Around the beginning of the 1940s, the most primitive versions of computers consisted of analog mechanisms such as the Complex Number Calculators (CNC) which was used to streamline mathematical computations. Only around 1941-1943 was when the first electromechanical computer was built like the Z3 then later the Z4 by Konrad Zuse. The Z4 performed floating point binary arithmetic, it used about 4,000 watts of power, ran at approximately 40 Hz, had 64 32-bit registers (the equivalent of 512 bytes of memory). The processing of one addition took 0.4 seconds.

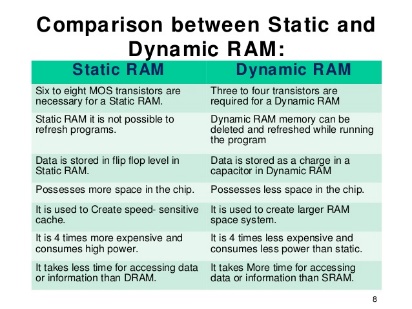
Near the mid to late 40s the analog was being replaced by digital and mechanical was being replaced by electromechanical. Computers of this era relied on vacuum tubes, tubes that control electric current flow in a high vacuum between electrodes. Colossus was considered the electronic digital programmable computer utilizing said vacuum tubes. ENIAC was the first general-purpose electronic, digital computer. The ENIAC could process addition or subtraction 5000 times a second, a thousand times faster than any other machine at the time.

In 1947, transistors were invented which replaced vacuum tubes. Later on, in 1952-1953, The use of magnetic tape allowed cheap mass storage of information, with the IBM 701. The whirlwind was the first to use a magnetic core memory. 1956 was the first year the use of the keyboard device was used as an input for computers. 1958 was the first development of the SAGE system which was the first large-scale computer communications network.

The invention of Integrated circuits around 1958. Around 1962, IBM developed the 1401 computer with smaller, more reliable transistors in comparison to previous machines. This in turn opened up the possibility of the use of general-purpose computers instead of specialized systems. In 1964, IBM made the 2321 Data Cell Drive which could store up to 400 MB.

In 1970 was the first use of an all-semiconductor memory which replaced magnetic core memory technology, because it could store the same amount of data using half the amount of space. In 1971, the introduction of the Intel 1103 DRAM integrated circuit signaled the beginning of the end for magnetic core memory in computers. In 1973, was the first invention of the internet, connecting multiple computers and other hardware using Ethernet. Throughout 1974-1977 was a major increase in the number of personal computers for the mass populous including the first Apple computer. Apple I was the first computer to use a single-circuit board.

During the 1980’s the computer world started to boom, not just in the effectiveness of hardware, but in how people perceived computers. Previously, computers were thought of as giant machines that were used by scientists to process data and do mathematics. However, much smaller machines started rolling out like the Sinclair ZX80 and the Commodore 64. These computers allowed the masses to experience computers from their homes.

Typically, around this time, processors ran off 8-to-16-bit architecture boasting clock speeds of 1-4 MHZ. Keyboard and monitor would be attached directly to the main board. The main kind of memory in the earliest of computers utilized SRAM (Static Random Access Memory) which was faster but volatile, meaning that without power it would lose the data stored. DRAM (Dynamic Random Access Memory) was then used as the main type of memory, however SRAM was still utilized for things like caches within the CPU (Ali, S. A. 2015, December 19). Cassette tapes were used as the main method of storage but eventually were replaced by the 5.25” floppy-disk. Towards the end of the 80’s when GUIs became more popular mice became a computer standard instead of just having a keyboard.

SRAM vs DRAM  
(Ali, S. A. 2015, December 19)

Simultaneously with the implementations of home-computers, the portable computer started to emerge. These bulky machines offered a way to bring your work with you. The very early portable computers had to be plugged in to a power supply. The Gavilan SC changed the world of the portable computer and was one of the first to be marketed as a laptop computer. It weighed about 9 pounds which was much lighter than most portables. Included an LCD screen with a resolution of 400 x 64 and had a touchpad pointing device. It utilized static CMOS memory which was expandable through plug-in modules (Stengel, S. S. (n.d.)).

While the 80’s produced several entertainment-based computers, perhaps the most rememberable is the Nintendo Entertainment System (NES). This system had a Picture Processing Unit (PPU) embedded on the motherboard which utilized different kinds of memory to project images on the screen. The game cartridges that the system used held the information for the game but also could expand the systems memory by adding additional memory to the cartridge itself (Fingers, L. B. 2020, July 19).

