

Where are the historical roots of the modern computer? Have you asked this question ever?



If you ask ten different people the same question, you'll probably get ten different answers. One will tell you that the modern personal computer could be traced back to two thousand years ago, when the abacus was invented. Some other guy will point the VIII-IX century period out since it was the time when mathematics and the Arabic numbers made their way throughout medieval Europe. Someone else will confidently mention the XVII century putting his finger on John Napier and his system for **number multiplication**. The fourth person you ask will name 1642 the birth year of the idea, saying that Blaise Pascal was the father of the **first calculating machine**. Yes, all of these

inventions have contributed to the idea of a calculating machine the way we know it. However, we should add to the list of fathers the names of Gottfried Wilhelm von Leibniz, Charles Xavier Thomas and his **mechanical calculator**, and of course the name of professor Charles Babbage.

Charles Babbage, a professor in mathematics at Cambridge, entered the history of computers with two great inventions - both of them were mechanical calculating machines. The "**Difference engine**" **tabulated polynomial equations** using the method of difference. Babbage worked on it for 10 years. He imagined a fully automatic, steam-powered machine that also printed the results on paper. Unfortunately, this project was never finished, since the professor forfeited the idea and started working on an even greater project – an **automated mechanical digital computer** of general purpose that was fully controlled by programs – the "**Analytical engine**". The blueprints show that the machine was supposed to work with decimal numbers, it could process numbers of 50 decimal digits each and had a memory of 1000 such numbers. The machine also had a convention for non-linear **program execution, cycles**, actually everything that a modern PC has. Unfortunately, that machine was never finished either, otherwise we would have had the unique opportunity of seeing a real steam computer in some London museum. However, most important is the idea that Professor Babbage introduced to the world – using a **punch card** as an input device. Those punch cards exactly, used by Hermann Hollerith, became the reason for the foundation of **Tabulating Machine Co**, a.k.a. IBM, whose place in the history of PC we are about to find out.



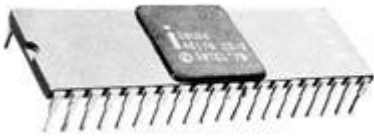
You might ask "When does the electronic computer come to life?". Its birth period was between 1937 and 1942. A physicist with the name of John V. Atanasoff, co working with Clifford Berry, created the ABC (Atanasoff-Berry Computer) – the first computer ever to use modern **trigger techniques, vacuum tubes**, and the concept of logic chains and **binary arithmetic**. It's interesting to know that until 1973 the patent of ENIAC, belonging to Mauchly and Eckert, legally turned the ABC into the first electronic computer. After that the Federal Court of Justice erased the patent and justice was restored.

In 1943 Alan Turing built the British war computer "Colossus", which was used for **codebreaking** of encrypted German messages. However, Turing's work never got society's attention because of the confidentiality of the project.

The first generation of computers entered its dark ages with the invention of the transistor in 1947 by Bardeen and Brattain (they were a part of the engineering team at Bell Laboratories) and with the invention of the planar transistor by W. Shockley from the same enterprise. Those inventions presented the fore mentioned scientists with the Nobel Prize in Physics in 1956 thus throwing the **triode vacuum tube** out of the computer industry and making place for the **semi-conductor electronic** switch – the transistor.



The third generation of computers began its rise with the invention of the **integrated circuit** – a semiconductor chain of multiple transistors in a shared corpus, connected without any wiring. It was invented in 1959 by the engineering team at Texas Instruments. The first such circuit used six transistors. In comparison, a Pentium class processor contains more than 55 million of those circuits.



As I mention **processors**, in my mind emerges a 38-year-old corporation, founded by Robert Noyce, Gordon Moore and Andrew Grove on July 18, 1968 - a corporation that from its very first day dominated the microprocessor market. Ok, it may not be from its very first day, but it's from around 1971, when they introduced the first 4-bit microprocessor

4004, containing 2300 transistors, covering a square cm, worth \$200 and with calculating power equal to the ENIAC's (which at that time covered a room of 85 cubic meters).

A year later Intel presented the 8008, and later the 8086 (16-bit) and the 8088 (8-bit) – two chips that in just a year won every prize for development in the industry. Consecutively came the 286, the 386, the 486, Pentium and thus things went to this happy day when all of us celebrate Simba's new 64-bit acquisition, produced by the opponents at AMD, but this is another story to tell...

The fourth generation of computers came along in 1973, when different devices, containing the 8008 Intel **chip**, started showing up on the market. The same year Intel presented the 8080 – a significantly faster chip, which could address the amazing for its time 64 kilobytes of memory. In 1975 the first personal computer appeared. "Popular electronics" magazine presented Altair – based on a 8080 processor, very colorful, bright and in possession of 256 **bytes** of memory. Unfortunately, the owner had to take the soldering-iron and put his possession in one piece himself, because Altair was sold in parts and the idea of PnP technology wasn't even close to the minds of the prognostics. Despite the joking manner, we should give full credit to Altair and the revolutionary open technology that let everyone develop circuits for it, circuits which were to be connected to the **100-contact slots of the bus**. Altair also gave the software industry a boost by making that very industry develop the proper software for it including the first operating system and the first BASIC.



In that very 1975 IBM introduced the IBM 5100. This is the company's first personal computer that includes a **built-in** monitor, 16 kilobytes of memory, a built-in **BASIC-interpreter** and a built-in **band storage device**. However, its \$9000 price immediately put it out of widespread use and the market remained dominated by the cheap machines that were put together in garages and basements (I'm serious here).



The IBM 5100 was followed by two not so successful models until the IBM PC (model 5150) came along. This model, although it formally belonged to the 51 series, had nothing in common with its predecessors. The construction of a PC involves the idea of external keyboard and monitor, a broad bus with a 62-output connector, a DMA-controller, an 8088 Intel microprocessor and... well, Microsoft. Despite the joking manner, actually it's IBM that turned Microsoft into the dominating developer of operating systems and software on the market. The roots of this situation are traced back to IBM's decision to make Entry **Systems Division** fully independent from IBM's other associated companies and departments.

This is what led to assigning the development of an operating system for PC to Microsoft. And on behalf of a lethal for IBM but yet quite favorable for the industry negligence Microsoft can now offer its **operating system** to every client willing to buy it. It was favorable for the industry because the competitors relatively easy succeeded in writing **BIOS** with an analogous to the IBM PC functionality, but it's questionable whether the same competitors would have ever took up the development of an operating system. The fact that **OS** can be ordered with no limitations, as well as the fact that IBM uses external suppliers for the components of its PC (suppliers that every other company could order from), gives all enterprising companies the opportunity to begin producing systems with compatible software for PC. This stated the start of the end for IBM as a dominating factor on the market for personal computers and gave the necessary boost to Microsoft, Intel and the popularity of the personal computer.

