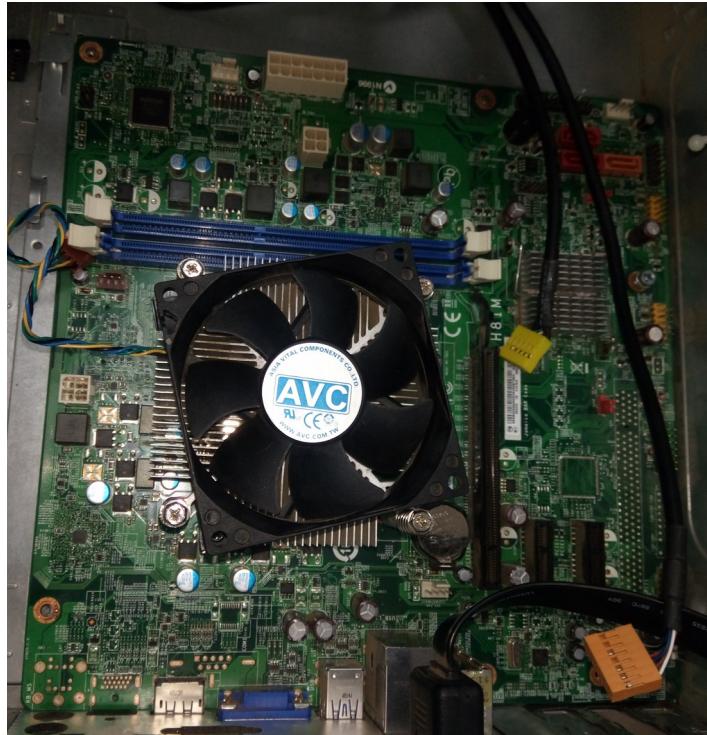


MOTHER BOARD & ITS

EVOLUTION

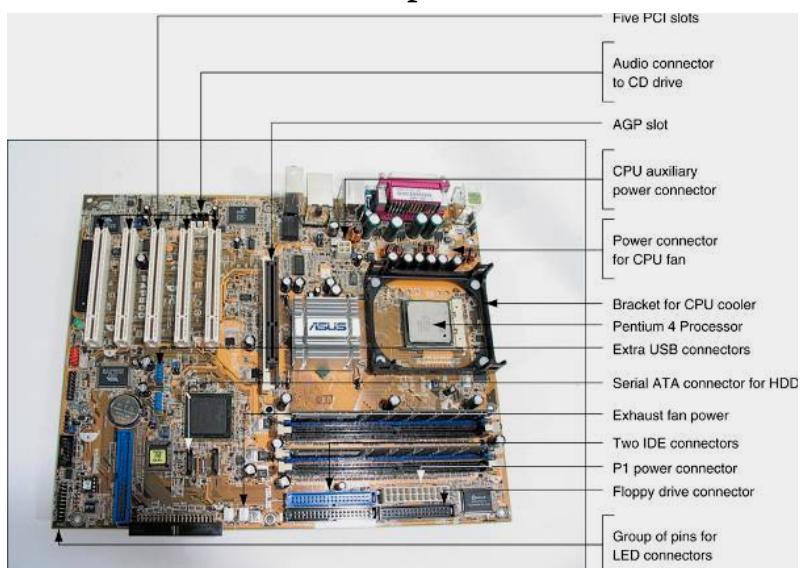


If you have ever taken in case of a computer,you have seen the one piece of equipment that ties everything together

