***THE HISTORY OF THE MICROPROCESSOR FAMILY.***

***a) Introduction***

A microprocessor is an integrated circuit that contains all the functions of a central processing unit of a computer. It has five major components which are the control unit, input/output unit, arithmetic logic unit, registers and cache. It is basically the brain of the computer that does all the work.

***B) Microprocessor history***

The development of MOS integrated circuit chips in the early 1960s, MOS chips reached higher transistor density and lower manufacturing costs than bipolar integrated circuits by 1964. MOS chips further increased in complexity at a rate predicted by Moore's law, leading to large-scale integration with hundreds of transistors on a single MOS chip by the late 1960s. The application of MOS large-scale integration chips to computing was the basis for the first microprocessors, as engineers began recognizing that a complete computer processor could be contained on several MOS large-scale integration chips. Designers in the late 1960s were striving to integrate the central processing unit functions of a computer onto a handful of MOS large-scale integration chips, called microprocessor unit chipsets. The first microprocessor was the intel 4004 made by intel. The intel 4004 is made of approximately 2300 transistors. It could execute approximately 92000 instructions per second. Its main function was it was used in a Japanese-made calculator. In 1975 is when the first personal computer, the Altair, used a successor chip, the Intel 8080 microprocessor. It could execute 290,000 instructions a second. Microprocessors have made a huge impact in the modern society. They affect the way we work and play, the way we travel and communicate. They offer remarkable processing power at infinitesimal cost. The microprocessor enabled personal computing by allowing for more accessible devices with smaller footprints. Computer processors are getting faster and faster because of a law called Moore's law. This law says that the number of transistors on a chip doubles every two years. However, there are natural limits to how small transistors can get, and eventually we will reach those limits. The main reason for the improvements on microprocessors is that it leads to the computer doing tasks way faster. The difference between the first-generation microprocessor and second-generation microprocessors was mainly the use of new semiconductor technologies to manufacture the chips. The result of this technology resulted in a fivefold increase in instruction, speed, execution, and higher chip densities. The most obvious step toward increasing the speed of the CPU is to increase the core voltage clock. The clock is what regulates the amount of energy moving through the CPU and, by increasing this value in the BIOS, you increase the number of bits processed by the CPU in a single second. The AMD Ryzen 9 7950X is easily the best processor on the market right now with incredible performance, energy efficiency, and support for the latest DDR5 and PCIe 5.0 technology. Multiple cores and customization will be the major drivers for future microprocessor performance. Multiple cores can increase computational throughput and customization can reduce execution latency. Challenges currently faced microprocessors are energy consumption, heat dissipation.