The 1990’s continued on the trend simultaneously coming out with more modern forms of computers ranging from game consoles, laptops, personal computers, and super computers; all while implementing new and faster hardware then previous models.

Perhaps one of the greatest accomplishments of the 1990s is the first supercomputer ASCI Red, to reach teraflop (TFLOP) speeds. A TFLOP measurement of a processors ability to calculate 1 trillion floating-point calculations every second. This was achieved using combining 9,632 Intel Pentium Pro processors, 12.5 terabytes of disk storage, and 1212 gigabytes of memory, all housed in 104 cabinets which took up 2500 square feet (ASCI Red: Sandia National Laboratory). This supercomputer was designed and used for nuclear material testing. Compared to today’s calculations per second it is not very good, however at the time the previous fastest supercomputer only 232.4 gigaflops (Sexton, M. J. A. 2016, June 30).

ASCI Red  
(ASCI Red: Sandia National Laboratory)

After the popularization of the term “Wi-fi” in 1999, the world was left wondering what the next innovation would be. In 2001, Apple unveiled the Mac OS X. The Mac was an operating system whose selling point was a sleeker user-friendly Graphical User Interface (GUI). The original Mac OS X came with protected memory architecture, an important feature for programmers who were skeptical of the Mac OS originally, along with various multi-tasking functionalities. Microsoft would soon feel the pressure to also deliver a new and improved OS, thus in the same year we also got Windows XP which sported a brand-new redesigned GUI.

2001 was a big year for the home computer industry. The next big thing to come would not be until 2003 with the introduction of the very first 64-bit processor, the AMD Athlon 64. This was a huge development in the commercial industry, as this processor was much faster than its previous option and to this day, we still use 64-bit processors in our own machines. Our processors now completely outclass the AMD Athlon 64 in terms of clock speed, cache size, and the ability to have multi-core processors.

The next big even to happen in computer history could be argued to be the introduction of the MacBook Pro in 2006 from Apple. This laptop, equipped with a dual-core processor, would go on to standardize laptops much more than they used to be. It was nowhere close to being the first laptop, but it made quite the entrance and provided a foothold for Apple in the laptop/mobile computer world. Later in that year, Microsoft would unveil their most recent innovation, Windows Vista. This OS would prove to be one of Microsoft’s more unappealing releases, and many users chose to stay with Windows XP. One of the biggest differences in Vista from XP was the ability for software developers to write applications without the Windows APIs that were traditionally being used before. Apple would go on to take back the spotlight with their release of the ever so popular “iPhone” in 2007.

The iPhone was truly a pioneer in the cellular device industry. It literally was a computer made to fit in your hand that also acted as a telecommunications device. The world had not seen anything quite like it before, and it is said that the computing power of an iPhone is greater than the computing powers of computers in the 80’s that would take up and entire room. Year after year Apple has continued to make improvisations to the iPhone and this continues to be the case to this day.

Apple had been dominating the computer industry by this point, and Microsoft needed an answer if they wanted to remain regarded as a top dog in the industry. 2009 brought about Windows 7, a new update to the windows OS that brought numerous upgrades to the previously popular Windows XP. When windows 7 came out, approximately 19% of users were using windows Vista while approximately 63% of users were still using XP. This goes to show that Microsoft’s introduction of Vista in 2006 was not received well. Thankfully for Microsoft, this would not the case for Windows 7 as it was marketed at the time as the fastest OS available.

The next few years for Apple and Microsoft hosted no new OS’s, besides the failed Windows 8, but that does not mean that another company could not make its move. In 2011 Google released its own OS, Chrome OS, and it was run on their new laptop brand the “Chromebook”. The Chrome OS is designed for simplicity and uses that as its selling point for the market. There is no high-end software that is needed for these devices, and they are primarily used for browsing the internet and running applications.

Microsoft went on to release Windows 10 in 2015 which is currently the most popular and most used version of Windows. Apple has also released various updates to their Mac OS over the years, but nothing significant enough to call it a new OS. This brings us up to date with household computers, but it is worth mentioning that in 2016 there was computational history made with the release of the world’s first reprogrammable quantum computer. This was a massive deal in the quantum computing field as every other quantum computer before had focused on a specific algorithm that it was built for.

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