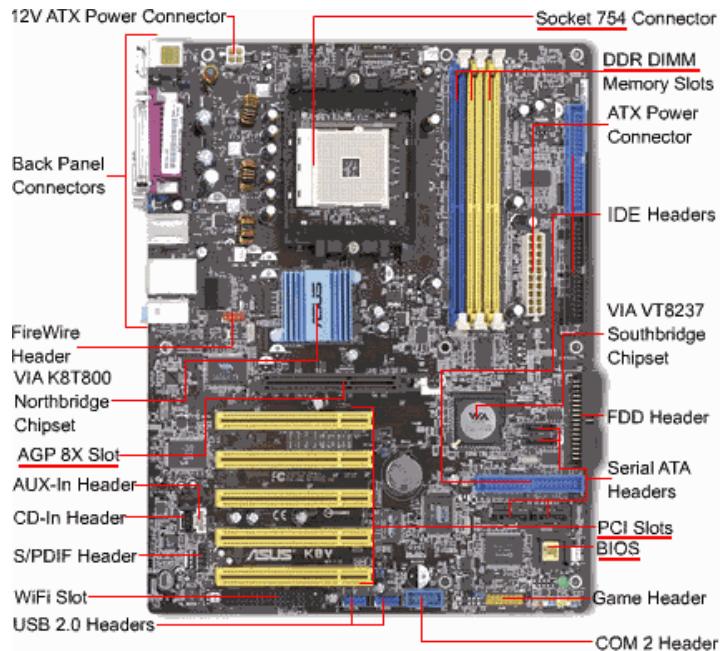
- MOTHERBOARD

A motherboard is one of the most essential part of your computer. It holds together many of crucial components including of computer including CPU, memory and connectors for input and output devices. A motherboard allows all parts of the your computer to recieve a power in communicate with one another.

Here we can see old and motherboard parts:



Here we can have a look over the new motherboard parts:



If you compare both the images, the older motherboard had a northbridge which connected with high bandwidth items like PCIe, AGP and DRAM while the south bridge was for the lower bandwidth items like ethernet, IDE, SATA, audio and USB 2.0.

the newer designs use a single chip that does everything except the GPU and memory ,the newer chip was more powerful and had a lot of functionality built in like USB 2.0 USB 3.1 gen 1&2&type C. Network, PCI x4, video output, SATA.

Some typical parts:

- **A CPU socket** : the actual CPU is directly soldered onto socket. Since it generates a lot of heat heat sinks are mounting points for fans next to the CPU socket.
- A power connector(**SMPS**) to distribute power to the CPU and other components.
- **Slots** for DRAM chips, AGP, for connecting input and output devices (PCI) , SATA , IDE, PCIe, etc.,
- The second chipset that controls I/O functions. It is not connected directly to the CPU but the north bridge. This I/O controller is referred to as the south bridge. The north bridge and south bridge combined are referred to as a chipset.
- A ROM chip contains the firmware or startup instructions for the computer system. This was also called the BIOS.

Motherboard contains the CPU, the memory and all the connectors to the rest of the hardware to the computer system. The board is the ‘mother’ of all components – that’s where it get’s its name

MOTHERBOARD & ITS COMPONENTS



The three major components of CPU are :

- Arthimetic logic unit
- control unit
- registers

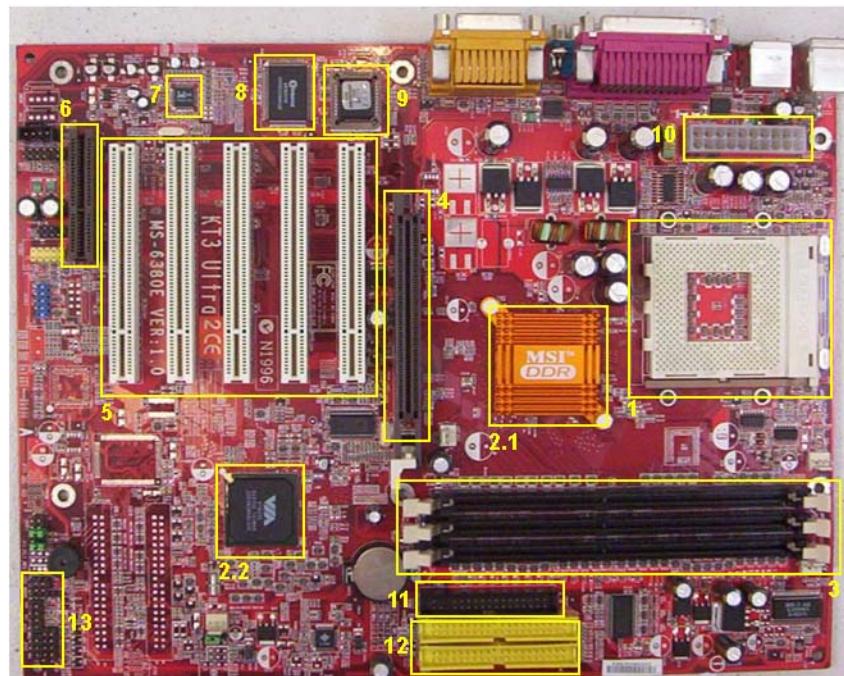
We find so many ports on the computer motherboard connecting the I/O :