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| **Microprocessor (year made)** | **Number of cores** | **Clock speed** | **Number of transistors** | **Manufacturer** | **Purpose** | |
| Intel 4004(1971) | 1 | 108KHz | 2300 | Intel | It was designed for use in calculators, automated teller machines and cash machines. |
| Intel 8008(1972) | 1 | 108KHz | 3500 | Intel | Computer terminals, calculators, bottling machines, 1970s ASEA industrial robots (IRB 6), simple computers, etc. |
| Intel 8080(1974) | 1 | 2MHz | 6000 | Intel | this microprocessor is used in general purpose digital computer systems. |
| Intel 8086(1978) | 1 | 5-10MHz | 29000 | Intel | The main advantage of the 8086 microprocessor is that it supports Pipelining. Memory segmentation: In order to increase execution speed and fetching speed, 8086 segments the memory. Its 20-bit address bus can address 1MB of memory, it segments it into 16 64kB segments. |
| Intel 80286(1982) | 1 | 6-12.5MHz | 134,000 | Intel | The CPU was designed for multi-user systems with multitasking applications, including communications (such as automated PBXs) and real-time process control. |
| Intel 486 (1989) | 1 | 25-50MHz | 1.2 million | Intel | Computer terminals, calculators, bottling machines, 1970s ASEA industrial robots (IRB 6), simple computers, etc. |
| Intel Pentium II(1987) | 1 | 200-300MHz | 7.5 million | Intel | The Pentium II was basically a more consumer-oriented version of the Pentium Pro. It was cheaper to manufacture because of the separate, slower L2 cache memory. The improved 16-bit performance and MMX support made it a better choice for consumer-level operating systems, such as Windows 9x, and multimedia application. |
| Intel Itanium 2(2002) | 2 or 1 | 0.9-1GHz | 220 million | Intel | Itanium is Intel's first microchip (microprocessor) family based on 64-bit architecture. It is commonly used in high-end workstations and enterprise servers. The underlying architecture of Itanium is called IA-64. |
| AMD Athlon64(2004) | 1 | 1.9 GHz to 3.2 GHz | 243 million | AMD | Despite being natively 64-bit, the AMD64 architecture is backward-compatible with 32-bit x86 instructions. |
| Intel Core 2 Duo(2006) | 1, 2, or 4 | 2.53 GHz | 167 million | Intel | The Intel Core 2 Duo processor is Intel's second-generation mobile dual-core processor designed to deliver breakthrough performance with great power savings for improved battery life. Two mobile-optimized execution cores in a single processor designed to increase performance and save power. |
| Intel Core I3 | 2 | 1.30 -3.50 GHz | 1.48 billion | Intel | Intel Corei3 Processors. These value-packed processors give you the performance you need for everyday gaming, multitasking, and productivity. |
| Intel Core I5 | 4 | 4.20 GHz | 1400 million | Intel | An Intel Corei5 provides better performance against heavier and demanding applications, games and rich audio-visual data using the embedded Intel Turbo Boost Technology. |
| Intel Core I7 | 8 | 5.00 GHz | 9661 million. | Intel | The Intel Core i7 has more processing power and is better for high-performance gaming, content creation, multimedia editing, and specialized applications. |
| Intel Core I9 | 8 | 5,3 GHz | 6billion | Intel | These processors feature a performance hybrid architecture designed for intelligent performance, optimized creating, and enhanced tuning to allow gamers to game with up to 5.8 GHz clock speed. |
| M1 | 8 | 3228 MHz | 114 billion | Apple | Apple's M1 offers tantalizing improvements to computing performance, graphics output, and battery life. |

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| **Models of Cx486S** | | | | | |
| **Model/Feature** | **Bus Speed** | **Clock Frequency** | **Cache** | **Voltage** | **Notes** |
| **Cx486S-25** | 25 MHz | 25 MHz | 2KB | 5 Volts DC | Does not have a heatsink. |
| **Cx486S-33** | 33 MHz | 33 MHz | 2KB | 5 Volts DC | Available with permanently attached heatsink. |
| **Cx486S-40** | 40 MHz | 40 MHz | 2KB | 5 Volts DC | Available with permanently attached heatsink. |

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| **Models of Cx486DX** | | | | | |
| **Model/Feature** | **Bus Speed** | **Clock Frequency** | **Cache** | **Voltage** | **Notes** |
| **Cx486DX-33** | 33 MHz | 33 MHz | 8KB | 5 Volts DC | Does not have a heatsink. |
| **Cx486DX-33QP** | 33 MHz | 33 MHz | 8KB | 3.3 Volts DC | QFP Package, Low Voltage. Does not have a heatsink. |
| **Cx486DX-40** | 40 MHz | 40 MHz | 8KB | 5 Volts DC | Available with permanently attached heatsink. |
| **Cx486DX-50** | 50 MHz | 50 MHz | 8KB | 5 Volts DC | Available with permanently attached heatsink. Uncommon. |

