

## Famous Interview Questions

**Q1:** Classic: If a bear walks one mile south, turns left and walks one mile to the east and then turns left again and walks one mile north and arrives at its original position, what is the color of the bear.

**A:** The color of the bear is trivial. The possible solutions to it are interesting. In addition to the trivial pole in the north, there are additional circles near the other pole. Think it out.

tags: [microsoft puzzle](#)

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**Q2:** Given a rectangular (cuboidal for the puritans) cake with a rectangular piece removed (any size or orientation), how would you cut the remainder of the cake into two equal halves with one straight cut of a knife?

**A:** Join the centers of the original and the removed rectangle. It works for cuboids too! BTW, I have been getting many questions asking why a horizontal slice across the middle will not do. Please note the "any size or orientation" in the question! Don't get boxed in by the way you cut your birthday cake :) Think out of the box.

tags: [microsoft puzzle](#)

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**Q3:** There are 3 boxes. One of them has red balls, one has blue balls only and the other has mixture of red and blue balls. The labels on their boxes always lie. (i.e. if the label says red, you are sure that it doesn't have red balls only, it could be a mixture) The task is to pick one box and pick only one ball from it and then correctly label all the three boxes.

**H:** There are only two combinations of distributions in which ALL the boxes have wrong labels. By picking a ball from the one labeled MIXTURE, it is possible to tell what the other two boxes have.

tags: [microsoft puzzle](#)

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**Q4:** You have 8 balls. One of them is defective and weighs less than others. You have a balance to measure balls against each other. In 2 weighings how do you find the defective one?

tags: [microsoft puzzle](#)

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**Q5:** Why is a manhole cover round?

**H:** The diagonal of a square hole is larger than the side of a cover!

**A:** Alternate answers: 1. Round covers can be transported by one person, because they can be rolled on their edge. 2. A round cover

doesn't need to be rotated to fit over a hole.

tags: [microsoft puzzle](#)

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**Q6:** How many cars are there in the USA? (or how many gas stations or how many houses)

tags: [microsoft puzzle](#)

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**Q7:** You've got someone working for you for seven days and a gold bar to pay them. The gold bar is segmented into seven connected pieces. You must give them a piece of gold at the end of every day. If you are only allowed to make two breaks in the gold bar, how do you pay your worker?

tags: [microsoft puzzle](#)

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**Q8:** One train leaves Los Angeles at 15mph heading for New York. Another train leaves from New York at 20mph heading for Los Angeles on the same track. If a bird, flying at 25mph, leaves from Los Angeles at the same time as the train and flies back and forth between the two trains until they collide, how far will the bird have traveled?

**H:** Think relative speed of the trains.

tags: [microsoft math puzzle](#)

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**Q9:** You have two jars, 50 red marbles and 50 blue marbles. A jar will be picked at random, and then a marble will be picked from the jar. Placing all of the marbles in the jars, how can you maximize the chances of a red marble being picked? What are the exact odds of getting a red marble using your scheme?

tags: [microsoft math puzzle](#)

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**Q10:** Imagine you are standing in front of a mirror, facing it. Raise your left hand. Raise your right hand. Look at your reflection. When you raise your left hand your reflection raises what appears to be his right hand. But when you tilt your head up, your reflection does too, and does not appear to tilt his/her head down. Why is it that the mirror appears to reverse left and right, but not up and down?

tags: [microsoft puzzle](#)

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**Q11:** You have 5 jars of pills. Each pill weighs 10 gram, except for contaminated pills contained in one jar, where each pill weighs 9 gm. Given a scale, how could you tell which jar had the contaminated pills in just one measurement?

**A:** 1. Mark the jars with numbers 1, 2, 3, 4, and 5. 2. Take 1 pill from

jar 1, take 2 pills from jar 2, take 3 pills from jar 3, take 4 pills from jar 4 and take 5 pills from jar 5. 3. Put all of them on the scale at once and take the measurement. 4. Now, subtract the measurement from 150 (  $1*10 + 2*10 + 3*10 + 4*10 + 5*10$ ) 5. The result will give you the jar number which has contaminated pill.

tags: [microsoft puzzle](#)

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**Q12:** If you had an infinite supply of water and a 5 quart and 3 quart pail, how would you measure exactly 4 quarts?

tags: [microsoft puzzle](#)

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**Q13:** Implement a multiple-reader-single-writer lock given a compare-and-swap instruction. Readers cannot overtake waiting writers.

tags: [microsoft sw programming](#)

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**Q14:** Given a makefile, design the data structure that a parser would create and then write code that iterates over that data structure executing commands as needed.

tags: [microsoft sw programming](#)

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**Q15:** You have a bucket of jelly beans. Some are red, some are blue, and some green. With your eyes closed, pick out 2 of a like color. How many do you have to grab to be sure you have 2 of the same?

tags: [microsoft math puzzle](#)

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**Q16:** Which way should the key turn in a car door to unlock it?

tags: [microsoft puzzle](#)

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**Q17:** If you could remove any of the 50 states, which state would it be and why?

tags: [microsoft puzzle](#)

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**Q18:** There are four dogs/ants/people at four corners of a square of unit distance. At the same instant all of them start running with unit speed towards the person on their clockwise direction and will always run towards that target. How long does it take for them to meet and where?

**H:** They will meet in the center and the distance covered by them is independent of the path they actually take (a spiral).

tags: [microsoft math puzzle](#)

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**Q19:** (from Tara Hovel) A helicopter drops two trains, each on a parachute, onto a straight infinite railway line. There is an undefined distance between the two trains. Each faces the same direction, and upon landing, the parachute attached to each train falls to the ground next to the train and detaches. Each train has a microchip that controls its motion. The chips are identical. There is no way for the trains to know where they are. You need to write the code in the chip to make the trains bump into each other. Each line of code takes a single clock cycle to execute. You can use the following commands (and only these); MF - moves the train forward MB - moves the train backward IF (P) - conditional that is satisfied if the train is next to a parachute. There is no "then" to this IF statement. GOTO

