What's New in Computers

Windows 95

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Windows 95 offers several new features and is undoubtedly a landmark development in software technology.

Evolution of Windows 95

There has been a lot of discussion around the release of Windows 95 on 24 August 1995, amidst much hype and marketing glitz. The media is full of speculation on what it will mean for the software industry and the end-users. In this article, we trace the evolution of Windows 95, look at its features and see what implications it has for the future.

Around 1981, the PC with a 8088 CPU was introduced by IBM with the DOS operating system. The 8088 CPU was internally identical to the 8086 (i.e., it processed data 16 bits at a time), but externally did the reads and writes to memory, 8 bits at a time. A short while later Apple released its 'Macintosh' line of PCs which had better hardware capabilities and had an operating system which had a graphical user interface (GUI) plus many of the features that Windows 95 has today. This GUI enabled users to interact with the computer through graphical representation of objects rather than by typing cryptic, hard-to-remember commands (as in DOS). This graphical user interface meant that Apple had to use a display monitor with a good resolution, together with relatively better performance hardware. The crucial difference was that IBM made public the details of the hardware architecture of its PC (referred to as 'open architecture') leading to extensive 'cloning' by other manufacturers (the clones are referred to as IBM-compatibles) and consequently steep reduction in prices. Apple, on the other hand kept the architecture 'closed'. What proliferated among users in the years to come were

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the IBM compatibles with DOS and DOS-based applications. This proliferation of DOS-based machines laid the foundation for Microsoft. Microsoft began working on its GUI operating system and introduced Windows (1.0) in late 1985. However, the average PC hardware at that time, despite phenomenal increase in performance wasn't still adequate for a hardware-resource-hungry Windows 1.0. Windows 1.0 never took off, but still Microsoft decided to pursue development of the Windows operating system.

Meanwhile, the evolution of the Intel processor was strongly influenced by the IBM-compatible DOS market and had to carry the 'DOS baggage' in every new processor (80386, 80486, Pentium and P6) that it has since introduced. Technically this meant that

• the processor be capable of operating simply as if it were a faster 8088 processor (called 'real-mode') where it processes data 16 bits at a time and can address only 1 Megabyte (MB) of memory.

• the processor could also operate in an advanced 32-bit mode (called 'protected mode') where it has many advanced features (including addressing 4 Gigabytes of memory) plus a feature by which it could run in the 8086 mode, being on protected mode (called 'virtual 8086 mode').

It must be remembered that Intel always maintained backward compatibility in the instruction set and this meant that software developed for a lower-end processor (such as 8088) would also run on the advanced processors without any change.

In 1990 Microsoft released Windows 3.0 which made use of some of the advanced features in the 80386 microprocessor. By this time the hardware (VGA- very high resolution graphics adapters for display, 4 MB of RAM memory, 80 MB of disk memory) had enough 'punch' to run Windows 3.0. Although DOS had a huge installation base on several million PCs, it was antiquated and was

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inadequate for the computing needs of the nineties. These reasons made Windows 3.0 an instant success. With the subsequent release of Windows 3.1, Microsoft established its dominance over the IBM compatible - GUI operating system market, beating off competition from IBM's OS/2. One of the keys to the success of Windows 3.1 was that it ran on top of DOS and used DOS for operations like file access, loading files etc. Hence users on the one hand could avail of powerful easy-to-use applications on Windows but could also use trusted DOS-based applications which they used for several years. Thus the first major step in causing a transition from DOS to Windows was achieved. Windows 95, is essentially the next step in that direction. But where does Microsoft eventually want this to go? Microsoft eventually expects the transition to take place to its high-end, high-reliability feature-rich operating system : the Windows NT.

Important Features of Windows 95

● *Improved GUI and general ease of use*

The user interface of Windows 95 is easier to use and more intuitive than ever before. The interface also makes it easy to setup and configure various components of the computer such as the printer, network interface and disc drives.

● *Plug-and-play feature for hardware*

In the past, considerable amount of time has been wasted by technicians and users trying to install different types of hardware (such as disk drives, and sound boards) which resulted in all types of hardware conflicts. A hardware conflict occurs when 2 cards (instead of one) get accessed for the same address or when two cards attempt to interrupt the CPU on a single line (interrupt lines cannot be shared). Resolving conflicts involves a painful process of changing connection (called 'jumpers') on the card and retrying. The idea of plug and play is to eliminate the need to change any jumpers on the card and to achieve configuration through

software. Thus the user simply 'plugs' the card and 'plays' the software and the installation is done. In order to achieve this, a plug-and-play standard for hardware manufacturers has been defined and Windows 95 is the first operating system to support this standard. Even for hardware that does not support this standard, Windows 95 has a lot of built-in support for 'nearly' plug-and-play capabilities.

