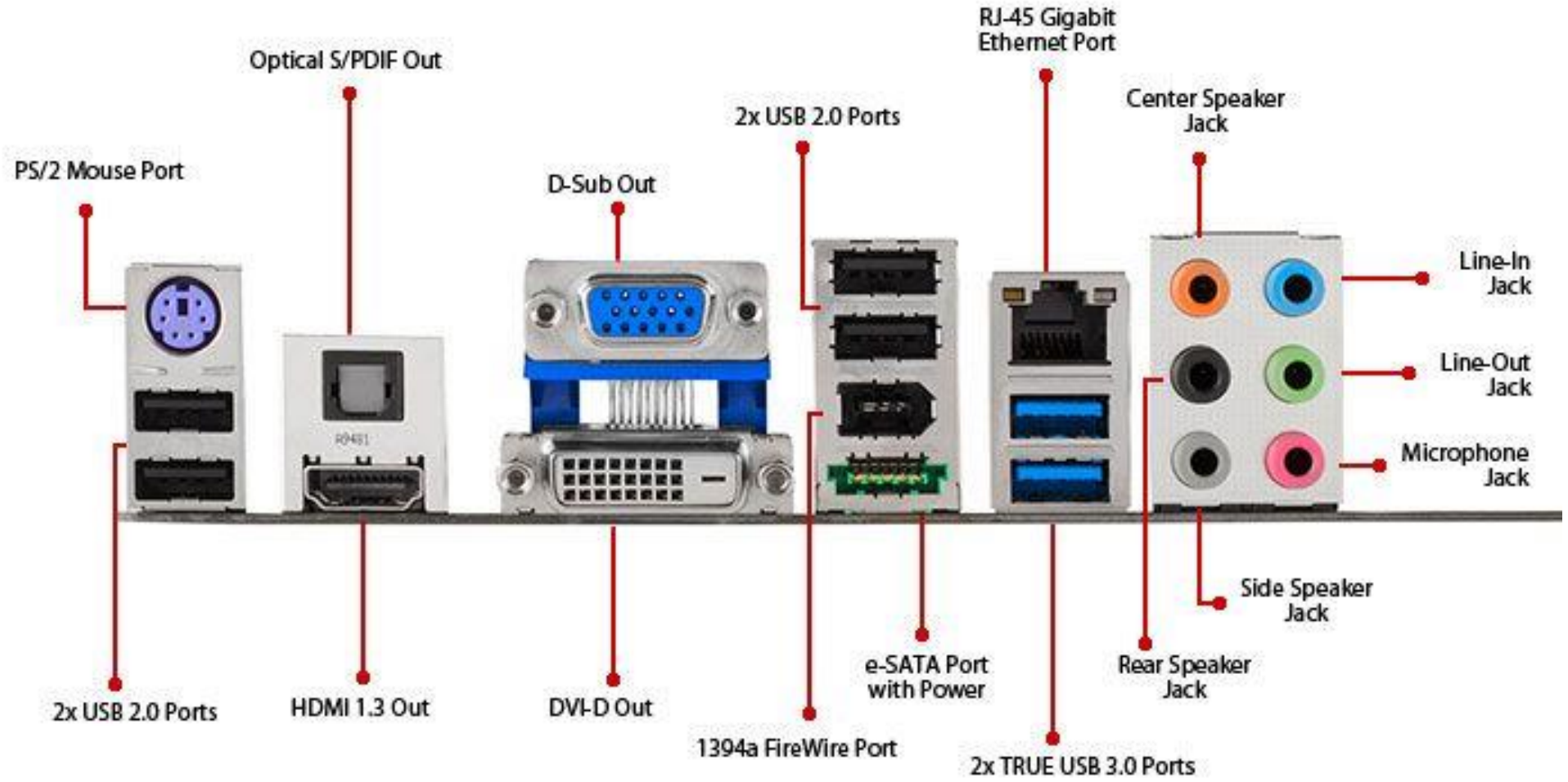
MOTHERBOARD

A motherboard (also called mainboard, main circuit board, or mobo) is **the main printed circuit board (PCB)** in general-purpose computers and other expandable systems. ... Motherboard means specifically a PCB with expansion capabilities.



HARDWARE

Motherboard back view connecters



How to know difference between USB 2.0 and USB 3.0 Ports
USB 2.0 Port will be in BLACK or WHITE color.
USB 3.0 Port will be in Blue Color.

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Top motherboard manufacturers:

ASRock.
Asus.
Biostar.
Gigabyte Technology.
MSI (Micro-Star International)
Intel.

NOTE :
All processors and RAM will not support all motherboard.
They have unique model number to their respective processors.
There are different motherboard for each processor generation and also for RAM.
There are different motherboard for INTEL and AMD, but RAM are same for both INTEL and AMD.