**A:**

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A: MF IF (P) GOTO B GOTO A ----- B: MF GOTO B
```

Explanation: The first line simply gets them off the parachutes. You need to get the trains off their parachutes so the back train can find the front trains parachute, creating a special condition that will allow it to break out of the code they both have to follow initially. They both loop through A: until the back train finds the front trains parachute, at which point it goes to B: and gets stuck in that loop. The front train still has not found a parachute, so it keeps in the A loop. Because each line of code takes a "clock cycle" to execute, it takes longer to execute the A loop than the B loop, therefore the back train (running in the B loop) will catch up to the front train.

tags: [microsoft sw programming puzzle](#)

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**Q20:** Tell me the courses you liked and why did you like them.

tags: [microsoft sw general](#)

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**Q21:** Give an instance in your life in which you were faced with a problem and you tackled it successfully.

tags: [microsoft general](#)

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**Q22:** What is your ideal working environment.

tags: [microsoft general](#)

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**Q23:** Why do you think you are smart.

tags: [microsoft general](#)

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**Q24:** Questions on the projects listed on the Resume.

tags: [microsoft general](#)

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**Q25:** Do you want to know any thing about the company.( Try to ask

some relevant and interesting question).

tags: [microsoft](#) [general](#)

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[How long do you want to stay in USA and why \(I guess non-citizens get this\)?](#)

tags: [microsoft](#) [general](#)

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**Q27:** What is your geographical preference?

tags: [microsoft](#) [general](#)

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**Q28:** What are your expectations from the job.

tags: [microsoft](#) [general](#)

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**Q29:** Given a rectangular (cuboidal for the puritans) cake with a rectangular piece removed (any size or orientation), how would you cut the remainder of the cake into two equal halves with one straight cut of a knife ?

tags: [microsoft](#) [math](#) [puzzle](#)

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**Q30:** You are given an array containing both positive and negative integers and required to find the sub-array with the largest sum ( $O(N)$  a la KBL). Write a routine in C for the above.

tags: [microsoft](#) [sw](#) [programming](#) [c](#)

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**Q31:** Given an array of size  $N$  in which every number is between 1 and  $N$ , determine if there are any duplicates in it. You are allowed to destroy the array if you like. [ I ended up giving about 4 or 5 different solutions for this, each supposedly better than the others ].

tags: [microsoft](#) [sw](#) [programming](#)

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**Q32:** Write a routine to draw a circle ( $x^2 + y^2 = r^2$ ) without making use of any floating point computations at all. [ This one had me stuck for quite some time and I first gave a solution that did have floating point computations ].

tags: [microsoft](#) [sw](#) [programming](#)

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**Q33:** Given only putchar (no printf, itoa, etc.) write a routine putlong that prints out an unsigned long in decimal.

**A:** I gave the obvious solution of taking  $\% 10$  and  $/ 10$ , which gives us

the decimal value in reverse order. This requires an array since we need to print it out in the correct order. The interviewer was not too pleased and asked me to give a solution which did not need the array.  
tags: [microsoft sw programming](#)

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**Q34:** Give a one-line C expression to test whether a number is a power of 2. [No loops allowed - it is a simple test.]  
tags: [microsoft sw programming](#)

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**Q35:** Given an array of characters which form a sentence of words, give an efficient algorithm to reverse the order of the words (not characters) in it.  
tags: [microsoft sw programming](#)

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**Q36:** How many points are there on the globe where by walking one mile south, one mile east and one mile north you reach the place where you started.  
tags: [microsoft puzzle](#)

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**Q37:** Give a very good method to count the number of ones in a "n" (e.g. 32) bit number.  
**A:** Given below are simple solutions, find a solution that does it in log (n) steps. Iterative function `iterativecount (unsigned int n) begin int count=0; while (n) begin count += n & 0x1 ; n >>= 1; end return count; end` Sparse Count function `sparsecount (unsigned int n) begin int count=0; while (n) begin count++; n &= (n-1); end return count ; end`  
tags: [microsoft sw programming](#)

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**Q38:** What are the different ways to implement a condition where the value of x can be either a 0 or a 1. Apparently the if then else solution has a jump when written out in assembly. `if (x == 0) y=a else y=b` There is a logical, arithmetic and a data structure solution to the above problem.  
tags: [microsoft sw programming hw](#)

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**Q39:** Reverse a linked list.  
tags: [microsoft sw programming](#)

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**Q40:** Insert in a sorted list  
tags: [microsoft sw programming](#)

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**Q41:** In a Xs and Os game (i.e. TIC TAC TOE) if you write a program for this give a fast way to generate the moves by the computer. I mean this should be the fastest way possible.

**A:** The answer is that you need to store all possible configurations of the board and the move that is associated with that. Then it boils down to just accessing the right element and getting the corresponding move for it. Do some analysis and do some more optimization in storage since otherwise it becomes infeasible to get the required storage in a DOS machine.

tags: [microsoft sw programming](#)

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**Q42:** I was given two lines of assembly code which found the absolute value of a number stored in twos complement form. I had to recognize what the code was doing. Pretty simple if you know some assembly and some fundamentals on number representation.

tags: [microsoft sw programming hw](#)

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**Q43:** Give a fast way to multiply a number by 7.

tags: [microsoft sw programming](#)

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**Q44:** How would go about finding out where to find a book in a library. (You do not know how exactly the books are organized beforehand).

tags: [microsoft sw programming puzzle](#)

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**Q45:** Linked list manipulation.

tags: [microsoft sw programming](#)

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**Q46:** Tradeoff between time spent in testing a product and getting into the market first.

tags: [microsoft sw general](#)

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**Q47:** What to test for given that there is not enough time to test everything you want to.

tags: [microsoft sw general testing](#)

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**Q48:** First some definitions for this problem: a) An ASCII character is one byte long and the most significant bit in the byte is always 0. b) A Kanji character is two bytes long. The only characteristic of a Kanji character is that in its first byte the most significant bit is 1. Now you are given an array of a characters (both ASCII and Kanji) and, an

index into the array. The index points to the start of some character. Now you need to write a function to do a backspace (i.e. delete the character before the given index).

tags: [microsoft sw programming](#)

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**Q49:** Delete an element from a doubly linked list.

tags: [microsoft sw programming](#)

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**Q50:** Write a function to find the depth of a binary tree.

tags: [microsoft sw programming](#)

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**Q51:** Given two strings S1 and S2. Delete from S2 all those characters which occur in S1 also and finally create a clean S2 with the relevant characters deleted.

tags: [microsoft sw programming](#)

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**Q52:** Assuming that locks are the only reason due to which deadlocks can occur in a system. What would be a foolproof method of avoiding deadlocks in the system.