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| **MODEL** | **AMD RYZEN™ 9 3900X** | **AMD RYZEN™ 7 3800X** | **AMD RYZEN™ 7 3700X** | **AMD RYZEN™ 5 3600X** | **AMD RYZEN™ 5 3600** |
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| **FAMILY** | AMD Ryzen™ Processors | AMD Ryzen™ Processors | AMD Ryzen™ Processors | AMD Ryzen™ Processors | AMD Ryzen™ Processors |
| **LINE** | AMD Ryzen™ 9 Desktop Processors | AMD Ryzen™ 7 Desktop Processors | AMD Ryzen™ 7 Desktop Processors | AMD Ryzen™ 5 Desktop Processors | AMD Ryzen™ 5 Desktop Processors |
| **PLATFORM** | Boxed Processor | Boxed Processor | Boxed Processor | Boxed Processor | Boxed Processor |
| **PRODUCT ID TRAY** | 100-000000023 | 100-000000025 | 100-000000071 | 100-000000022 | 100-000000031 |
| **PRODUCT ID BOXED** | 100-100000023BOX | 100-100000025BOX | 100-100000071BOX | 100-100000022BOX | 100-100000031BOX |
| **PRODUCT ID MPK** | 100-100000023MPK | 100-100000025MPK | 100-100000071MPK | 100-100000022MPK | 100-100000031MPK |
| **LAUNCH DATE** | 7/7/2019 | 7/7/2019 | 7/7/2019 | 7/7/2019 | 7/7/2019 |
| **# OF CPU CORES** | 12 | 8 | 8 | 6 | 6 |
| **# OF THREADS** | 24 | 16 | 16 | 12 | 12 |
| **BASE CLOCK** | 3.8GHz | 3.9GHz | 3.6GHz | 3.8GHz | 3.6GHz |
| **MAX. BOOST CLOCK ¹ ²** | Up to 4.6GHz | Up to 4.5GHz | Up to 4.4GHz | Up to 4.4GHz | Up to 4.2GHz |
| **L1 CACHE** | 768KB | 512KB | 512KB | 384KB | 384KB |
| **L2 CACHE** | 6MB | 4MB | 4MB | 3MB | 3MB |
| **L3 CACHE** | 64MB | 32MB | 32MB | 32MB | 32MB |
| **UNLOCKED FOR OVERCLOCKING** | Yes | Yes | Yes | Yes | Yes |
| **PROCESSOR TECHNOLOGY FOR CPU CORES** | TSMC 7nm FinFET | TSMC 7nm FinFET | TSMC 7nm FinFET | TSMC 7nm FinFET | TSMC 7nm FinFET |
| **CPU SOCKET** | AM4 | AM4 | AM4 | AM4 | AM4 |
| **PCI EXPRESS® VERSION** | PCIe 4.0 x16 | PCIe 4.0 x16 | PCIe 4.0 x16 | PCIe 4.0 x16 | PCIe 4.0 x16 |
| **THERMAL SOLUTION PIB** | Wraith Prism with RGB LED | Wraith Prism with RGB LED | Wraith Prism with RGB LED | Wraith Spire | Wraith Stealth |
| **THERMAL SOLUTION MPK** | Wraith PRISM | Wraith PRISM | Wraith PRISM | Wraith Spire | Wraith Stealth |
| **DEFAULT TDP** | 105W | 105W | 65W | 95W | 65W |
| **MAX. OPERATING TEMPERATURE (TJMAX)** | 95°C | 95°C | 95°C | 95°C | 95°C |
| **\*OS SUPPORT** | Windows 10 - 64-Bit Edition, RHEL x86 64-Bit, Ubuntu x86 64-Bit \*Operating System (OS) support will vary by manufacturer. | Windows 11 - 64-Bit Edition, Windows 10 - 64-Bit Edition, RHEL x86 64-Bit, Ubuntu x86 64-Bit \*Operating System (OS) support will vary by manufacturer. | Windows 11 - 64-Bit Edition, Windows 10 - 64-Bit Edition, RHEL x86 64-Bit, Ubuntu x86 64-Bit \*Operating System (OS) support will vary by manufacturer. | Windows 11 - 64-Bit Edition, Windows 10 - 64-Bit Edition, RHEL x86 64-Bit, Ubuntu x86 64-Bit \*Operating System (OS) support will vary by manufacturer. | Windows 11 - 64-Bit Edition, Windows 10 - 64-Bit Edition, RHEL x86 64-Bit, Ubuntu x86 64-Bit \*Operating System (OS) support will vary by manufacturer. |
| **SYSTEM MEMORY SPECIFICATION** | Up to 3200MHz | Up to 3200MHz | Up to 3200MHz | Up to 3200MHz | Up to 3200MHz |
| **SYSTEM MEMORY TYPE** | DDR4 | DDR4 | DDR4 | DDR4 | DDR4 |
| **MEMORY CHANNELS** | 2 | 2 | 2 | 2 | 2 |
| **GRAPHICS MODEL** | Discrete Graphics Card Required | Discrete Graphics Card Required | Discrete Graphics Card Required | Discrete Graphics Card Required | Discrete Graphics Card Required |