

# Computer and layer essay



**ASSIGN  
BUSTER**

An SIS (Instruction Set Architecture) is the agreed upon Interface which runs between the software that runs on the machine and the hardware that executes it. What is the Importance of the Principle of Equivalence of Hardware and Software? Any task that can be done by software which can also be done using hardware, and any operation performed directly by hardware can be done using software. Name the three basic components of every computer. 1. Processor - interpret and execute programs 2. Memory- store data and programs 3. I/O devices- transfer data to and from outside world. To what power of 10 does the prefix giga- refer? What is the (approximate) equivalent power of 2? Giga (G) Power of 10 is 1 billion =  $10^9$  to the power of 9. Equivalent = 2 to the power of 30. To what power of 10 does the prefix micro- refer? What is the (approximate) equivalent power of 2? Micro (m) Power of 10 is 1 millionth =  $10^{-6}$  to the power of -6. Equivalent = 2 to the power of -20. The unit of measurement used to measure a computer's clock speed is called a hertz (Hz).

This denotes one cycle per second and measures a clock's speed. In computer clock speed, one hertz is equivalent to one tick per second. A computer's clock speed is normally measured in MHz (megahertz) or GHz (gigahertz). A megahertz is equal to one million ticks per second while one gigahertz is equal to one billion ticks per second. A computer with the clock speed of 600 MHz runs at 600,000,000 cycles per second, while a 2 GHz computer runs at 2,000,000,000 cycles per second. Name two types of computer memory.

The two types of memory are synchronous (synchronize itself with a microprocessor's bus) and asynchronous. What is the mission of the IEEE?

Siege's core purpose is to foster technological innovation and excellence for the benefit of humanity. What is the full name of the organization that uses the initials 'ISO'? Is ISO an acronym? ISO is not an acronym. ISO stands for International Organization for Standardization. The term ISO is based on the Greek word 'ISO' meaning equal and was adopted to ensure that it would be applicable to all languages.

ISO regulates industrial, computer and commercial standards. ISO has defined a number of important computer standards, the most significant of which is OSI (Open Systems Interconnection) with standards for designing computer networks. ANSI is the acronym used by which organization? ANSI stands for American National Standards Institute which is used to represent the US. What is the name of the Swiss organization that devotes itself to matters concerning Telephony, telecommunications, and data communications? The International Telecommunications Union (ITU). Who is known as the father of computing and why?

Charles Babbage modern computers: processing unit (mill), a memory (store), and input/output. Also, conditional branching. What was the significance of the punch card? It was the type of input programming. Hollering went on to use it for census data (and also went on to found MUM). His 80 column punch card was a staple of automated data processing for 50 years. Name two driving factors in the development of computers. What is it about the transistor that made it such a great improvement over the vacuum tube? They use less power, are more reliable, and are smaller.

It is an improvement because it is a solid-state version of the triode (used in a vacuum tube) and electrons are better behaved in a solid medium than in an open void of a vacuum tube. How does an integrated circuit differ from a transistor? ICs allow multiple transistors to exist on a single silicon chip that is smaller than a single "discrete component" transistor. Explain the differences between AS, MS, LSI, and VLSI. What technology spawned the development of microcomputers? Why? VLSI technology, and its incredible shrinking circuits, spawned the development of microcomputers.

This made computing small enough and inexpensive enough for the general public to use at home. What is meant by an "open architecture"? An open architecture is one where the system design is not copyrighted or has they used off-the-shelf parts. State Moore's Law. The number of transistors on a chip doubles in less than 2 years. How is Rock's Law related to Moore's Law? Rock's law states "The cost of capital equipment to build semiconductors will double every four years." When compared to Moore's Law it soon becomes infeasible to pay the costs associated with designing more densely packed chips.

Name and explain the seven commonly accepted layers of the Computer Level Hierarchy. How does this arrangement help us to understand computer systems? Application (Layer 7) This layer supports application and end-user processes. Communication partners are identified, quality of service is identified, user authentication and privacy are considered, and any constraints on data syntax are identified. Everything at this layer is application-specific. This layer provides application services for file transfers, e-mail, and other network software services. Presentation (Layer 6) This layer

provides independence from differences in data representation (e. G. , encryption) by translating from application to network format, and vice versa. This layer formats and encrypts data to be sent across a network, providing freedom from compatibility problems. It is sometimes called the syntax layer. Session(Layer 5) This layer establishes, manages and terminates connections between applications. The session layer sets up, coordinates, and terminates conversations, exchanges, and dialogues between the applications at each end.

It deals with session and connection coordination. O transport(Layer 4) This layer provides transparent transfer of data between end systems, or hosts, and is responsible for end-to-end error recovery and flow control. It ensures complete data transfer. O Network(Layer 3) This layer provides switching and routing technologies, creating logical paths, known as virtual circuits, for transmitting data from node to node. Routing and forwarding are functions of this layer, as well as addressing, intertwining, error handling, congestion control and packet sequencing. Furnishes transmission protocol knowledge and management and handles errors in the physical layer, flow control and frame synchronization. The data link layer is divided into two sub layers: The Media Access Control (MAC) layer and the Logical Link Control (LLC) layer. The MAC sub layer controls how a computer on the network gains access to the data and permission to transmit it. The LLC layer controls frame synchronization, flow control and error checking. 00 Physical(Layer 1) This layer conveys the bit stream - electrical impulse, light or radio signal through the network at the electrical and mechanical level.

