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FAQs & Glossary CS502

Question:	**what is the proper definition of thita used in the lectures?**
Answer:	Theta (which show asymptotic notation) is a measurement tool from mathematic to measure the efficiency of algorithm.
Question:	**how can we get the values of log base to 2 in calculator.?**
Answer:	The following formula is used to calculate any base of logarithm Logb x = ln x / ln 2 e.g. for X = 1000000 and base b = 2 we calculate the value Log2 1000000 = ln 1000000 / ln 2. Log2 1000000 = 13.82 / .69 Log2 1000000 = 20.02
Question:	**what are parallel machines or parallel computers.**
Answer:	Parallel computers are the sort of computer containing more than one microprocessor.
Question:	**what is difference b/w data structure and algorithm ?**
Answer:	Algorithm An algorithm is any well-defined computational procedure that takes some values, or set of values, as input and produces some value, or set of values, as output. An algorithm is thus a sequence of computational steps that transform the input into output. Data Structure While data structure is the organization of data and define operation on that data.
Question:	**What main difference between pseudo code and language code(c++ , java)?**
Answer:	Here two space means 2D Space in which x and y coordinates are involved. Pseudo code is the english like lanugage which is used to write the program (The set of instrution in english lanugage). Where as C++, Java lanugages have their predefined grammer and you have to follow those grammer rules inorder to write usefull program in these languages
Question:	**what is difference b/w quardratic and linear**
Answer:	A linear equation with one variable is a polynomial equation of degree one—that is, of the form ax + b = 0. These are called linear equations because graphing these e ations results in straight lines. A quadratic equation in one variable is a polynomial equation of degree two—that is, of the form ax2 + bx + c = 0.
Question:	**What is the worst case for any Algorithm?diff between order n2 and nlogn algorithm ?**
Answer:	Worst-case time is the maximum running time over all (legal) inputs of size n. "n2" and "n log n" is the time take to different type of algorithm in which "n2" produce bigger value than n log n which mean the algorithm having time "n2" will take more time to run then the algorithm having time n log n, which produce less value than "n2".
Question:	**What is random access and sequential access? And what is difference ? Z = w[10]; , Z=a+b ; both are separate or not ?because the array 10 time execute and the second 1 time execute and how many time spend the both instruction? What is 2-dimension ? What is maximal point?**
Answer:	Sequential Access A method of storing or retrieving information that requires the program to start reading at the beginning and continue until it finds the desired data Random Access The ability of a computer to find and go directly to a particular storage location without having to search sequentially from the beginning location. Maximal point Given a set of n points, P = {p1, p2, . . . , pn} in 2-space a point is said to be maximal if it is not dominated by any other point in P. For more

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	detail of Maximal point please see the handouts of lecture No.2 topic "2-dimension maxima"
Question:	**measures of efficiency are just speed and space ?.**
Answer:	Efficiency means how much faster/slower an algorithm runs. Speed and space are the factors which effect on efficiency.
Question:	**what are the differences between pseudo code and algorithems**
Answer:	Pseudo code is English like language which is used to explain some sort of program or be algorithm
Question:	**what is parallel Algorithm**
Answer:	An algorithm in which more than one portion of the algorithm can be followed at one time. Parallel algorithms are usually used in multiprocessing environments
Question:	**what do u mean optimal value**
Answer:	Optimal values are such values which cause the algorithm run fast.
Question:	**what difference between the O(n log n) and and theta(n lo**
Answer:	The O-notation is used to state only the asymptotic upper bounds. While theta notation deals with the upper and lower bound of the asymptote. So O(n log n) deals with uppper asymptotic bounds while theta(n log n) deals with lower as well as upper asymptotic bound.

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abstract data type :	ata values and associated operations that are precisely specified independent of any
acyclic graph :	
adjacent edges :	two distinct edges are said be adjacent if they have at least one vertex in common
adjacent vertices :	them
Algebra :	A generalization of arithmetic in which symbols, usually letters of the alphabet, represent ified set of numbers and are related by operations that hold for
algorithm :	a step-by-step procedure for solving a problem or accomplishing some task
Analyzing Algorithm :	oblem, also some time involve the
Asymptotic analysis :	The asymptotic analysis of an algorithm determines the running time. To perform the asymptotic analysis, we find the worst-case number of primitive operations executed as a function of the input size and express this function with asymptotic notation.
Asymptotic notation :	It is a special kind of mathemaics. An important tool to analyze which algorithm is the best suited for the job
Asymptotically equal :	n - 10 log n) • n(n - 3) are all asymptotically equivalent. Because the highest order term of n in all functions is n2.√Consider the following functions : • 4n2, • (8n2 + 2n - 3), • (n2/5 +
Average case :	Its an intermediate case in best and worst case which involves some probibilties of inputs.

