Building A Computer Essay, Research Paper

BUILDING A COMPUTER

With increasing popularity of computer games, and multimedia home PC users often need an unexpensive computer system upgrade. By building a custom computer one is able to combine componenets, and operating system to provide maximal gaming performance.

Computers are often called number manipulators, because of their ability to run millions of mathematical operations per second (White 43). Computers use binary system of numbers, which allows them to operate system of microscopic switches called transistors found inside of computer chips. Binary system is defined as counting system that uses two digits one and zero (Gookin 49). A transistor is a basic building block of microchips; transistors are combined in formations called logic gates (White 39). ?Transistor can only create binary information: one if current passes through or zero if current does not, to work with transistors?(White 39). Computer software uses Boolean logic, which is based on selecting true or false values used in computer programming (White 39).

All personal computers have BIOS, which is an acronym for Basic Input Output System. The BIOS runs every time the computer is started, and it basically tells the computer how to act (White 19). The BIOS is a part of the boot up process, or a complex set of operations checking hardware that components are working properly. Besides BIOS and several other operations there is power?on self-test – POST being ran. POST test runs at the start up, and if it finds an error, it sends a warning message (White 5).

Central processing unit ? CPU is the most important part of the personal computer, all other components work as a bridge to CPU (White 59). The speed of the processor is usually defined by using units called megahertz (MHz, also million frequency waves per second). CPUs are generally divided into two categories- CISC and RISC. CISC ? complex instruction set computing, uses many small instructions to carry out a single operations. CISC is a standard in today?s processors. RISC ? reduced instruction set computing, uses less complicated instructions with simpler design. RISC microprocessors are cheaper, they produce less heat, and they are generally smaller in size compared to CISC. With less heat and smaller size RISC processors have great advantage in reaching higher frequencies with less danger of overheating. The major disadvantage and also reason why RISC microprocessors are not widely used, is less compatibility with available software. The earlier programs were written for CISC chips. In order to reach maximal speed, and compatibility the major manufacturers of microprocessors such as Intel, use some advantages of RISC technology, to improve the performance of their CISC compatible microprocessors (White 55).

Computer microprocessor is the most important part of the PC, but it can not work by it self. One of the few primary components is BUS, also called a highway of the computer. BUS transports data among the processor, random access memory, and hard disk. Speed of the BUS depends on the type of motherboard where it is installed (White 119).

Random access memory- RAM is also attached to the motherboard- base of all the components, but unlike BUS, RAM can be easily removed and changed. Random access memory works as a staging area for the central processing unit (White 43). Capacity of random access memory is very important for the performance of a computer. In case there is not enough RAM the software can create space on the hard drive to be used as temporary operating memory (White 31). Random means that any part of the memory can be accessed at any time, it is not necessary to read all of the memory to find one location. RAM is usually fast, temporary memory where data is saved until removed or power is turned off on the computer (White 43).

?A hard drive is the workaholic of a PC system.?(White 87)) It is based on using magnetic plates; spinning at extreme speeds up to 7,200 rotations a minute, which are 120 spins every second. Even with extreme speed and microscopic accuracy modern hard drives are unlikely to fail. The hard disk is a combination of electronic and mechanical portions, which makes it the one of the slowest parts of the computer (White 87).

A graphic card is usually plugged into one of the expansion slots, which are metallic contacts on the motherboard (White 119). One of the most common expansion slots is PCI ? peripheral components interconnect. PCI are most commenly white slots used to attach a graphic or sound card, also modem or network card (White 120). Latest expansion slot used for graphic cards only is AGP ? accelerated graphic port, which is faster than PCI (White 121). Both PCI and AGP based adapters use SVGA ? super video graphics array as a modern standard, which added new capabilities, such as higher resolution and color depth to the previous VGA interface. Super VGA allows as many as 16 million colors also called 32-bit color, or true color(Stephen 1253). There are three major factors defining the speed of a graphic adapter, overall performance depends on the chipset speed, performance and capacity of graphic random access memory and the expansion slot architecture (Stephen 1258). One of the other factors defining speed of a video adapter is the software driver. ?Even the finest accelerator board hardware can bog-down when run with careless, loosely written code?(Stephen 1259). Graphic cards have their own BIOS software which is firmware, or permanently recorded in a memory device such as ROM ? read only memory, and usually can not be modified. Graphic card is actually a device what enables visualizing of data on the monitor?s screen. Graphic adapter sends signals to the monitor. The monitor uses glowing dots of red, green, and blue rays, which then blend into millions of colors. The display dots are called pixels ?picture element, also the smallest area of the monitor?s screen. Pixels are on/off to create and image, the graphic adapter sends the information about position and color of pixels in form of a bitmap. Bitmaps are also the most common form of computer graphics (White 143).

The CD-ROM ?compact disk read only memory became standard equipment in personal computer systems in late 1980?s. Data is retrieved from a compact disk by using a laser beam without any physical contact between the disk and the drive. No physical contact makes compact disks long lasting data storage media (White 205). Since early 1990s the CD-R – compact disk recorder became more reliable for home users. CD-R allows one to record CD?s on a home personal computer. The newer technology is CD-RW compact disk rewriteable, which enables rewriting CD?s after it is recorded (White 139). The latest way to store very large amount of data are DVD-digital versatile disk, which allows to store up to thirteen times more data than a CD. DVDs are usually used for movies because of their large capacity, and digital quality sound and picture(White 205).