tags: [microsoft sw programming os](#)

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**Q53:** Reverse a linked list.

**A:** Ans: Possible answers - iterative loop curr->next = prev; prev = curr; curr = next; next = curr->next endloop recursive reverse(ptr) if (ptr->next == NULL) return ptr; temp = reverse(ptr->next); temp->next = ptr; return ptr; end

tags: [microsoft sw programming](#)

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**Q54:** Write a small lexical analyzer - interviewer gave tokens. expressions like "a\*b" etc.

tags: [microsoft sw programming](#)

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**Q55:** Besides communication cost, what is the other source of inefficiency in RPC? How can you optimize the communication?

**A:** Context switches, excessive buffer copying. Optimize by communicating through shared memory on same machine, bypassing the kernel.

tags: [microsoft sw programming os](#)

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**Q56:** Write a routine that prints out a 2-D array in spiral order!

tags: [microsoft sw programming](#)



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**Q57:** How is the readers-writers problem solved? - using semaphores/ada .. etc.

tags: [microsoft sw programming os](#)

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**Q58:** Ways of optimizing symbol table storage in compilers.

tags: [microsoft sw programming](#)

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**Q59:** A walk-through through the symbol table functions, lookup() implementation etc. - The interviewer was on the Microsoft Compiler team.

tags: [microsoft sw programming](#)

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**Q60:** A version of the "There are three persons X Y Z, one of which always lies".. etc..

tags: [microsoft puzzle](#)

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**Q61:** There are 3 ants at 3 corners of a triangle, they randomly start moving towards another corner.. what is the probability that they do not collide.

tags: [microsoft sw math puzzle](#)

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**Q62:** Write an efficient algorithm and C code to shuffle a pack of cards. This one was a feedback process until we came up with one with no extra storage.

tags: [microsoft sw programming](#)

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**Q63:** There are 4 women who want to cross a bridge. They all begin on the same side. You have 17 minutes to get all of them across to the other side. It is night. There is one flashlight. A maximum of two people can cross at one time. Any party who crosses, either 1 or 2 people, must have the flashlight with them. The flashlight must be walked back and forth, it cannot be thrown, etc. Each woman walks at a different speed. A pair must walk together at the rate of the slower woman's pace. Woman 1: 1 minute to cross Woman 2: 2 minutes to cross Woman 3: 5 minutes to cross Woman 4: 10 minutes to cross For example if Woman 1 and Woman 4 walk across first, 10 minutes have elapsed when they get to the other side of the bridge. If Woman 4 then returns with the flashlight, a total of 20 minutes have passed and you have failed the mission. What is the order required to get all women across in 17 minutes? Now, what's the other way?

tags: [microsoft puzzle](#)

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**Q64:** Implement an algorithm to do string matching with wildcards.

tags: [microsoft sw programming algorithms](#)

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**Q65:** Some general questions on Lex, Yacc etc.

tags: [microsoft sw](#)

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**Q66:** Given an array t[100] which contains numbers between 1..99. Return the duplicated value. Try both O(n) and O(n-square).

tags: [microsoft sw programming algorithms](#)

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**Q67:** Given an array of characters. How would you reverse it. ? How would you reverse it without using indexing in the array.

tags: [microsoft sw programming](#)

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**Q68:** Given a sequence of characters. How will you convert the lower case characters to upper case characters. ( Try using bit vector - solutions given in the C lib -typec.h)

tags: [microsoft sw programming](#)

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**Q69:** Fundamentals of RPC.

tags: [microsoft sw os](#)

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**Q70:** Given a linked list which is sorted. How will you insert in sorted way.

tags: [microsoft sw programming](#)

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**Q71:** Write a function that takes in a string parameter and checks to see whether or not it is an integer, and if it is then return the integer value.

tags: [microsoft sw programming](#)

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**Q72:** Give a good data structure for having n queues ( n not fixed) in a finite memory segment. You can have some data-structure separate for each queue. Try to use at least 90% of the memory space.

tags: [microsoft sw programming](#)

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**Q73:** Do a breadth first traversal of a tree.

tags: [microsoft sw programming algorithms](#)

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**Q74:** What is the difference between an Ethernet Address and an IP address?

tags: [microsoft networking](#)

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**Q75:** Write, efficient code for extracting unique elements from a sorted list of array. e.g. (1, 1, 3, 3, 3, 5, 5, 5, 9, 9, 9, 9) -> (1, 3, 5, 9).

tags: [microsoft sw programming algorithms](#)

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**Q76:** Given an array of integers, find the contiguous sub-array with the largest sum.

**A:** Can be done in  $O(n)$  time and  $O(1)$  extra space. Scan array from 1 to n. Remember the best sub-array seen so far and the best sub-array ending in i.

tags: [microsoft sw programming algorithms](#)

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**Q77:** Given an array of length N containing integers between 1 and N, determine if it contains any duplicates.

**A:** [Is there an  $O(n)$  time solution that uses only  $O(1)$  extra space and does not destroy the original array?]

tags: [microsoft sw programming algorithms](#)

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**Q78:** Sort an array of size n containing integers between 1 and K, given a temporary scratch integer array of size K.

**A:** Can be done in  $O(k)$  time i.e. without initializing the auxiliary array!

tags: [microsoft sw programming algorithms](#)

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**Q79:** An array of integers. The sum of the array is known not to overflow an integer. Compute the sum. What if we know that integers are in 2s complement form?

**A:** If numbers are in 2s complement, an ordinary looking loop like for ( $i=total=0; i < n; total+=array[i++]$ ); will do. No need to check for overflows!

tags: [microsoft sw programming](#)

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**Q80:** An array of integers of size n. Generate a random permutation of the array, given a function `rand_n()` that returns an integer between 1 and n, both inclusive, with equal probability. What is the expected

time of your algorithm?

**A:** "Expected time" should ring a bell. To compute a random permutation, use the standard algorithm of scanning array from  $n$  down to 1, swapping  $i$ -th element with a uniformly random element  $\leq i$ -th. To compute a uniformly random integer between 1 and  $k$  ( $k < n$ ), call `rand_n()` repeatedly until it returns a value in the desired range.

tags: [microsoft sw programming math](#)

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**Q81:** An array of pointers to (very long) strings. Find pointers to the (lexicographically) smallest and largest strings.

**A:** Scan array in pairs. Remember largest-so-far and smallest-so-far. Compare the larger of the two strings in the current pair with largest-so-far to update it. And the smaller of the current pair with the smallest-so-far to update it. For a total of  $\leq 3n/2$  `strcmp()` calls. That is also the lower bound.

tags: [microsoft sw programming algorithms](#)

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**Q82:** Write a program to remove duplicates from a sorted array.

**A:** `int remove_duplicates(int * p, int size) { int current, insert = 1; for (current=1; current < size; current++) if (p[current] != p[insert-1]) { p[insert] = p[current]; current++; insert++; } else current++; return insert; }`

tags: [microsoft sw programming](#)

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**Q83:** What is a virtual function ? What happens if an error occurs in constructor or destructor. Discussion on error handling, templates, unique features of C++. What is different in C++? ( compare with unix).

tags: [microsoft sw programming C++ C](#)