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GARPHICS CARD

What is Graphic Card ?

A graphics card is an expansion card for your PC that is responsible for rendering images to the display. High-end GPUs are used for gaming, ray tracing, graphics production, and even mining cryptocurrency.

is graphic card necessary ?

First of all the answer of the title is **Yes every computer needs a** Graphics Card without graphics card your PC will not be able to give display output and you can't see anything on your display.

How does the graphics card work ?

A graphics card works along the same principles. The CPU, working in conjunction with software applications, **sends information about the image to the graphics card**. The graphics card decides how to use the pixels on the screen to create the image. It then sends that information to the monitor through a cable.

Is graphic card necessary for Photoshop and designing ?

A graphics card is **usually necessary if** you plan on working with 3D graphics in Photoshop, since this uses up a lot of RAM. In general, when it comes to working with Photoshop, it is best to aim to have as much RAM available as possible.

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DESKTOP GRAPHICS CARD

Dedicated Graphics Card

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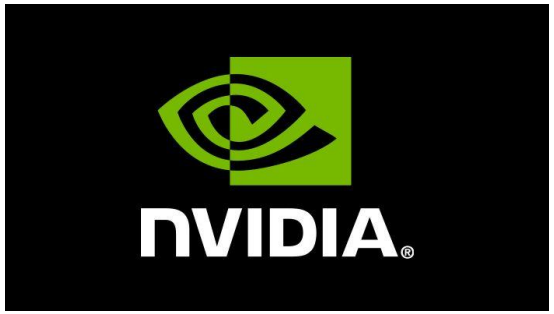
What is integrated graphics card vs dedicated card ?

Very basically, integrated graphics cards don't have their own CPU (or 'processor') instead using system RAM and system CPU. Dedicated graphics cards have their own CPU that's known as a GPU (Graphics Processing Unit) and RAM of their own.

Two main companies for manufacturing dedicated graphics card



Nvidia Corporation is an American multinational technology company incorporated in Delaware and based in Santa Clara, California. It designs graphics processing units for the gaming and professional markets, as well as system on a chip units for the mobile computing and automotive market.

Advanced Micro Devices, Inc. is an American multinational semiconductor company based in Santa Clara, California, that develops computer processors and related technologies for business and consumer markets.

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Below some companies are partnered with Nvidia and AMD

Asus.	Partnered with: AMD, Nvidia.
MSI.	Partnered with: AMD, Nvidia.
Gigabyte.	Partnered with: AMD, Nvidia. ...
EVGA.	Partnered with: Nvidia. ...
ZOTAC.	Partnered with: Nvidia. ...
PNY.	Partnered with: Nvidia. ...
Sapphire.	Partnered with: AMD. ...
XFX.	Partnered with: AMD

Dedicated graphics card also has a bit.

Starting from **64 bit, 128 bit, 256 bit.**

Higher bit and gb gives you higher performance.

Dedicated graphics card is available in gb.(Gigabyte)

starting from **2gb, 4gb, 6gb, 8gb, 12gb**

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Integrated graphics card

Integrated graphics is **a GPU built into the processor**. Integrated graphics hardware doesn't use a separate memory bank for graphics/video. Instead, the GPU uses system memory that is shared with the CPU. (inbuilt graphics will be in processor itself.)

Which is better integrated graphics or dedicated ?

The bottom line is that, while a dedicated graphics card will typically provide more GPU power **than integrated graphics will**, the reality is that some users will be better off with integrated graphics if A) they don't have the budget to accommodate a dedicated graphics card, or B) they will only be using their system ...

NOTE :

INTEL or AMD processors new generation chips are providing up to 2gb graphics inbuilt for laptop and for desktop.

Only desktop has a dedicated graphics card available in market.

For laptop you wont get any dedicated graphics card, so while purchasing your first laptop make sure that you purchase with dedicated graphics. However nowadays all laptop processor have 2gb inbuilt (integrated) graphics. It depends on your work and your professional. If you want more graphics then see the laptop with logo NVidia and AMD.

Remember once you purchase laptop without dedicated graphics later you cannot upgrade graphics. So before purchase make sure what all you need according to your requirements.

