ECC 301

Assignment 1

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Evolution of Microprocessors

Microprocessors have evolved way too much since the first microprocessor was ever created, the microprocessor is not anything but the Central Processing Unit and it is a necessary Item of the pc. it is a microchip that include voluminous transistors and a lot of electronic parts like conductors that function several instructions in a second. Which was introduced in 1971 by Intel it was a 4-bit Microprocessor which had the name 4004. and then later the same year they introduced an enhanced and a better version of that microprocessor which was called 4040.

It receives digital data as i/p and operates it and keeps it with the instructions that are stored within the memory. The microprocessor got a lot of purposes such as duties of data storage, link with a lot of other appliances and other time related duties. But the foremost duty is to send and get the knowledge to make the work ability of the personal computer well. this text discusses the categories and rise of microprocessors. The microprocessor has become a more necessary as a component of the various gadgets

A year later in 1972 Intel created a new processor which was way better and more efficient than the previous ones which was the world’s first microprocessor which had 8-bit and it was called 8008 it was used for a technology which had the name P-MOS technology those early processors were fairly slow and unreliable and they were not compatible with TTL, in some way of course they evolved over time to our current intel i7 and i9 which we have today and also let’s not forget our workstation processor Intel Xeon.

Later the same year they introduced a newer enhanced well-built version of the 8008 which was called Intel 8080 but there was a problem with that processor which was that it needed a huge amount of power, it wasn’t energy efficient therefore they had to make a new more enhanced version of the same processor which was later called Intel 8085 that was a huge accomplishment for intel .

Years later they were developing a new microprocessor which was way better but way too expensive at that time it was the first x86 processor & it was named Intel 8086.

Later they released updated versions of Intel 8086 which were much better yet more expensive at that time which were called (Intel 8088 (16 bit), Intel 80186 (16 bit), Intel 80286 (24 bit), Intel 80386(32 bit), Intel 80486 (32 bit)).

Good traits and downsides of Microprocessors

The good traits of microprocessors are

• Very high processing speeds which can go up to 5Ghz in our current days

• Intelligence has been dropped at systems

• Very flexible.

• Dense size.

• Easy repair and maintenance

• Difficult mathematics

Some of the disadvantages of the microprocessor are it would get overheated then the microprocessor wont work as efficiently as it should be and you might need to do a maintenance or a slight repair or either some fan cleaning

After launching Intel 8080, 8085, 8086 and all of their other enhanced processors Intel launched Intel Pentium processor, although it was one of their biggest steps towards history of the microprocessors. After Pentium and Intel dual core and Intel core duo were initiated by Intel. Now i3 and i5 and i7 and i9 processors are leading in our current generation of processors which is additionally initiated by Intel they're also changed from micro-technology to nano-technology while they are competing against AMD's Ryzen micro and nano processors.

**Specifications of microprocessors over the years**

**Introduced at the year 1972 --- Intel 4004**

* It was a **4-bit** microprocessor
* It contained a main memory of **4KB**
* It had **45** instructions within its instructions set
* It also had **P-MOS** Technology
* It was the world’s first programmable device which was on the other hand used in calculators

Introduced at the year 1972 --- **Intel 8008**

* It was an **8-bit** microprocessor (simply an 8-bit version of the Intel 4004).
* It contained a main memory of **16KB.**
* It also had **3** more instructions than the **Intel 4004** which puts it at **48** Instructions within its instructions set.
* It also contained **P-MOS** Technology just like the previous version.
* It was very slow as well.
* It had the processing speed Up to **800 KHz**

Introduced a year after at the year 1973 --- **Intel 8080**

* It was also an **8-bit** microprocessor.
* It contained a main memory that had the capacity of **64KB.**
* **2** micro-seconds cycle time
* It contained a huge instruction set which contained **500,000** instruction per second
* It was also **10 times faster** than **8008**
* The only problem was that it needed a lot of power (very high-power consumption)
* It also contained **N-MOS** technology
* It had the processing speed Up to **Up to 4 MHz**

Later after 2 years introducing the **Intel 8085** in 1975

* **8-bit** Microprocessor (basically the upgraded and enhanced version of **Intel 8080**)
* It also contained a main memory that had the capacity of **64KB.**
* **1.3** microseconds clock cycle time which was faster than the previous version
* it contained **246** instructions within its instruction set
* It had the processing speed Up to **Up to 8 MHz**
* It also had 256 I/O ports
* It was super energy efficient that it only required one **5v** power supply to conduct and start processing although it was x2 times as fast as the **8008**

Three years later Intel introduced a new microprocessor which was called **Intel 8086** which was introduced in 1978

* It was a **16-bit** microprocessor which is a great improvement from the previous versions over the years
* The **8086** had a considerably good data bus which was consisted of **16-bit**
* It contained a way bigger memory which had the capacity of **1MB**
* It was a lot faster than all previous microprocessor and it had a speed of **400 nanoseconds** clock cycle time
* It was the first microprocessor to get introduced to cache and it had **6-byte** instructions cache

A year later in 1979 they introduced the **Intel 8088** which was very similar to the 8086

* It was also a **16-bit** microprocessor which is a great improvement from the previous versions over the years
* Data bus width of **8086** is **8-bit**
* It also contained a way bigger memory which had the capacity of **1MB**
* It was also a lot faster than all previous microprocessor and it had a speed of **400 nanoseconds** clock cycle time
* It was the second microprocessor to get introduced to cache and it had **4-byte** instructions cache which was 2 bytes less than the 8086

Years later in 1982 they introduced a newer upgraded version of the 8086 which was referred to as **Intel 80186**