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**Q84:** Given a list of numbers ( fixed list) Now given any other list, how can you efficiently find out if there is any element in the second list that is an element of the first list (fixed list).

tags: [microsoft sw programming algorithms](#)

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**Q85:** Given 3 lines of assembly code : Find what it is doing. `cwd xor ax, dx sub ax, dx`

**A:** Finds absolute value. - It does only operate on AX/EAX - It destroys a register (DX/EDX) - It can be done faster on Pentium and newer processors The problem is the CWD instruction. To replace CWD, you can use this combination: `mov dx,ax sar dx,15` (If 32-bit registers are used, shift with a value of 31 instead.)

tags: [microsoft sw programming assembly hw](#)

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**Q86:** If you are in a boat on a lake and you throw out a suitcase, Will the level of water increase in the lake?

tags: [microsoft puzzle](#)

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**Q87:** Print an integer using only putchar. Try doing it without using extra storage.

tags: [microsoft sw programming](#)

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**Q88:** Write C code for (a) deleting an element from a linked list (b) traversing a linked list

tags: [microsoft sw programming C](#)

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**Q89:** What are various problems unique to distributed databases

tags: [microsoft sw database](#)

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**Q90:** Declare a void pointer

**A:** void \*ptr;

tags: [microsoft sw programming](#)

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**Q91:** Make the pointer aligned to a 4 byte boundary in a efficient manner

**A:** Assign the pointer to a long number and the number with 11...1100 add 4 to the number

tags: [microsoft sw programming](#)

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**Q92:** What is a far pointer (in DOS)

tags: [microsoft sw programming](#)

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**Q93:** What is a balanced tree

tags: [microsoft sw programming algorithms](#)

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**Q94:** Given a linked list with the following property node2 is left child of node1, if node2 < node1 else, it is the right child.

**A:** O P || O A || O B || O C How do you convert the above linked list to the form without disturbing the property. Write C code for that. O P || O B || O ? O ? determine where do A and C go

tags: [microsoft sw programming](#)

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**Q95:** Describe the file system layout in the UNIX OS

**A:** describe boot block, super block, inodes and data layout

tags: [microsoft sw os unix](#)

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**Q96:** In UNIX, are the files allocated contiguous blocks of data

**A:** Describe the direct blocks and indirect blocks in UNIX file system

tags: [microsoft sw os unix](#)

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**Q97:** Write an efficient C code for tr program. tr has two command line arguments. They both are strings of same length. tr reads an input file, replaces each character in the first string with the corresponding character in the second string. eg. tr abc xyz replaces all a by x, b by y and so on.

**A:** a) have an array of length 26. put x in array element corr to a put y in array element corr to b put z in array element corr to c put d in array element corr to d put e in array element corr to e and so on. the code while (!eof) { c = getc(); putc(array[c - 'a']); }

tags: [microsoft sw programming](#)

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**Q98:** what is disk interleaving

tags: [microsoft database](#)

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**Q99:** why is disk interleaving adopted

tags: [microsoft database](#)

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**Q100:** Given a new disk, how do you determine which interleaving is the best a) give 1000 read operations with each kind of interleaving determine the best interleaving from the statistics

tags: [microsoft sw database](#)

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**Q101:** [Draw the graph with performance on one axis and n on another, where n is the n in n-way disk interleaving. \(a tricky question, should be answered carefully\)](#)

tags: [microsoft sw database](#)

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**Q102:** I was given c++ code and was asked to find out the bug in that. The bug was that he declared an object locally in a function and tried to return the pointer to that object. Since the object is local to the function, it no more exists after returning from the function. The pointer, therefore, is invalid outside.

tags: [microsoft sw programming C++](#)

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**Q103:** A real life problem - A square picture is cut into 16 squares and they are shuffled. Write a program to rearrange the 16 squares to get the original big square.

tags: [microsoft sw programming puzzle algorithms](#)

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**Q104:** `int *a; char *c; *(a) = 20; *c = *a; printf("%c",*c);` what is the output?

**A:**

tags: [microsoft sw programming](#)

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**Q105:** Write a program to find whether a given m/c is big-endian or little-endian!

tags: [microsoft sw programming hw](#)

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**Q106:** What is a volatile variable?

tags: [microsoft sw programming](#)

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**Q107:** What is the scope of a static function in C ?

tags: [microsoft sw programming C](#)

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**Q108:** What is the difference between "malloc" and "calloc"?

tags: [microsoft sw programming](#)

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**Q109:** `struct n { int data; struct n* next}node; node *c,*t; c->data = 10; t->next = null; *c = *t;` what is the effect of the last statement?

tags: [microsoft sw programming](#)

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**Q110:** If you are familiar with the ? operator `x ? y : z`, you want to implement that in a function: `int cond(int x, int y, int z);` using only `~, !, ^, &, +, |, <<, >>` no if statements, or loops or anything else, just those operators, and the function should correctly return y or z based on the value of x. You may use constants, but only 8 bit constants. You can cast all you want. You are not supposed to use extra variables, but in the end, it will not really matter, using vars just makes things cleaner. You should be able to reduce your solution to a single line in the end though that requires no extra vars.

tags: [microsoft sw programming puzzle](#)

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**Q111:** You have an abstract computer, so just forget everything you know about computers, this one only does what I am about to tell you it does. You can use as many variables as you need, there are no negative numbers, all numbers are integers. You do not know the size of the integers, they could be infinitely large, so you cannot count on truncating at any point. There are NO comparisons allowed, no if statements or anything like that. There are only four operations you can do on a variable. 1) You can set a variable to 0. 2) You can set a variable = another variable. 3) You can increment a variable (only by 1), and it is a post increment. 4) You can loop. So, if you were to say loop(v1) and v1 = 10, your loop would execute 10 times, but the value in v1 would not change so the first line in the loop can change value of v1 without changing the number of times you loop. You need to do 3 things. 1) Write a function that decrements by 1. 2) Write a function that subtracts one variable from another. 3) Write a function that divides one variable by another. 4) See if you can implement all 3 using at most 4 variables. Meaning, you are not making function calls now, you are making macros. And at most you can have 4 variables. The restriction really only applies to divide, the other 2 are easy to do with 4 vars or less. Division on the other hand is dependent on the other 2 functions, so, if subtract requires 3 variables, then divide only has 1 variable left unchanged after a call to subtract. Basically, just make your function calls to decrement and subtract so you pass your vars in by reference, and you cannot declare any new variables in a function, what you pass in is all it gets. Linked lists

tags: [microsoft sw programming puzzle](#)

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**Q112:** Under what circumstances can one delete an element from a singly linked list in constant time?

**A:** If the list is circular and there are no references to the nodes in the list from anywhere else! Just copy the contents of the next node and delete the next node. If the list is not circular, we can delete any but the last node using this idea. In that case, mark the last node as dummy!

tags: [microsoft sw programming](#)

