

1.

1.

Describe how a computer can produce an incorrect answer when performing numerical computations even though it has not malfunctioned./

A:

Most students will probably refer to overflow and truncation errors./

2.

Describe how the concept of Hamming distance is used to produce an error-correcting code./

A:

By designing a code in which each pattern has a Hamming distance of n from any other pattern, patterns with fewer than $n/2$ errors can be corrected by replacing them with the code pattern that is closest./

3.

a.What is the output of the circuit below? b. In general, how does the three-bit input pattern across the top of the diagram relate to the circuit' s output?

A:

a. 0 b. The output is 0 if the input parity is odd; the output is 1 if the input parity is even./

4.

If the input and output bit patterns in the circuit below are interpreted as binary representations of numeric values, what operation does the circuit perform?

A:

The circuit subtracts one (except for the case of the input being 000)./

5.

Explain why such terms as kilobyte, megabyte, and gigabyte have acquired double meanings.

A:

The prefixes kilo, mega, and giga are used traditionally to refer to units measured in powers of ten.

However, due to the early misuse of the prefix kilo in reference to units of the size 1024, these prefixes are now often used to refer to units that are powers of two especially when referring to the capacity of main memories./

6.

Convert the following addition problem into two's complement notation (using four bits per value), perform the addition, convert the answer back into base ten notation, and explain the results./

A:

In two's complement notation the problem is to add 0110 and 0011. The sum is 1001 which translates to -7. This answer is incorrect due to overflow./

7.

Under what condition is each of the following data compression techniques most effective? a. Run-length encoding b. Relative encoding.

A:

a. Compresses most when data consists of long strings of the same entry. b. Compresses most when each block of data differs little from the previous block./

8.

What is frequency-dependent encoding?

A:

Frequency-dependent encoding is an encoding system that uses short bit patterns to represent data items that occur most often and longer patterns to represent less frequently occurring items. The result is that entire blocks of data can be represented in less space than would be required if each data item were represented by the same size bit pattern./

9.

Construct the entire two's complement scale in which each value is represented by three bits.

A:

3 011 2 010 1 001 0 000 -1 111 -2 110 -3 101 -4 100/

10.

To what does the term “normalized form” refer in the context of floating-point notation?

A:

Normalized form refers to a standard for positioning the bit pattern within the mantissa field. Many values can be represented in floating-point notation by different bit patterns, only one of which is in normalized form. Hence, restricting representations to normalized form assures that each value is represented by a unique pattern./

12.

Among the Boolean operations AND,OR,EXCLUSIVE OR,and NOT,which is least like the others?

Explain your answer.

A:

There is not really a right or wrong answer. The student’ s explanation is the most important part.Most students will probably answer NOT because it has only one input whereas the others have two./

13.

If a term paper consisted of 42 pages,each containing 40 lines of 100 symbols each (counting each space as a symbol), was to be encoded using Unicode,how many bytes of storage space would be required?

A:

336,000 bytes (168,000 symbols times 2 bytes per symbol)/

14.

Explain why adding only a few characters to a text file may increase the file’ s size by several hundred bytes and at other times may not increase the file’ s size at all.

A:

File space is allocated in terms of physical records, each of which is several hundred bytes in size. Thus, the size of a file grows by physical record units rather than by byte size units./

15.

In a two's complement system, what value can be added to any other value without causing an overflow? How many values in the system have this property? Explain your answer.

A:

Adding the value 0 to any other value will not produce an overflow. However, if m is the largest positive integer that can be represented in the system, then any value in the range 1 to m will produce an overflow when added to m , and any value in the range -1 to $-(m + 1)$ will produce an overflow when added to $-(m + 1)$.

3.

1.

Explain the difference between application software and system software.

A:

System software provides the infrastructure required by the application software. It includes the operating system and utilities. Application software provides the unique functionality required to perform the particular tasks for which the computer is used. Examples include word processors, spreadsheet systems, database systems, and image processing systems./

2.

Describe a scenario that leads to deadlock in a computer system.

A:

There are many possible answers. One would be the case of two processes in a time-sharing system, each of which needs to spawn additional processes to complete its task even though the process table is full. In this case, each process would hold a nonshareable resource (space in the process table) that the other needed to progress resulting in deadlock./

3.

What conditions are necessary for deadlock to occur?

A:

There must be competition for nonshareable resources, resources must be requested on a piecemeal basis, and resources, once allocated, cannot be forcibly retrieved./

5.

What is the difference between a process that is waiting as opposed to a process that is ready?

A:

A process that is waiting would not be able to advance if given a time slice (perhaps because it is waiting for a peripheral device to complete a task) whereas a process that is ready would be able to continue execution if given a time slice./

6.