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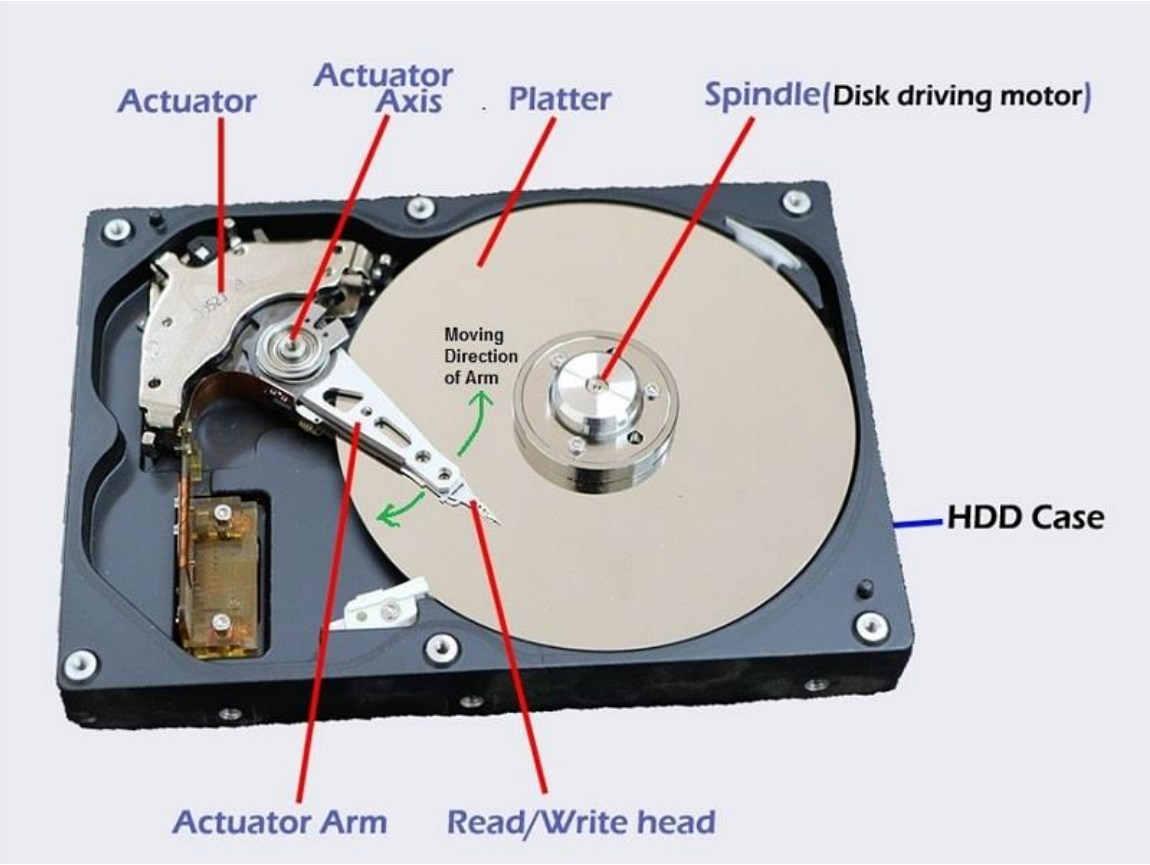
What is Hard disk ?

A hard disk drive, hard disk, hard drive, or fixed disk is an electro-mechanical data storage device that stores and retrieves digital data using magnetic storage and one or more rigid rapidly rotating platters coated with magnetic material.

A hard disk drive (HDD), hard disk or hard drive, is **a data storage device for computers which uses magnetic storage to store data**. The capacity of a hard drive is usually measured in gigabytes (GB), however hard disk capacity can also be measured in terabytes when the capacity is over 1000 gigabytes.



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What is SSD ?

A solid-state drive is a solid-state storage device that uses integrated circuit assemblies to store data persistently, typically using flash memory, and functioning as secondary storage in the hierarchy of computer storage.

A **solid-state drive** (SSD) is a new generation of storage device used in computers. SSDs use flash-based memory, which is much faster than a traditional mechanical hard disk. Upgrading to an SSD is one of the best ways to speed up your computer.