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**Q113:** Given a singly linked list, determine whether it contains a loop or not.

**A:** (a) Start reversing the list. If you reach the head, gotcha! there is a loop! But this changes the list. So, reverse the list again. (b) Maintain two pointers, initially pointing to the head. Advance one of them one node at a time. And the other one, two nodes at a time. If the latter overtakes the former at any time, there is a loop! p1 = p2 = head; do { p1 = p1->next; p2 = p2->next->next; } while (p1 != p2);



tags: [microsoft sw programming](#)

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**Q114:** Given a singly linked list, print out its contents in reverse order. Can you do it without using any extra space?

**A:** Start reversing the list. Do this again, printing the contents.

tags: [microsoft sw programming](#)

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**Q115:** Given a binary tree with nodes, print out the values in pre-order/in-order/post-order without using any extra space.

tags: [microsoft sw programming algorithms](#)

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**Q116:** Reverse a singly linked list recursively. The function prototype is `node * reverse (node *) ;`

**A:** `node * reverse (node * n) { node * m ; if (! (n && n -> next)) return n ; m = reverse (n -> next) ; n -> next -> next = n ; n -> next = NULL ; return m ; }`

tags: [microsoft sw programming](#)

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**Q117:** Given a singly linked list, find the middle of the list.

**H:** Use the single and double pointer jumping. Maintain two pointers, initially pointing to the head. Advance one of them one node at a time. And the other one, two nodes at a time. When the double reaches the end, the single is in the middle. This is not asymptotically faster but seems to take less steps than going through the list twice.

tags: [microsoft sw programming](#)

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**Q118:** Reverse the bits of an unsigned integer.

**A:** `#define reverse(x) (x=x>>16|(0x0000ffff&x)<<16, x=(0xff00ff00&x)>>8|(0x00ff00ff&x)<<8, x=(0xf0f0f0f0&x)>>4|(0x0f0f0f0f&x)<<4, x=(0xcccccccc&x)>>2|(0x33333333&x)<<2, x=(0xaaaaaaaa&x)>>1|(0x55555555&x)<<1)`

tags: [microsoft sw programming](#)

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**Q119:** Compute the number of ones in an unsigned integer.

**A:** `#define count_ones(x) (x=(0xaaaaaaaa&x)>>1+(0x55555555&x), x=(0xcccccccc&x)>>2+(0x33333333&x), x=(0xf0f0f0f0&x)>>4+(0x0f0f0f0f&x), x=(0xff00ff00&x)>>8+(0x00ff00ff&x), x=x>>16+(0x0000ffff&x))`

tags: [microsoft sw programming](#)

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**Q120:** Compute the discrete log of an unsigned integer.

**A:** `#define discrete_log(h) (h=(h>>1)|(h>>2), h|=(h>>2), h|=(h>>4), h|=(h>>8), h|=(h>>16), h=(0xaaaaaaaa&h)>>1+(0x55555555&h), h=(0xcccccccc&h)>>2+(0x33333333&h), h=(0xf0f0f0f0&h)>>4+(0x0f0f0f0f&h), h=(0xff00ff00&h)>>8+(0x00ff00ff&h), h=(h>>16)+(0x0000ffff&h))` If I understand it right,  $\log_2(2) = 1$ ,  $\log_2(3) = 1$ ,  $\log_2(4) = 2$ ..... But this macro does not work out  $\log_2(0)$  which does not exist! How do you think it should be handled?  
tags: [microsoft sw programming](#)

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**Q121:** How do we test most simply if an unsigned integer is a power of two?

**A:** `#define power_of_two(x) ((x)&&(~(x&(x-1))))`  
tags: [microsoft sw programming](#)

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**Q122:** Set the highest significant bit of an unsigned integer to zero.

**A:** (from Denis Zabavchik) Set the highest significant bit of an unsigned integer to zero `#define zero_most_significant(h) (h&=(h>>1)|(h>>2), h|=(h>>2), h|=(h>>4), h|=(h>>8), h|=(h>>16))`  
tags: [microsoft sw programming](#)

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**Q123:** Let  $f(k) = y$  where  $k$  is the  $y$ -th number in the increasing sequence of non-negative integers with the same number of ones in its binary representation as  $y$ , e.g.  $f(0) = 1$ ,  $f(1) = 1$ ,  $f(2) = 2$ ,  $f(3) = 1$ ,  $f(4) = 3$ ,  $f(5) = 2$ ,  $f(6) = 3$  and so on. Given  $k \geq 0$ , compute  $f(k)$ .

tags: [microsoft sw programming algorithms](#)

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**Q124:** A character set has 1 and 2 byte characters. One byte characters have 0 as the first bit. You just keep accumulating the characters in a buffer. Suppose at some point the user types a backspace, how can you remove the character efficiently. (Note: You cant store the last character typed because the user can type in arbitrarily many backspaces)

tags: [microsoft sw programming](#)

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**Q125:** What is the simplest way to check if the sum of two unsigned integers has resulted in an overflow.

tags: [microsoft sw programming](#)

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**Q126:** [How do you represent an n-ary tree? Write a program to print the nodes of such a tree in breadth first order.](#)

tags: [microsoft sw programming algorithms](#)

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**Q127:** Write the tr program of UNIX. Invoked as tr -str1 -str2. It reads stdin and prints it out to stdout, replacing every occurrence of str1[i] with str2[i]. e.g. tr -abc -xyz to be and not to be <- input to ye xnd not to ye <- output

**A:**

tags: [microsoft](#) [sw](#) [programming](#) [algorithms](#)

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**Q128:** How do you use RSA for both authentication and secrecy?

tags: [microsoft](#) [sw](#) [security](#)

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**Q129:** What is ARP and how does it work?

tags: [cisco](#) [microsoft](#) [networking](#)

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**Q130:** What is the difference between a switch and a router?

tags: [microsoft](#) [cisco](#) [networking](#)

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**Q131:** Name some routing protocols? (RIP, OSPF etc..)

tags: [microsoft](#) [cisco](#) [networking](#)

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**Q132:** How do you do authentication with message digest(MD5)? (Usually MD is used for finding tampering of data)

tags: [microsoft](#) [security](#) [networking](#)

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**Q133:** How do you implement a packet filter that distinguishes following cases and selects first case and rejects second case. i) A host inside the corporate n/w makes a ftp request to outside host and the outside host sends reply. ii) A host outside the network sends a ftp request to host inside. for the packet filter in both cases the source and destination fields will look the same.

tags: [cisco](#) [microsoft](#) [networking](#)

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**Q134:** How does traceroute work? Now how does traceroute make sure that the packet follows the same path that a previous (with ttl - 1) probe packet went in?

tags: [microsoft](#) [cisco](#) [juniper](#) [networking](#)

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**Q135:** Explain Kerberos Protocol ?

tags: [microsoft](#) [sun](#) [cisco](#) [security](#) [networking](#)

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**Q136:** What are digital signatures and smart cards?

tags: [microsoft](#) [sun](#) [cisco](#) [security](#) [networking](#)

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**Q137:** Difference between discretionary access control and mandatory access control?

tags: [microsoft](#) [sun](#) [security](#) [networking](#)

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**Q138:** How do you find the size of a java object (not the primitive type) ?

**A:** type cast it to string and find its s.length()

tags: [microsoft](#) [sw](#) [java](#) [programming](#)

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**Q139:** Why is multiple inheritance not provided in Java?

tags: [microsoft](#) [sw](#) [programming](#) [java](#)

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**Q140:** Thread t = new Thread(); t.start(); t = null; now what will happen to the created thread?

tags: [microsoft](#) [sw](#) [programming](#) [java](#)

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**Q141:** How is garbage collection done in java?

tags: [microsoft](#) [sw](#) [programming](#) [java](#)

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**Q142:** How do you write a "ping" routine in java?

tags: [microsoft](#) [sw](#) [programming](#) [java](#) [networking](#)

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**Q143:** What are the security restrictions on applets?

tags: [microsoft](#) [sw](#) [programming](#) [java](#)

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**Q144:** Write a function to check if two rectangles defined as below overlap or not. struct rect { int top, bot, left, right; } r1, r2;

tags: [microsoft](#) [sw](#) [programming](#) [puzzle](#)