- mono out (for sprakers)
- F- audio (for mocrophone and speakers)
- COM-2 (for monitor)
- F-USB

- F-panel (for power, reset,etc., Switches)
- SMPS
- LPC and SPI debug
- DRAM
- SATA
- processor
- BIOS

Some parts of the motherboard are :

- * Processor slot
- * Chipset
- * RAM slots
- * AGP slot
- * PCI slot
- * CNR moden slot
- * Audio chip
- * I/O chip
- * BIOS
- * ATX power connector
- * floppy drive connector
- * ATA connectors
- * connectors for buttons, indicating lights, etc.,



The CPU deals with them directly as CPU had a built in memory controller and had its own dedicated PCIe lanes.

EXPANSION CARD SLOTS:

- **ISA slots.** The full form of ISA is Industry Standard Architecture and is a 16-bit bus. These were the oldest expansion slots in the history of motherboards. Conventional display cards or sound cards were installed in these slots.
- **PCI Slots.** The full form of PCI is Peripheral Component Interconnect. The PCI slot was one of the important motherboard components today and vastly used to install add on cards on the motherboard. The PCI supports up to 64-bit high-speed bus.

- **PCI express.** Also known as PCIe, these are the latest and the fastest component of the motherboard to support add-on cards. It supports a full duplex serial bus.

AGP slot. Accelerated graphics port(AGP) is specifically used to install a latest graphics card. AGP runs on a 32-bit bus and both PCIe and AGP can be used to install high-end gaming display cards.

IDE connector The full form of IDE is Integrated Drive Electronics connectors are used to interface disk drives. The 40-pin connector is used to connect IDE hard disk drives and the 34-pin connector connects to Floppy Disk Drive.

SATA connector Latest in the series, the connectors, Serial Advance Technology Attachment(SATA) are 7-pin connectors to interface latest SATA hard disks or optical drives. They are much faster than IDE interface.

BIOS stands for Basic Input/Output System. BIOS is a “read only” memory, a low-level software that controls the system hardware and acts as an interface between the operating system and the hardware. It was more known as just drivers.

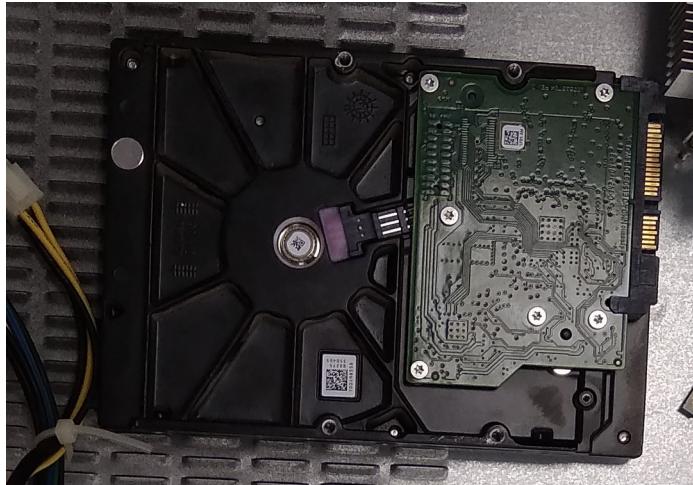
FAN ports most motherboards these days provide PWM controlled or controllable fan header. Heatsink for cooling the VRM and chipset.
Co-Processor One of vital parts or components of the motherboard is Co-Processors. It is used to perform mathematical calculations and computer graphics with the main processors.