It provides the hardware means of sending and receiving data on a carrier, including defining cables, cards and physical aspects. How does the term abstraction apply to computer organization and architecture? Process of Abstraction allows layers to hide lower level information from higher levels - in a way that allows the higher levels to be useful and consistent without being cluttered by unnecessary detail What was it about the von Neumann architecture that distinguished it from its predecessors? Name the characteristics present in a von Neumann architecture. . CPU with a control unit, ALL], and registers. . Main memory unit to hold programs and control the computer's operation 3. I/O system How does the fetch-decode-execute cycle work? Von Neumann Execution Cycle 1 . The control unit fetches the next program instruction from the memory, using the program counter to determine where the instruction is located. 2. The instruction is decoded into a language the ALLIS can understand. 3. Any data operands required to execute the instruction are fetched from memory and placed into registers within the CAP]. 4. The ALL executes the instruction and places the results in registers or Emory.

What is meant by parallel computing? 0 Parallel processing refers to a collection of different architectures, from multiple multiple cores integrated onto the same chip. What is a multi-core processor? A parallel processor that has multiple processing units (cores) on a single chip. What is the underlying premise of Medal's Law? No matter how many processors are placed in a system, or how many resources are assigned to them, somehow, somewhere, a bottleneck is bound to develop. The best that we can do to

remedy this is to make sure that the slowest parts of the system are the ones that are used the least.

This law states that the performance enhancement possible with a given improvement is limited by the amount that the improved feature is used. The underlying premise is that every algorithm has a sequential part that ultimately limits the speedup that can be achieved by multiprocessor implementation. The word bit is a contraction for what two words? Binary Integer Explain how the terms bit, byte, nibble, and word are related. A nibble is made up of 4 bits (1101 is the binary number), a byte is made up of 2 nibbles, and a word is made up of two bytes. Why are binary and decimal called positional numbering systems?

They are called positional numbering systems because the value of that number depends on the position of the digits such as 123 is a different value of 321 Explain how base 2, base 8 and base 16 are related. Base 2 is binary Base 8 is octal Base 16 is hexadecimal They are all related because they are powers of base 2 What is a radix? The base (or radix) of a number system is the number of different symbols available to represent any digit within that system. How many of the “ numbers to remember” (in all bases) from Figure 2. 1 can you remember? Of the result is incorrect.

In signed magnitude, the sign bit is used only for the sign, so we can't “ carry into” it. If there is a carry emitting from the seventh bit, our result would be truncated as the seventh bit overflows, giving an incorrect sum. Name the three ways in which signed integers can be represented in digital computers and explain the differences Which one of the three integer representations is

used most often by digital computer How are complement systems like the odometer on a bicycle? Do you think that double-dabble is an easier method than the other binary-to- chemical conversion methods explained in this chapter? Why?

With reference to the previous question, what are the drawbacks of the other two conversion methods? What is overflow and how can it be detected? How does overflow in unsigned numbers differ from overflow in signed numbers? If a computer is capable only of manipulating and storing integers, what difficulties present themselves? How are these difficulties overcome? What are the goals of Booths Algorithm? How does carry differ from overflow? What is arithmetic shifting? What are the three component parts of a floating-point number? What is a biased exponent, and what efficiencies can it provide? What is normalization and why is it necessary?

Why is there always some degree of error in floating-point arithmetic when performed by a binary digital computer? How many bits long is a double-precision number under the IEEE-754 floating-point standard? 64 bits with a 11 bit exponent and 53 bit significant. The bias is 1023. (single precision is 32 bits) BCC encodes each digit in a decimal number to a 4-bit binary form. EPISODIC expanded BCC from 6 bits to 8 bits. What is ASCII and how did it originate? ASCII uses requires the zone to be 0011 (hexadecimal 3). ASCII is a direct descendant of the coding schemes used for decades by teletype (telex) devices.

Explain the difference between ASCII and Unicode ASCII uses an 8-bit encoding while Unicode uses a variable bit encoding. Unicode is standardized



while ASCII isn't. Unicode represents most written languages in the world while ASCII does not. ASCII has its equivalent within Unicode. How many bits does a Unicode character require? 16 Why was Unicode created? It became apparent that a new character encoding scheme was needed and the Unicode standard was created. The objective of Unicode is to unify all the different encoding schemes so that the confusion between computers can be limited as much as possible.

How do cyclic redundancy checks work? Blocks of data entering these systems get a short check value attached, based on the remainder of a polynomial division of their contents; on retrieval the calculation is repeated, and corrective action can be taken against presumed data corruption if the check values do not match. What is systematic error detection? What is a Hamming code? Hamming Code is used in situations where random errors are likely to occur and are an adaptation of the concept of parity What is meant by Hamming distance and why is it important?

What is meant by minimum Hamming distance? The number of bit positions in which two code words differ is called the Hamming Distance of those two code words. The minimum Hamming distance of a code, often signified by the notation  $D(\min)$ , determines its error detecting and correcting capability. Accordingly, the Hamming distance of a code must be at least  $k + 1$  in order for it to be able to correct  $k$  errors. How is the number of redundant bits necessary for code related to the number of data bits? What is a burst error? When multiple adjacent bits are damaged.