SSD used for desktop

M.2 SSD used for laptop

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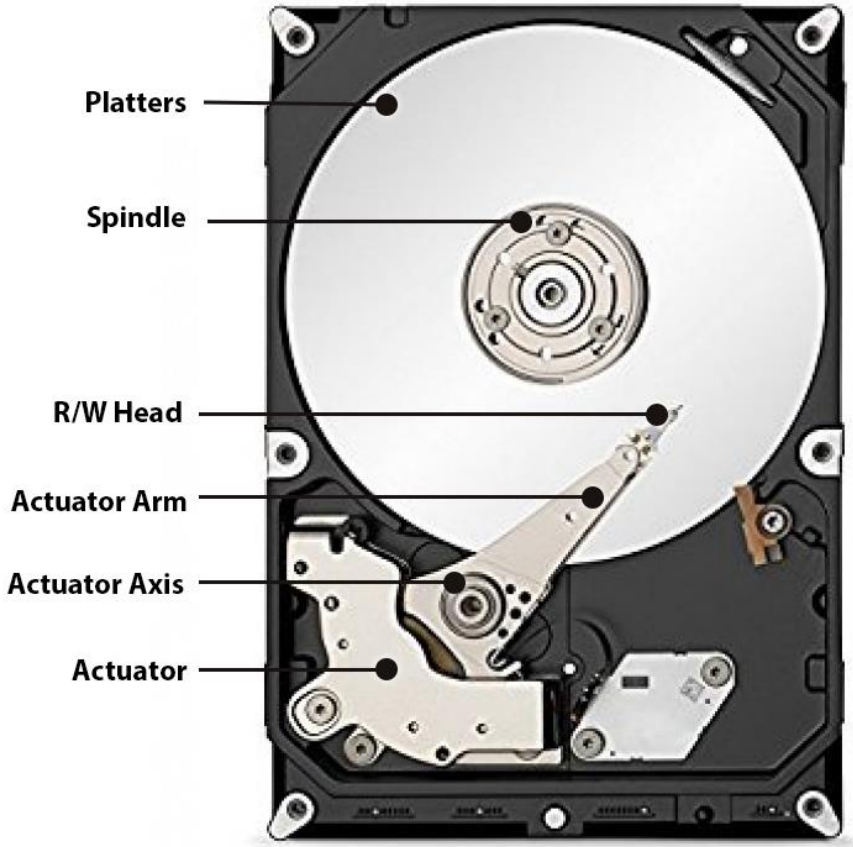
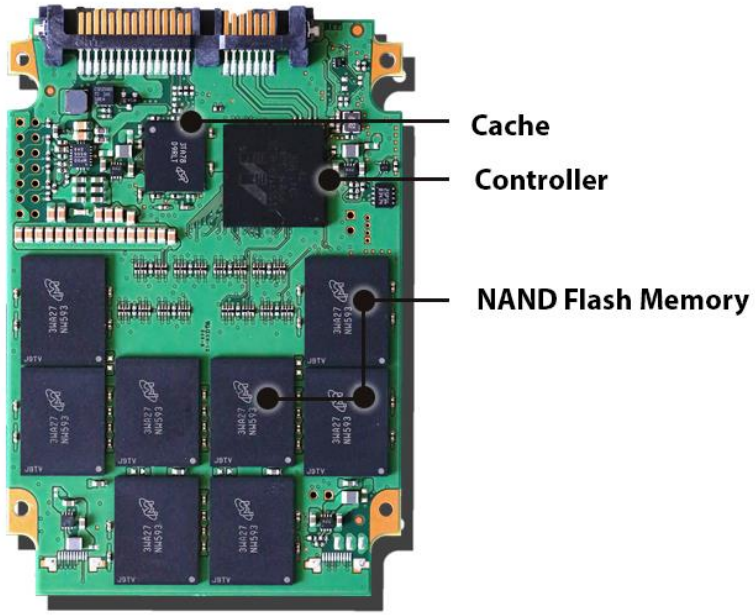
INTERNAL VIEW OF SSD, HDD

HDD
3.5″



Shock resistant up to 55g (operating)
Shock resistant up to 350g (non-operating)

SSD
2.5″



Shock resistant up to 1500g
(operating and non-operating)

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SSD	HDD
SSD stands for Solid State Drive.	HDD stands for Hard Disk Drive.
SSD consists of electrical parts, e.g., ICs.	HDD consists of moving mechanical parts, e.g., arm.
SSD is more expensive.	HDD is Less expensive.
SSD is available in compact sizes. Higher performance for faster read/write operations and fast load times.	HDD is comparatively larger in size. HDD is slower in performance than SSD.
Read / write speeds 200mb/s to 2500mb/s.	Read / write speeds upto 200mb/s.
SSD may not be durable/reliable as HDD.	HHD are durable/reliable.
Not good for long term data storage.	Long term data storage.
Most of users use SSD for boot up the system (installing OS in SSD for higher performance.) Less capacity storage space compared to HDD.	High capacity storage space.

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DESKTOP HDD

LAPTOP HDD

Laptop HDD are compact in size.

EXTERNAL HDD

Laptop HDD and external HDD are same in size.

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HDD manufacturing Companies

Seagate
Toshiba
WD (Western Digital)

500 gb
1 tb
2 tb
8 tb

SSD manufacturing Companies

ADATA
Kingston
Transcend
Others….

120 gb
180 gb
240 gb
500 gb
1 tb

Computer HDD / Laptop HDD		
Space promised	**Displayed on Computer**	**Our Loss !**
100 gb	93.13 gb	6.87 gb
250 gb	232.83 gb	17.17 gb
500 gb	465.66 gb	34.34 gb
1 tb	931.32 gb	92.68 gb
2 tb	1862.64 gb	185.36 gb