* It was also a **16-bit** microprocessor
* It also contained a way bigger memory which had the capacity of **1MB**
* It contained a lot of unique hardware like some software programmed counters, interrupt controller etc.
* It was also **NOT** used in Personal Computers although **IBM** used the other version which was the 8086 In their PCs

A year later in 1983 they introduced a big upgrade to their microprocessors roster which was the **Intel 80286**

* It was also a **16-bit** microprocessor but it was a very high-performance microprocessor and it contained memory management and protection
* It contained a huge memory compared to the older versions which was 16 times bigger and its capacity was **16MB**
* It also contained extra additional **instructions** to be sure to work with the extra **15 MB**
* The instruction execution time was very low which is a huge improvement which was at 250 nanoseconds
* It concentrated on other features that can help with implementing and adding Multi-tasking which will allow more work load

Three years later in 1986 they introduced a newer version which was called **Intel 80386**

* It was the world’s first functional **32-bit** practical microprocessor
* It had a way bigger memory which had the capacity of **4GB**
* It had great improvements which were that it was able to do page handling in a virtual environment
* Includes hardware electrical cicuits for memory sotrage management and memory organization to help manage and assign data so you could access it more quickly using the random-access memory (RAM)
* It also had memory paging and way more enhanced and upgraded I/O permissions

Later in 1989 the Intel introduced a new chip which was called **Intel 80486**

* It was the 2nd **32-bit** but it was a high-performance microprocessor
* It also had a main memory of **4GB**
* It also had a bigger cache which had the capacity of **8KB** in one package
* It was faster than the previous version it was able to execute an instruction in **1 nanosecond** rather than 2ns in the 80386

Then years later in 1993 they introduced the well-known **Intel Pentium**

* It was a **32-bit** microprocessor, which had a **64-bit** data bus and a **32-bit** address bus
* It had the same memory capacity which contained and capped at **4GB**
* It was double clocked which means that it could run at either **120MHz** or **133MHz**
* It had a great feature which was being a **dual integer** processor
* The fastest version had a speed of **233Mhz** way back then but currently in 2020 they sit on around **3GHz**
* It had a way bigger cache which had the size of **16 KB L1** cache

Later they introduced the **Intel Pentium Pro** which was released in 1995

* It was a **32-bit** Microprocessor
* It had a huge memory capacity which was capped at **64GB**
* It had a **64-bit** data bus and a **36-bit** address bus
* It also had the **same amount of L1 Cache** but with another **256KB** additional L2 Cache
* It uses **3 execution engines**

2 years later they introduced the **Intel Pentium 2** in 1997

* It was also a **32-bit** Microprocessor
* **64-bit** data bus and **36-bit** address bus
* **64GB** main memory
* **32KB** split instruction /data L1 caches (**16KB** each)
* It had a module integrated **512KB** L2 cache (**133MHz**)

Later in 1999 they introduced the **Intel Pentium 3** and in 2002 the introduced the **Pentium 4** which both had some improvements from the previous versions of the Pentium microprocessors family

Then they introduced the well-known **Core 2 Duo** and **Intel Core** both together in 2006

Then in 2008 they introduced the most recognizable processor which is called **Intel Core i7** later after that they decided they want more market value and share so they decided to make some weaker and cheaper alternatives to the i7 which were called **Intel Core i3** and **Intel Core i5** The i3 was introduced in 2009 then they introduced the i5 a year later to be the mid-section in the high end processors which is currently the best selling processors in the world.

Also they introduced a workstation line of Intel Processors which were a high performance version of their processors which required a lot of power and it was very expensive but it had high specifications that it could work during high workloads and finish stuff faster than usual computers it also had a way bigger memory in todays world it could reach up to **1TB of random access memory** which is a huge deal for multitasking also intel introduced intel core i9 processor in may 2017 which was a very big deal and had a huge performance increase and a different chipset than the normal LGA1151 also they introduced another series of processors which was called Intel Core X series which was also a useful line up for Intel’s Graphic Designers and Game makers world also it was useful for video rendering and editing therefore it had a high amount of cores but a little less core speed which allowed it to be a little more stable but a little less efficient in gaming

All these new processors are unlocked to provide you with a great headroom so you can overclock them and have more speed but at the cost of your power supply and your cooling if you over clock a central processing unit you will need to make the correct adjustments in order to keep it stable overclocking was not famous back in the 90s and 80s but then when the new unlocked line ups were introduced overclocking started to become a thing in the microprocessors world which created a significant change and also huge improvement in some processors.

With all that being said Intel’s new plan for the future is to create the best processors they can while being energy efficient and also have a good temperature while being on extreme stress or heavy work load which can make a normal processor gain a lot of temperature also other companies like AMD are also doing the same to stay in competition with Intel’s high end roster of microprocessors while keeping their prices as reasonable as they can be

Still to this day microprocessors and other electrical devices that can help run these microprocessors such as conductors and power supplies are evolving enormously especially in these current days we have better and more compact equipment that could help us achieve more speeds and more efficiency from our unlocked processor chips, Microprocessors were the tool that invented computers to us and made them possible and functional which is currently at this stage helping us with our education and everything else we need.

Microprocessors have evolved way too much in the past years from the first microprocessor introduced so that they are used in a lot of things from your washing machine, your smart phone to your personal computer or your laptop also tablets as well even smart watches we use microprocessors mostly everyday of our lives we helped building them but they helped us understand them and evolve them to reach today’s level of processing power and being able to build super computers that can gather information from space and store it or gather information about a patient’s proteins during a surgery using MATLAB or other programming languages that are build for such stuff.