Describe the bootstrap process.

A:

When the computer is first turned on, the bootstrap program stored in ROM is executed. This program directs the computer to load the operating system into main memory from mass storage. The bootstrap then executes a jump to the operating system, the operating system takes over./

9.

Based on the meaning of the term virtual memory, give an argument that time sharing could be called virtual CPU.

A:

The term virtual memory refers to the illusion of a memory space that is larger than that actually present. This illusion is created by the operating system. Time sharing is a technique used by operating systems to create the illusion of more CPUs than are actually present./

10.

Describe concerns that occur when designing a multitasking operating system that do not occur in the case of a single tasking system.

A:

Possible answers include: The implementation of time sharing, the need to protect each process

from malicious behavior of other processes, and the need to deal with the possibility of deadlock.

4

1.

What is the difference between a repeater and a bridge?

A:

Both repeaters and bridges are used to connect two buses, but a repeater transfers all messages whereas a bridge transfers only those messages destined for the other side./

2.

What is the difference between hubs, switches, and routers?

A:

A hub is merely a central (short) bus to which computers are connected to form a bus network. A switch connects several bus networks to form a larger network. A router connects two networks to form an internet in which the original two networks continue to function as independent networks./

3.

Many people use the terms Internet and world-wide web interchangeably. What is the difference between the Internet and the world-wide web?

A:

The Internet is the infrastructure used by the world-wide web. That is, the world-wide web is only one application of the Internet. Other applications include email, ftp, and telnet./

4.

What are HTML and XML?

A:

HTML is an actual markup language. XML is not a markup language itself. Instead it is a markup language "style." /

5.

What are some distinctions between UDP and TCP?

A:

UDP is a connectionless protocol whereas TCP establishes a two way communication between the origin and destination of a message. TCP is a reliable protocol in that the origin and destination work together to confirm that the entire message was successfully transferred. In contrast, UDP merely transmits the message without confirming its reception./

6.

As an encryption system, what is unique about public-key encryption (that is, why is public-key encryption so named)?

A:

In a public-key encryption system, knowing the encryption key does not allow one to decipher a message. Thus, the encryption key can be public knowledge without violating security./

7.

Draw a sketch showing how the following HTML document would appear on the computer screen

A:

The displayed page contains only the words "Mud Art" displayed as a major heading. The words "This is the title" are NOT part of the displayed page./

9.

What would happen if a user clicked the mouse on the term "pig" while viewing the HTML document shown below?

A:

The browser would retrieve and display the document pigs.html./

10.

To what do the terms "server side" and "client side" refer?

A:

They indicate whether the identified activity is performed by the client or the server when using the client/server model for interprocess communication./

11.

What assumptions are made when a URL is denoted by merely zoo.org?

A:

It is assumed that the protocol is http and that the document desired is the default document in the default directory./

12.

Briefly summarize the steps performed by each of the four layers in the TCP/IP hierarchy at the computer at which a message originates.

A:

Application layer: originates the message and obtains destination's IP address. Transport layer: chops message into segments and assigns sequence numbers. Network layer: determines intermediate address. Link layer: transmits message segments.

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eight address. B49F 1010 0111 1101 1111 64 12 2+ 3/8 1/4 17111 10111 10.01 0.101 111.001 000011 111101 127 (represented by 01111111) -7 10010110 0 -2 3 01011110 7 1/2 (represented as 01111111) A, B, and C CHDF 3 2nd 4th 5th 6th Run-length encoding, relative encoding, frequency-dependent encoding, /

3

100 150 0.02% (1/5000) Interactive processing Real-time processing Window manager Dispatcher File manager Memory manager Batch processing Application software Ready process Memory space, mass storage space, printers, space in process table, CPU time, The time spent switching between processes could become significant when compared to the time spent actually executing processes. UNIX, LINX, and Microsoft's Windows series Load balancing refers to the task of assigning tasks to the processors in a way that leads to efficient use of all processors./

4

star, ring,&bus TCP&UDP Circle: superheroes, underline:http,rectangle:batpage.html (or just batpage) Underline:com, rectangle: heroes/superheroes Rectangle: Fido, underline: dogmail.zoo.org 00100001 00101010 00010010 (212A12 in hexadecimal) 18.12 network identifier host address name server,file server,mail server,Web server, com, org,edu,gov,net,uk,ca,, The following tags are missing:<title>, >,<body>,,and</p>. Tags are surrounded by < and >, tags that close an item are the same as the opening tag except that / is added, tag name are in lower case, and others. Token ring protocol and CSMA/CD IP <body> </html> <p> server clients peer-to-pee At the gateway At the domain' s mail server At the individual machine ttp://animals.org/dogs/bulldogs.html