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**Q145:** Write a SetPixel(x, y) function, given a pointer to the bitmap. Each pixel is represented by 1 bit. There are 640 pixels per row. In each byte, while the bits are numbered right to left, pixels are numbered left to right. Avoid multiplications and divisions to improve performance.

tags: [microsoft](#) [sw](#) [programming](#)

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**Q146:** You, a designer want to measure disk traffic i.e. get a

histogram showing the relative frequency of I/O/second for each disk block. The buffer pool has  $b$  buffers and uses LRU replacement policy. The disk block size and buffer pool block sizes are the same. You are given a routine `int lru_block_in_position (int i)` which returns the `block_id` of the block in the  $i$ -th position in the list of blocks managed by LRU. Assume position 0 is the hottest. You can repeatedly call this routine. How would you get the histogram you desire?

**A:** Simply do histogram [`lru_block_in_position (b-1)`] ++ at frequent intervals... The sampling frequency should be close to the disk I/O rate. It can be adjusted by remembering the last block seen in position  $b$ . If same, decrease frequency; if different, increase, with exponential decay etc. And of course, take care of overflows in the histogram.

tags: [microsoft](#) [sw](#) [programming](#) [database](#)

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**Q147:** What does the following code do? `xor eax,eax mov ebx,data ; your input data mov cl,bits ; number of bits loop: ror ebx,1 rcl eax,1 dec cl jnz loop`

**A:** Reverses the order of bits

tags: [microsoft](#) [intel](#) [amd](#) [nvidia](#) [hw](#) [comparch](#) [architecture](#) [hardware](#)

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**Q148:** Explain what is DMA?

tags: [microsoft](#) [intel](#) [amd](#) [nvidia](#) [hw](#) [comparch](#) [architecture](#) [hardware](#)

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**Q149:** What is pipelining?

tags: [microsoft](#) [intel](#) [amd](#) [nvidia](#) [hw](#) [comparch](#) [architecture](#) [hardware](#)

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**Q150:** What are superscalar machines and vliw machines?

tags: [microsoft](#) [intel](#) [amd](#) [nvidia](#) [hw](#) [comparch](#) [architecture](#) [hardware](#)

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**Q151:** What is cache?

tags: [microsoft](#) [intel](#) [amd](#) [nvidia](#) [hw](#) [comparch](#) [architecture](#) [hardware](#)

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**Q152:** What is cache coherency and how is it eliminated?

tags: [microsoft](#) [intel](#) [amd](#) [nvidia](#) [hw](#) [comparch](#) [architecture](#) [hardware](#)

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**Q153:** What is write back and write through caches?

tags: [microsoft](#) [intel](#) [amd](#) [nvidia](#) [hw](#) [comparch](#) [architecture](#) [hardware](#)

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**Q154:** What are different pipelining hazards and how are they

eliminated.

tags: [microsoft](#) [intel](#) [amd](#) [nvidia](#) [hw](#) [comparch](#) [architecture](#) [hardware](#)

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**Q155:** What are different stages of a pipe?

tags: [microsoft](#) [intel](#) [amd](#) [nvidia](#) [hw](#) [comparch](#) [architecture](#) [hardware](#)

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**Q156:** Explain more about branch prediction in controlling the control hazards

tags: [microsoft](#) [intel](#) [amd](#) [nvidia](#) [hw](#) [comparch](#) [architecture](#) [hardware](#)

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**Q157:** Give examples of data hazards with pseudo codes.

tags: [microsoft](#) [intel](#) [amd](#) [nvidia](#) [hw](#) [comparch](#) [architecture](#) [hardware](#)

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**Q158:** How do you calculate the number of sets given its way and size in a cache?

tags: [microsoft](#) [intel](#) [amd](#) [nvidia](#) [hw](#) [comparch](#) [architecture](#) [hardware](#)

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**Q159:** How is a block found in a cache?

tags: [microsoft](#) [intel](#) [amd](#) [nvidia](#) [hw](#) [comparch](#) [architecture](#) [hardware](#)

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**Q160:** Scoreboard analysis.

tags: [microsoft](#) [intel](#) [amd](#) [nvidia](#) [hw](#) [comparch](#) [architecture](#) [hardware](#)

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**Q161:** What is miss penalty and give your own ideas to eliminate it.

tags: [microsoft](#) [intel](#) [amd](#) [nvidia](#) [hw](#) [comparch](#) [architecture](#) [hardware](#)

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**Q162:** How do you improve the cache performance.

tags: [microsoft](#) [intel](#) [amd](#) [nvidia](#) [hw](#) [comparch](#) [architecture](#) [hardware](#)

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**Q163:** Different addressing modes.

tags: [microsoft](#) [intel](#) [amd](#) [nvidia](#) [hw](#) [comparch](#) [architecture](#) [hardware](#)

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**Q164:** Computer arithmetic with twos complements.

tags: [microsoft](#) [intel](#) [amd](#) [nvidia](#) [hw](#) [comparch](#) [architecture](#) [hardware](#)

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**Q165:** About hardware and software interrupts.

tags: [microsoft](#) [intel](#) [amd](#) [nvidia](#) [hw](#) [comparch](#) [architecture](#) [hardware](#)

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**Q166:** What is bus contention and how do you eliminate it.

tags: [microsoft](#) [intel](#) [amd](#) [nvidia](#) [hw](#) [comparch](#) [architecture](#) [hardware](#)

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**Q167:** What is aliasing?

tags: [microsoft](#) [intel](#) [amd](#) [nvidia](#) [hw](#) [comparch](#) [architecture](#) [hardware](#)

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**Q168:** What is the difference between a latch and a flip flop?

tags: [microsoft](#) [intel](#) [amd](#) [nvidia](#) [hw](#) [comparch](#) [architecture](#) [hardware](#)

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**Q169:** What is the race around condition? How can it be overcome?

tags: [microsoft](#) [intel](#) [amd](#) [nvidia](#) [hw](#) [comparch](#) [architecture](#) [hardware](#)

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**Q170:** What is the purpose of cache? How is it used?

tags: [microsoft](#) [intel](#) [amd](#) [nvidia](#) [hw](#) [comparch](#) [architecture](#) [hardware](#)

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**Q171:** What are the main issues associated with multiprocessor caches and how might you address them?

**H:** Think Coherency

tags: [Intel](#) [AMD](#) [nVidia](#) [ATI](#) [Sun](#) [HP](#) [hw](#) [architecture](#) [design](#)

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**Q172:** In what cases do you need to double clock a signal before presenting it to a synchronous state machine?

tags: [Intel](#) [AMD](#) [Sun](#) [hardware](#) [architecture](#) [design](#)

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**Q173:** You have a driver that drives a long signal & connects to an input device. At the input device there is either overshoot, undershoot or signal threshold violations, what can be done to correct this problem?

tags: [Intel](#) [AMD](#) [Sun](#) [circuit](#) [hardware](#) [design](#) [logic](#)

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**Q174:** You have 2 candles. Every candle lights for 60 minutes. You have to find the way to measure 45 minutes.

tags: [microsoft](#) [google](#) [ebay](#) [puzzle](#)

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**Q175:** A band is going in the street with a constant speed. Someone in the last row has a dog. The dog runs ahead, reaches the front row of the band and gets back to its owner. The dog's speed was constant all the way and while it was running the band passed 50 feet. Find the length of the dog's path, if the distance between the front and the rear row of the band is 50 feet.

tags: [microsoft](#) [puzzle](#)

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**Q176:** [A chess board has 64 squares. Two squares in the diagonal corners are erased. Is it possible to cover the remaining 62 squares with 31 dominos? \(One domino covers two squares.\) Why or How?](#)  
tags: [microsoft puzzle](#)

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**Q177:** A man is running across a bridge. When he is  $\frac{3}{8}$  of the way across, he heard a train coming behind him. If he keeps running he will reach the end of the bridge at the same time with the train. If he turns around and runs back, he will get to the beginning of the bridge at the same time as the train. The man runs at a speed of 5mph. What is the speed of the train?  
tags: [microsoft puzzle math](#)

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**Q178:** What is the purpose of the preprocessor directive #error?  
tags: [WindRiver software programming embedded](#)

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**Q179:** What does the following code output? 