switched-mode power supply (switching-mode power supply), switch-mode power supply, switched power supply, SMPS, or switcher) is an electronic power supply that incorporates a switching regulator to convert electric power efficiently. Like other power supplies, an SMPS transfers power from a DC or AC source to DC loads, such as a personal computer, while converting voltage and current characteristics. Unlike as a linear power supply, the pass transistor of a switching-mode supply continually switches between low-dissipation, full-on and full-off states, and spends little time in the high dissipation transitions, which minimizes wasted energy. Ideally, a switched-mode power supply dissipates no power.

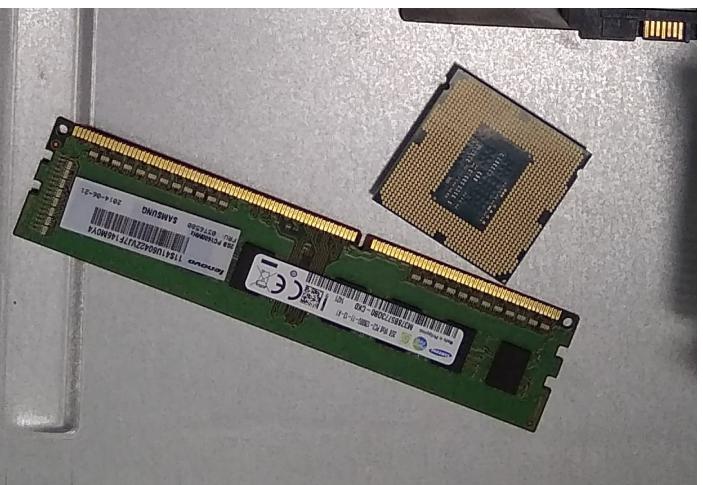
Different parts of motherboard :