● *Support for 32 bit applications (apps).*

Windows 3.1 ran applications that were 16 bit apps. This means that not only did they process data 16 bits at a time, but the movement of data from and to the processor was done 16 bits at a time. This was so even though the 80386, 486 and Pentium were 32 bit processors. This meant that these apps were under-utilizing the capabilities of the CPU, and thus paid a performance penalty. Windows 95 offers full support for 32 bit applications through its Application Programmer's Interface (API) thus leading to increased performance. At the same time Windows 95 is backward compatible which means it is capable of running the old 16 bit apps as well.

● *Pre-emptive multitasking for 32 bit apps*

Multitasking refers to the fact that the user can run more than one task at the same time. For instance, the user could be editing his document using a word processor and in the background another task could be transferring a file over the network. Essentially the CPU and other resources are shared between many tasks, giving the illusion that many tasks are being done at the same time. Pre-emptive means that a task can be interrupted (due to the occurrence of an event such as a mouse click or the time being a certain value - like an alarm clock) and another task run. Windows 3.1 also supported multitasking but this was cooperative in nature. This meant that once a task had begun to run it was up to the task to say to the operating system: "for the moment I don't need the CPU and other computer resources". The operating system would then

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decide to allot these resources to some other task. Pre-emptive multitasking improves performance considerably.

● *Support for long filenames*

In DOS, filenames cannot be more than 11 characters long and this created problems in documenting files. In Windows 95 filenames can be up to 256 characters in length. So for example, in Windows 95, it is possible for a file to be named 'my physics lab work on October 25th 1995'. In DOS one would perhaps have named the file something like 'PHLOCT25.195'.

● *Extensive built-in support for networking*

The earlier systems made it necessary to put together a large number of software programs in order to gain complete access to all the networks connected to the PC. Windows 95 integrates all these functions and makes network connectivity extremely easy to achieve. In addition, it is possible to do peer-to-peer networking with Windows 95. This means that PCs connected in a local area network can share disk drives and files. i.e., a PC's hard disk can be viewed as a hard disk of another PC connected to the same network. Software to browse through the Internet (called a 'Web Browser') is also integrated. In addition to network connectivity, support for fax, electronic mail and mobile computing is built-in.

● *Better support for multimedia*

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Multimedia refers to the fact that digital data can now be presented in more than one medium: moving pictures (video) and sound. This essentially means that one can now view video clips together with sound on a PC and also control the playback. However the problem with multimedia applications is that they are resource hungry in terms of storage space requirements, computational power required and data transfer speeds. This entails use of special purpose hardware (to improve quality of video or 3-dimensional animation, for instance). Windows 95

allows applications to easily access these special purpose hardware.

To summarize, Windows 95 offers a lot of new features and performance benefits. In order to get these performance benefits one must have the adequate hardware too: A 486 running at 66MHz with 16 MB RAM and a VGA display. However there are many who feel that the integration of many of the programs (which were earlier regarded as applications) into Windows 95, will further reduce competition for Microsoft in the applications market and this will lead to a total dominance of the desktop market by Microsoft, thus leading to their monopoly of this market. In addition, claims made by Microsoft, that it is a pure 32 bit operating system and its dependence on DOS is minimal have been questioned by experts. Nevertheless, Windows 95 is undoubtedly a landmark development in software technology and will certainly spur growth in areas such as multimedia, networking and plug-and-play technologies.

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His father wanted him to be a bricklayer ... In Brunswick, Germany, in 1780, a stonemason was calculating the wages due his workmen at the end of the week. Watching was his three-year-old son. "Father," said the child, "the reckoning is wrong." The boy gave a different total which, to everyone's surprise, was correct. No one had taught the lad any arithmetic. The father had hoped his son would become a bricklayer, but thanks to his mother's encouragement, the boy, Carl Friedrich Gauss (1777 - 1855), became one of the greatest mathematicians in history.

The tireless mathematician ... Leonhard Euler (1707 - 1783) authored 734 memoirs. And he did all this under a severe handicap, for he lost the sight of one eye in 1735, and the sight of the other in 1766. His skill in manipulation was remarkable, and his intuitive grasp of mathematics enormous.