```
<pre> void foo(void)
{ unsigned int a=6; int b=-20; (a+b >6) ? puts(">6") : puts("<=6"); }
</pre>
```

  
tags: [microsoft WindRiver software programming embedded](#)

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**Q180:** Write a program to print a binary tree such that the root is printed in the middle of its left and right sub-trees.  
**H:** in-order traversal  
tags: [microsoft software programming C](#)

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**Q181:** What is the difference in memory management between Java and C++? Is it possible to create a memory leak in Java?  
tags: [ebay microsoft amazon software programming C java c++](#)

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**Q182:** An 8bit ADC with parallel output converts input signal into digital numbers. You have to come up with the idea of a circuit, that finds the maximum of every 10 numbers at the output of the ADC.  
tags: [Intel AMD nVidia ATI Sun HP hardware hw design circuit logic](#)

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**Q183:** You have two counters to 16, built from negative D-FF. First circuit is synchronous and second is "ripple" (cascading). Which circuit has a less propagation delay?  
**H:** Show how propagation delay of ripple counter is  $4 \cdot t_{prop}$ , while



synchronous counter has only  $1 \cdot t_{prop}$ .

tags: [Intel](#) [NationalSemi](#) [AMD](#) [Sun](#) [hardware](#) [hw](#) [design](#) [circuit](#) [logic](#)

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**Q184:** Design a divide-by-3 counter with equal duty cycle ?

tags: [Intel](#) [AMD](#) [nVidia](#) [ATI](#) [Sun](#) [HP](#) [NationalSemi](#) [hardware](#) [hw](#) [design](#) [circuit](#) [logic](#)

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**Q185:** When will you use a latch and a flipflop in a sequential design?

tags: [Intel](#) [AMD](#) [nVidia](#) [ATI](#) [Sun](#) [HP](#) [NationalSemi](#) [hardware](#) [hw](#) [design](#) [circuit](#) [logic](#)

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**Q186:** FIFO Design: We have a fifo which clocks data in at 10mhz and clocks data out at 8mhz. On the input there is only 8 data samples in any order during each 10 clocks. In other words, a 10 input clock window will carry only 8 data samples and the other 2 clocks carry no data (data is scattered in any order). How big does the fifo need to be to avoid data over/under-run.

tags: [Intel](#) [AMD](#) [nVidia](#) [ATI](#) [Sun](#) [HP](#) [NationalSemi](#) [hardware](#) [hw](#) [design](#) [circuit](#) [logic](#)

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**Q187:** We have a circular wheel with half painted black and the other half painted white. There are 2 sensors mounted 45 degree apart at the surface of this wheel( not touching the wheel) which give a "1" for black and "0" for white passing under them. Design a circuit to detect which way the wheel is moving. Do not assume any fixed position for start.

tags: [Intel](#) [AMD](#) [nVidia](#) [ATI](#) [Sun](#) [HP](#) [NationalSemi](#) [hardware](#) [hw](#) [design](#) [circuit](#) [logic](#)

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**Q188:** The silicon of a new device has memory leak. When all "0" are written into memory, it reads back all "0" without any problem. When all "1" are written, only 80% of memory cells are read back correctly. What can be possibly the problem with the memory?

tags: [Intel](#) [AMD](#) [nVidia](#) [ATI](#) [Sun](#) [HP](#) [NationalSemi](#) [hardware](#) [hw](#) [design](#) [circuit](#) [logic](#)

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**Q189:** There are 100 doors in a row that are all initially closed. You make 100 passes by the doors starting with the first door every time. The first time through you visit every door and toggle the door (if the door is closed, you open it, if its open, you close it). The second time you only visit every 2nd door (door #2, #4, #6). the third time, every 3rd door (door #3, #6, #9), etc, until you only visit the 100th door.

What is the state of each door after the last pass?

**H:** Think factors of a number.

tags: [microsoft puzzle](#)

---

**Q190:** There are four ants on a square, one at each corner. At the same time, they all set off for a different corner at random. What is the probability that they don't collide?

**H:** Think total possible combinations based on choices of each ant and then set of non-colliding choices.

tags: [microsoft puzzle math](#)

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**Q191:** Implement a queue in an array.

tags: [Microsoft software c c++ programming](#)

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**Q192:** A man has two paper cubes on his desk. Every day he arranges both cubes so that the front faces show the current day of the month. What numbers are required on the faces of the cubes to allow this for all possible days in the calendar?

tags: [microsoft ebay puzzle](#)

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**Q193:** (Attributed to the Monty Hall show) You are presented with three doors (door 1, door 2, door 3). One door has a million dollars behind it. The other two have goats behind them. You do not know ahead of time what is behind any of the doors. Monty asks you to choose a door. you pick one of the doors and announce it. Monty then counters by showing you one of the doors with a goat behind it and asks you if you would like to keep the door you chose, or switch to the other unknown door. Should you switch? Why or Why not?

tags:

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**Q200:** Design and describe a system/application that will most efficiently produce a report of the top 1 million Google search requests. These are the particulars. \* You are given 12 servers to work with. They are all dual-processor machines with 4Gb of RAM, 4x400GB hard drives and networked together. (Basically, nothing more than high-end PC's) \* The log data has already been cleaned for you. It consists of 100 Billion log lines, broken down into 12 320 GB files of 40-byte search terms per line. \* You can use only custom written applications or available free open-source software.

tags: [google sw software programming design algorithms](#)

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**Q194:** You have a normal six sided cube. How many different cubes

can you make by painting each side using one of six colors? If you can rotate two cubes to make them look identical in color then they are the same cube!

tags: [microsoft](#) [puzzle](#)

---

**Q199:** You have been shrunk down to the size of a nickel and tossed into a blender. You are told that the blender blades will start in 60 seconds. What would you do to save your life?

tags: [google](#) [behavioral](#) [general](#)

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**Q195:** Create an XOR gate using only NAND gates. What is the minimum number of gates you need for doing it?

tags:

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**Q196:** What is the effective way of Device Independent Bitmap files management?

**A:** Memory-mapped file is the best choice for device-independent bitmaps. MMF allows to map the file to RAM/SWAP addresses and to let Windows handle all load/unload operations for the file.

tags: [microsoft](#) [hp](#) [programming](#) [sw](#) [windows](#)

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**Q198:** what is the volume of a rectangular prism

**H:** it starts with l

**A:** length times width times height

tags: [microsoft](#) [sw](#)

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**Q197:** The Dutch National Flag Problem (The following problem was proposed by W.H.J. Feijen and made famous by Edsger W. Dijkstra, both of Dutch origin.) You are given a row of  $n$  buckets, each containing one ball, which may be either red, white, or blue. Your goal is to rearrange the balls in the buckets such that they appear in the order of the colors on the Dutch national flag: red balls should be grouped on the left, the order of the colors on the Dutch national flag: red balls should be grouped on the left, move balls is  $\text{swap}(i, j)$ , which swaps the contents of the  $i$  and  $j$  buckets. Give pseudocode for a linear-time algorithm for sorting an array  $B[1..n]$  of balls in the Dutch national flag order. Your algorithm should use only constant space in addition to the given array.

tags: [microsoft](#) [ebay](#) [hp](#) [yahoo](#) [programming](#) [algorithms](#) [sw](#)

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**Q201:** [What is the difference between deep copy and shallow copy?](#)

[Which of the two does Object.clone\(\) implement?](#)

tags: [ebay](#) [sw](#) [java](#)

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**Q202:** You have a bucket of jelly beans. Some are red, some are blue, and some green. With your eyes closed, pick out 2 of a like color. How many do you have to grab to be sure you have 2 of the same?

**A:** 4, in any four beans. two will definitely be of a same color

tags: [MICROSOFT](#) [Puzzle](#)

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**Q203:** You are at a party with a friend and 10 people are present including you and the friend. Your friend makes you a wager that for every person you find that has the same birthday as you, you get \$1; for every person he finds that does not have the same birthday as you, he gets \$2. Would you accept the wager?