1. connectig ports



2. heatsink fan



3. Hard disk

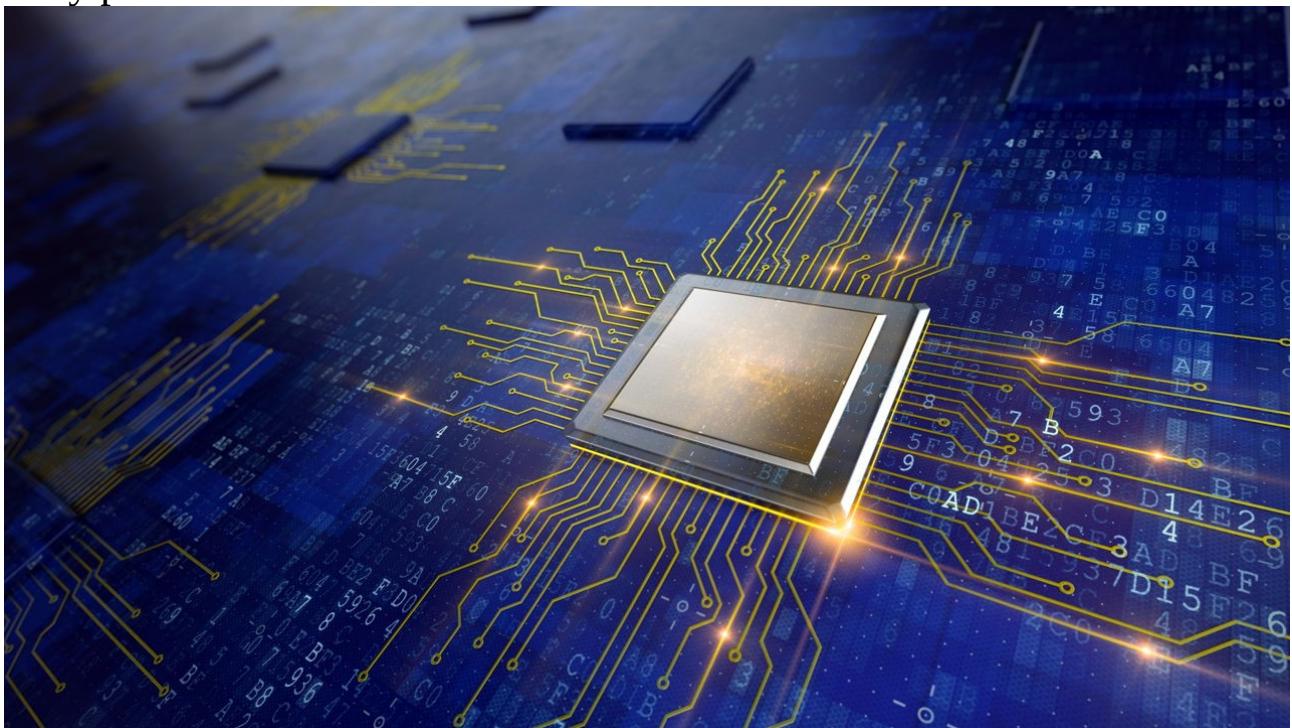


4. DRAM & processor

5. SMPS

EVOLUTION OF PROCESSOR

Many people consider the CPU (Central Processing Unit) as the brains of the computer. This analogy is very loose because, for the most part, the CPU cannot keep data stored inside it like a brain. In contrast, it mostly used to process much of the information needed by the computer, just like our brain thinks and processes information and gives orders to our other body parts.



Over the past few years, we have seen the CPU MHz speeds go from 100 MHz to over 2 GHz (1000 MHz = 1 GHz). This was the one reason that people need to learn about a CPU.

For knowing speed looking at a CPU, there are a few basic things that we should know about it:

- A CPU had four basic tasks that it performs. They are Fetch, Decode, Manipulate and Output.
- Speed rating, although not accurate, is almost always measured by MHz.
- The CPU speed is determined by a combination of raw MHz as well as design and other features such as the FPU of the chip.

To process data, a CPU really only needs 6 basic parts to do its job:

* **instruction pointer :**

This tells the CPU as the instruction or data is stored. Before a CPU can process data, it needs to know where the information should be taken from.

* **Instruction Fetch :**

Takes the instruction and data from the part of the memory that the instruction pointer specifies.

* **Instruction Decoder :**

Takes the instruction from Fetch, and decodes it so that it can be used by other parts of the CPU or the Computer.

* **Register :**

One of the most basic parts of memory where the data is stored. It can store data which had been processed or will be processed.

* **ALU :**

Arithmetic Logic Unit- used by the CPU to perform the calculations; completes the functions that the instructions tell it to perform.

* **Control Unit :**

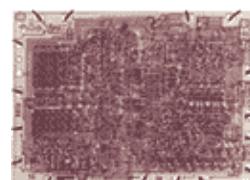
It specifies what the different operations on the CPU are to be done. For example, it tells the instruction fetch what to fetch data, or the instruction decoder what to decode data.

So evolution of processor will take place based on the efficiency of these things

History of processor:

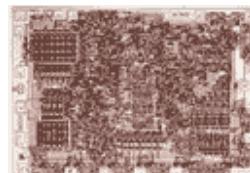
* **Intel 4004 (1971) :**

Intel's first microprocessor. It was a breakthrough in computer technology, powering one of the first electronic calculators.



* **Intel 8008 (1979) :**

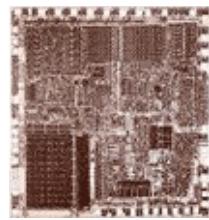
This is the first chip that was used in a PC. It could run at 4 MHz and supported up to 1 MB of system RAM.