Another common component of the personal computer is a modem. A modem works as a connection between digital and analog signals. The modem itself is an analog device. It uses analog telephone lines which were invented before any digital device. Modern 56K modems combine both analog, and digital transfer, making it perform better than analog ? only devices. Newer technology in data transfer are DSL – digital subscriber line, satellite, and cable. All of those are generally faster, but a more expensive way to connect to the Internet (White 171).

A sound card is one the devices that has been overlooked in early systems, besides a simple speaker the early PCs were mute. Due to the of increasing popularity of computer games, designers developed a soundboard, which was able to read and reproduce sound data recorded in separate files. Modern soundboards allow users to enjoy realistic three-dimensional sound surrounding a person while playing computer games (Stephen 1187).

To build a PC providing maximal gaming performance, one of the most important things to consider is choosing a CPU. There are several choices meeting individual needs, and purposes. Traditionally the speed of the processor is defined by it clock speed, but that is often not very certain because different developers can pack more performance into fewer clock cycles (Stephen 289). However to reach good gaming performance, today?s CPU needs a clock speed of 400 MHz or more, which eliminates selection below that point. The two major manufacturers making high performing processors are Intel and AMD. Both producers have selection of low and high price range CPUs between one hundred dollars up to one thousand dollars. Intel Celeron is one of the good performing and low priced CPUs, but compared to higher priced Intel Pentium II/III Celeron does not perform quite as well . The reason why Celeron is not as fast as Pentium II/III, is no presence, or low amount of cache memory. Cache memory is a very fast type of memory where data is temporary stored to avoid accessing slower RAM or hard drive. Older CPUs such as Pentium were using cache memory implemented on the motherboard; newer processors have cache memory installed on them, which makes the data transfer faster. AMD- advanced micro devices, as Intel?s largest competitor is known for providing well- designed and highly compatible processors. Currently to compete with Intel, AMD sells two good performing types of processors. The highly priced, and great performing AMD K7-Anthlon, and the ?Celeron competition? AMD K6. The Anthlon CPU in most benchmarks performs better than its clock speed equivalent from Intel (Hwang 1).

After selecting CPU next thing to consider is motherboard. There is a wide selection of motherboards, but only few well performing and high compatible. Abit is one of the well-known mainboard manufacturers, their policy has always been to provide greatest flexibility and feature set available. Their fair priced Abit BX6 rev. 2.0 features five PCI slots, two ISA and one AGP. BX6 supports up to one gigabyte of RAM, and is compatible with all Intel?s Slot – one processor, making it an excellent choice for Intel?s CPUs (Hwang 1).

If AMD K7- Anthlon is the choice for CPU, outstanding MSI MS-61-67 is a high quality mainboard supporting all Anthlon CPUs, and providing same as Abit BX6, five PCI, and two ISA slots. AGP slot is implemented as well. MS 61-67 supports up to 768 megabytes of random access memory, which provides plenty of upgrading options. The mainboard also provides ?Plug and Play? BIOS which detects the peripheral devices and expansion cards of the board automatically(Hwang 3).

A good graphic card is one the most important things to consider while building a gaming computer. 3Dfx Voodoo3 is one of the best performing graphic cards available on the market (Vederman 204). Its impressive test results in Glide interface based games are unbeatable by any other graphic card, just because 3Dfx is the only manufacturer using Glide interfacing. Using other interfaces such as Open GL or Direct 3D the Voodoo 3 3500 looses speed compare to TNT 2 Ultra based accelerators. One of the features of the high priced Voodoo3 3500 is a TV tuner that allows user to watch television on computers monitor (Case 49) . Voodoo 3 supports all three interfaces- Open GL, Glide, and Direct 3D which makes it one of the fastest, and most compatible graphic cards available. Only sixteen megabytes of graphic memory does not allow Voodoo3 to run true color, three dimensional scenes in high resolutions, and that is what Nvidia TNT 2 Ultra does (Case 204). Several graphic card manufacturers use TNT 2 Ultra chipset. Well known, and one of the largest is Diamond Multimedia producing Viper 770 Ultra, using previously mentioned TNT 2 Ultra chipset. Viper 770 is a very fast graphic accelerator with implemented thirty-two megabytes of graphic memory, allowing true coloring in high resolutions. Retail version of the Viper includes a large software bundle with several valuable games. Another feature is an excellent toolbar that allows the user to tweak up a lot of details improving performance, such as an overclocking utility (Case 99).

After all the hardware parts are assembled it is time to install the most important software, the operating system. The computer is unable to do anything unless it is running an operating system, which is a basic type of software that acts as a supervisor for all the applications (White 9). Although the operating system is the most important software it is not included in computers, because of the need to upgrades. Operating system is loaded from hard drive to the random access memory before the CPU can perform any operations. Operating systems were originally created to handle communication with other drives, because without an operating system programmers would have to invent software with instructions to run the hardware (White 19).

Currently the most popular operating system is Microsoft Windows 98 Second Edition. One of the new features of the Windows OS is an upgraded version of USB- universal serial bus support, which allows to use USB compatible modems. The feature improvement since Windows 95 includes for example Disk Defragmentation Optimization Wizard, using the process of disk defragmentation to increase the speed of the most frequently used applications (Stephen 53)

The newest Microsoft operating system Windows 2000 is still available only in beta test version. Impressive new features such as very complex plug and play detection devices, or performance improvements due using the newest drivers are only few of the new implementations (Cleveland 75).

Todays reality – like games require high-end PCs, sold for thousands of dollars. By building a custom computer a user is really able to tweak up the best performance for the best price. Cheaper, custom built PC allows user to play any of the hundreds of games available, and reach the best frame rates.