tags: [google](#) [microsoft](#) [puzzle](#)

---

**Q204:** Given a string, with spaces, replace spaces with %20. You have extra space on the end of the string. (No additional memory and do it as close to O(n) as possible).

tags: [microsoft](#) [software](#) [programming](#) [algorithm](#) [string](#)

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**Q205:** Write the 'grow' function for a C++ vector class

tags: [microsoft](#) [software](#) [programming](#) [algorithm](#) [C++](#)

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**Q206:** How would you determine if someone has won a game of tic-tac-toe on a board of any size?

tags: [microsoft](#) [puzzle](#) [algorithm](#)

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**Q207:** The government wants cars to keep track of whether or not they are speeding. The part to determine this is already able to determine the speed of the vehicle, how would you design the rest of the system.

tags: [microsoft](#) [puzzle](#) [algorithm](#)

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**Q208:** Write a function to find the 2 biggest numbers in an array, and return the sum. How about the K biggest elements in the array, and return the sum. Do both in linear time.

tags: [microsoft](#) [software](#) [programming](#) [algorithm](#)

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**Q209:** Write a function to find the next prime number after a given number.

tags: [google](#) [microsoft](#) [software](#) [programming](#) [algorithm](#)

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**Q210:** From K sorted arrays, each of size N, how would you construct one big array, and what would the big-O of the procedure be? What if you only had memory of size 2N.

**H:** Second one can be done in  $O(KN \log K)$ .

tags: [google](#) [microsoft](#) [software](#) [programming](#) [algorithm](#)

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**Q211:** Find the nth node in an in-order search of a tree.

tags: [google](#) [microsoft](#) [software](#) [programming](#) [algorithm](#)

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**Q212:** Find the intersection of 2 sorted integer arrays. What if one of them is huge? What if one of them is so huge, it can't fit in memory. How do you minimize the number of disk seeks?

tags: [google](#) [microsoft](#) [software](#) [programming](#) [algorithm](#)

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**Q213:** How do you represent a directed graph in a relational table?

tags: [google](#) [microsoft](#) [software](#) [programming](#) [algorithm](#) [database](#) [sql](#)

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**Q214:** Given 2 strings (as character arrays) A and B, how would you determine if the characters in B were a subset of the characters in A.

tags: [google](#) [microsoft](#) [software](#) [programming](#) [algorithm](#)

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**Q215:** Given that there are about 4 billion pages indexed by Google, how would you keep from indexing the same page twice?

tags: [google](#) [microsoft](#) [software](#) [programming](#) [algorithm](#)

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**Q216:** How would you find out if a machine's stack grows up or down in memory?

**A:** Instantiate a local variable. Call another function with a local. Look at the address of that function and then compare. If the function's local is higher, the stack grows away from address location 0; if the function's local is lower, the stack grows towards address location 0. (If they're the same, you did something wrong!)

tags: [google](#) [software](#) [programming](#) [architecture](#)

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**Q217:** Implementation unbounded precision multiplication in C++.

tags: [google](#) [software](#) [programming](#) [algorithm](#) [C++](#)

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**Q218:** Write Java vector add() by using C++ Templates

tags: [google](#) [software](#) [programming](#) [algorithm](#) [C++](#) [java](#)

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**Q219:** Given a set of KEY->VALUE pairs such that each KEY is unique, describe a method of storing these pairs on disk, and a method for accessing the corresponding VALUE given a KEY. Assume that RAM is fixed at 1gb and the set of pairs requires 40gb. HINT: we are trying to minimize page-transfers

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**Q220:** Given N computers networked together, with each computer storing N integers, describe a procedure for finding the median of all of the numbers. Assume that a computer can only hold  $O(N)$  integers (i.e. no computer can store all  $N^2$  integers). Also assume that there exists a computer on the network without integers, that we can use to interface with the computers storing the integers.

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**Q221:** Given the sequence  $S1 = \{a,b,c,d,\dots,x,y,z,aa,ab,ac,\dots\}$  and given that this sequence corresponds (term for term) to the sequence  $S2 = \{1,2,3,4,\dots\}$  Write code to convert an element of S1 to the corresponding element of S2. Write code to convert an element of S2 to the corresponding element of S1.

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**Q222:** Given a binary tree with the following constraints: a) A node has either both a left and right child OR no children b) The right child of a node is either a leaf or NULL write code to invert this tree.

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**Q223:** Given a square with side length = 1, describe all points inside square that are closer to the center of the square than to the edge of the square.

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**Q224:** How many 0's are at the end of  $N!$

**H:** Look at the prime factorization of  $N!$

tags: [google](#) [puzzle](#) [algorithm](#) [math](#)

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**Q225:** Given an array  $A[\text{string}]$ , an array of strings where each string represents a word in a text document. Also given 3 search terms  $T1$ ,  $T2$ , and  $T3$  and 3 corresponding sorted sequences of integers  $S1$ ,  $S2$ ,

and S3 where each integer in Si represents an index in A where search term Ti occurred (i.e. S1, S2, and S3 contain the locations of the search terms in our array of words). Now find a minimal subarray of A that contains all of the search terms T1, T2, and T3. Extend this algorithm for an arbitrary number of search terms.

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**Q226:** [Design a data structure that supports push\(\), pop\(\), and min\(\) all in O\(1\) time](#)  
[Design a data structure that supports push\(\), pop\(\), and min\(\) all in O\(1\) time](#)

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**Q227:** There are a set of 'n' integers. Describe an algorithm to find for each of all its subsets of n-1 integers the product of its integers. For example, let consider (6, 3, 1, 2). We need to find these products :  $6 * 3 * 1 = 18$   $6 * 3 * 2 = 36$   $3 * 1 * 2 = 6$   $6 * 1 * 2 = 12$

tags: [google](#) [math](#) [puzzle](#) [programming](#) [algorithm](#)

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**Q228:** What are the variable types in perl, how can you visually identify them in code?

tags: [google](#) [software](#) [programming](#) [perl](#)

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**Q229:** What is the difference between a single-quote, a quote, and a back-tick in the shell?

tags: [microsoft](#) [programming](#) [shell](#)

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**Q230:** What is the difference between hard links and symlinks? Where might you find a hard link commonly used?

tags: [google](#) [unix](#)

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**Q231:** What do the variables \$\* and \$@ do in bash

tags: [google](#) [shell](#) [programming](#)

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**Q232:** What do you do if postfix displays an error about use when you try to start it?

tags: [google](#) [shell](#) [programming](#) [unix](#)

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**Q233:** Where are the common ports listed?

tags: [google](#) [unix](#) [networking](#)

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**Q234:** How can you check the exit status of a process?

tags: [google](#) [unix](#)

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**Q235:** How do you view the routing table?

tags: [google](#) [unix](#) [networking](#)

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**Q236:** What does the sticky bit do on a directory?

tags: [google](#) [unix](#)

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**Q237:** Name the three packets exchanged in the setup of a TCP connection. Followup: name the three packets exchanged when a client closes a TCP connection.

**A:** SYN, SYN/ACK, SYN Followup: FIN, ACK, FIN, ACK

tags: [google](#) [networking](#)

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**Q238:** How many computers can you put on a /17 network?

tags: [google](#) [networking](#)