* **Intel 80186 (1980) :**

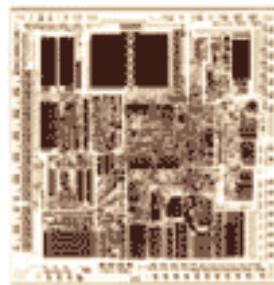
The 186 was a very popular CPU. There are two versions, an 8-bit or 16-bit (the

amount of bits allowed to was inputted each clock cycle). The 186 eventually reached a speed of 25 MHz, using 3 volts power supply.



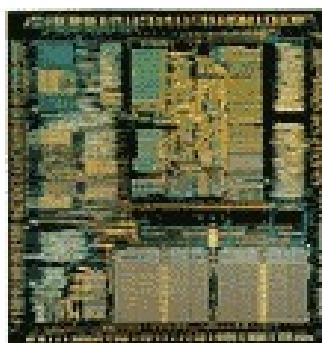
* Intel 80286 (1982) :

This is a 16-bit processor which supports up to 16 MB of RAM. It was the first processor designed to multitask (run multiple programs at a time), but the operating systems at that time could not take advantage of it. The chip run as high as 20 Mhz.



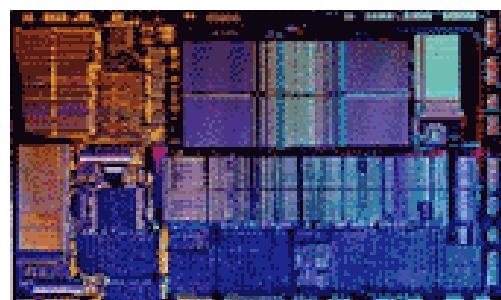
* Intel 80386 (1988) :

This was a revolutionary chip for the PC industry. It was the first 32-bit processor, which meant it could use twice as much data on each clock cycle. The 386 was also capable of using 16 bytes of cache. Having speeds of 12.5 MHz to 33 MHz, it was a big step for the PC, and was very user-friendly.



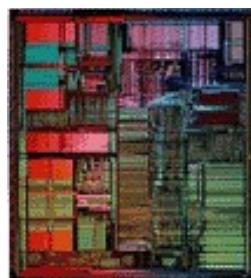
* Intel 486 (1991) :

The 486 used much of the 386 architecture, but it added a math algo calaculating processor, which made it much faster. It can go up to 120MHz.



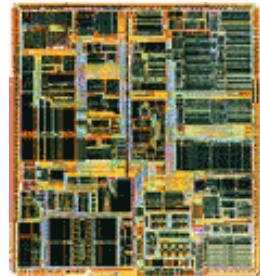
* Intel Pentium (1993) :

The Pentium was available in speeds from 75MHz all the way up to 233MHz. It had an FPU, which allowed much grater performance. Internally, it had two 32-bit chips which split the work. The chip came with 16 KB of cache.



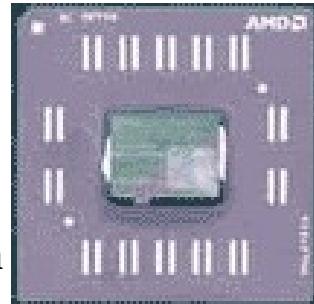
* Intel Pentium II (1997) :

Built with over 7.5 million transistors, this processor included MMX technology, used to process video and audio faster. This CPU used as cartridge to connect to the motherboard. It had a built in L2 Cache, making it a very fast processor.



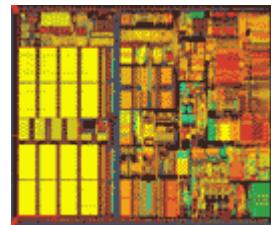
* AMD Athlon (1999) :

The first processor that was faster than its Intel counterpart, the Athlon made history. It featured 256Mb of cache, as well as 3D Now instructions designed to improve the FPU. It uses a 266MHz bus, twice as fast as the Pentium III. AMD made history with the Athlon by being the first to break the 1GHz barrier.



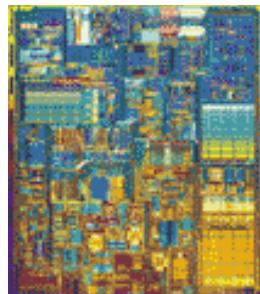
* Intel Pentium III (1999) :

Performing similarly to the AMD Athlon, the Pentium III features 256Mb of cache. It came with a speed from 450MHz all the way up to 1.13 GHz.



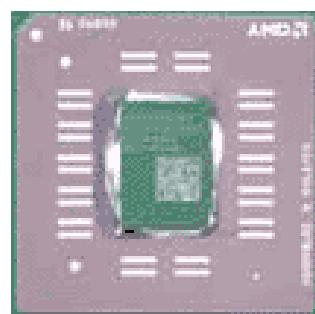
* Intel Pentium 4 (2001) :

This chip is actually much slower than its predecessor, but the MHz advantage it had over the Pentium III made it faster. It is especially fast on internet applications, although it cannot compete with its AMD counterpart in any other area.



* AMD Thunderbird (2001) :

Currently the best PC processor on the market, AMD dominates the world of 3D gaming as well as professional programs. It comes with first in almost every test, even though its clock is about 0.5GHz slower than the Pentium 4.



* 2003 - Pentium M :

This processor was a mobile single-core processor from Intel. It was designed with a clock speed of 2.26 Ghz. Two processors are developed under this pentium-M family, namely:

- Banias: Clock speed of 1.7 GHz and TDP of 24.5 watts
- Dothan: Die of 90 nm and clock speed of 2.1 GHz; TDP is reduced to 21 watts

* 2006 - Core 2 :

Intel Core 2 brand, launched on July 27, 2006, was also known as E6320. The clock speed was achieved up to 3.5 Ghz. The processors launched under this family are single-core, dual-core and quad-core.

*** The Latest :**

The microprocessor technology had come with a long way since the launch of 4004. The chip size had reduced, the clock speed had increased and the caches have further increased. The latest processors that have achieved this are:

1.Sandy Bridge(2011) :

This Intel microarchitecture-based products was launched in 2011. It had achieved a 32-nanometer die for manufacturing. It includes Intel Quick sync that is a hardware support for video encoding and decoding. There is also a improved 256-bit/cycle ring bus connect that interconnects the different parts of the processor. The transistor count used in this processor reaches up to 2.27 billion. The clock speed designed is of 3.6 GHz. The series under this family are:

- Pentium: Clock speed up to 3.0 GHz
- Celeron: Clock speed up to 3.0 GHz
- Core i3: Clock speed up to 2.5 GHz
- Core i5: Clock speed up to 3.4 GHz
- Core i7: Clock speed up to 3.3 GHz
- Core i7 Extreme: Clock speed up to 3.8 GHz

2.Ivy Bridge(2011) :

An amazing 22-nm die processor named Ivy Bridge was announced by Intel in 2011. Reduced die is possible due to the use of the 3D (tri-gate) transistors. The 3D transistors reduce the power consumption to almost 50% less than the 2D ones. It also includes special support for PCI Express and also better graphics with DirectX 11. The clock speed is about 3.80 GHz. They are reported to have 20degree higher temperature than Sandy Bridge. The desktop models under this family are:

- Core i3 Series: Clock speed up to 3.4 GHz
- Core i5 Series: Clock speed up to 3.8 GHz
- Core i7 Series: Clock speed up to 3.5 GHz

In 2017. AMD announced ryzen processors based on zen architecture and Intel introduced Coffee Lake, which increases core counts by two on Core i3, Core i5, and Core i7 processors while removing hyperthreading for Core i3. The Core i7 now had six hyperthreaded cores, but it was once only available to high-end desktop computers.