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	Average-case time is more difficult to compute; it is difficult to specify probability distribution on inputs.
bag :	Definition: An unordered collection of values that may have duplicates. Formal Definition: As an abstract data type, a bag has a single query function, numberIn(v, B), which tells how many copies of an element are in the bag, and two modifier functions, add(v, B) and remove(v, B). These may be defined with axiomatic semantics as follows. new() returns a bag numberIn(v, new()) = 0 numberIn(v, add(v, B)) = 1 + numberIn(v, B) numberIn(v, add(u, B)) = numberIn(v, B) if v ≠ u remove(v, new()) = new() remove(v, add(v, B)) = B remove(v, add(u, B)) = add(u, remove(v, B)) if v ≠ u where B is a bag and u and v are elements. The predicate isEmpty(B) may be defined with the following additional axioms. isEmpty(new()) = true
Best case :	thm is minimum to process an
Big-oh notation :	asymptotic behavior of functions. More exactly, it is used to describe an asymptotic upper bound for the magnitude of
Close form expression :	A non recursive form of an expression is called Closed Form Expressions used for
Compiler :	language into machine
complete graph :	
connectedness :	describes a graph in which for any given vertex in the graph, all the other vertices are
cycle (or circuit) :	
data structure :	An organization of information, usually in memory, for better algorithm efficiency, such as al unity, such as the name and address of a person. It may include redundant information, such as length of the list or number
decimal system :	1. A number system based on units of 10. 2. A system of measurement in which all derived
degree of a vertex :	
digraph (or directed graph) :	
distance :	the length of a minimum path length from one specific vertex to another vertex.
Divide and Conquer Technique :	The idea behind this technique is to take a problem on a large input, break the input into smaller pieces, solve the problem on each of the small pieces, and then combine the piecewise solutions into a global solution. It consist of three parts, Divide: the problem into a small number of pieces Conquer: solve each piece by applying divide and conquer to it recursively

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	Combine: the pieces together into a global solution.
Dominated term :	If there are two points p and q in a set, now p is said to be dominated term if and only if p.x <= q.x and p.y <= q.y.
Dominating term :	If there are two points p and q in a set, now q is said to be dominating term if and only if p.x <= q.x and p.y <= q.y.
edge (or arc) :	a connection made between two vertices in a graph
Efficient Algorithm :	Efficient algorithms are those algorithm which take minimum resources w. r. t. time and storage to process a legal set of inputs.
elementary cycle :	a cycle through a graph that does not visit any vertex more than once
elementary path :	a path in which all the vertices are distinct
Factorial Time Algorithm :	Factorial time algorithms are almost always impractical. The number of steps required to complete the algorithm becomes very large very quickly as the size of the input grows.
Function :	A computation which takes some arguments or inputs and yields an output. Any particular input yields the same output every time. More formally, a mapping from each element in the domain to an element in the range. (2) A subroutine which returns a value.
Generic machine :	It is an ideal machine which is independent of all complexities of hardware and software, used to check the performance of an algorithm, also called RAM.
graph :	consists of a set of vertices and a set of edges
incident :	an edge that joins two specified vertices is said to be incident to them
indegree :	the number of edges terminating in a given node in a directed graph
inefficient algorithm :	Inefficient algorithms are those algorithm which take maximum resources w. r. t. time and storage to process a legal set of inputs.
Input instance :	A unique set of legal inputs is called an input instance.
isolated vertex :	a vertex of degree zero (no edges going in or out of it)
Iteration Method to solve recurrence relation :	In this method we simply continue to substitute back until we see a pattern of some sort. We then deduce a formula from the pattern. Once we discover a likely formula we prove that the formula actually solves the relation.
length :	the number of edges appearing in the sequence of a path
loop (or sling) :	where an edge joins a vertex to itself
Lower bound :	It is the lower limit of growth rate that an algorith may have also, what is the best that can happen for a given data size. This is represented by Big-omega notation.
Maximal point :	A pint p is said to be maximal if it is not dominated by any other point in the same set where p exist.
Merge sort :	A divide and conquer technique based algorithm that combines several sorted (input) lists into a single sorted (output) list. It is an nlog n algorithm.
minimum path	the path of minimum length between two vertices that are reachable from one another

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length :	
mixed graph :	a graph that consists of both directed and undirected edges
model of computation :	A formal, abstract definition of a computer. Using a model one can more easily analyze the intrinsic execution time or memory space of an algorithm while ignoring many implementation issues. There are many models of computation which differ in computing power (that is, some models can perform computations impossible for other models) and the cost of various operations.
multigraph :	a graph with multiple edges between the same vertices
null graph (or totally-disconnected graph) :	a graph that contains only isolated vertices (a graph with no edges)
Omega notation :	This notation is a mathematical notation used to describe the asymptotic behavior of functions . More exactly, it is used to describe an asymptotic lower bound only.
outdegree :	the number of edges originating from a given vertex in a directed graph
parallel :	where there is more than a single edge connecting two given vertices
parallel processing :	A method of processing that can run only on a type of computer containing two or more processors running simultaneously. Parallel processing differs from multiprocessing in the way a task is distributed over the available processors. In multiprocessing, a process might be divided up into sequential blocks, with one processor managing access to a database, another analyzing the data, and a third handling graphical output to the screen. Programmers working with systems that perform parallel processing must find ways to divide a task so that it is more or less evenly distributed among the processors available
path :	a sequence of edges that begins at an initial vertex and ends at a terminal vertex
Random access machine :	A model of computation whose memory consists of an unbounded sequence of registers, each of which may hold an integer. In this model, arithmetic operations are allowed to compute the address of a memory register.
reachability :	describes a relationship between two vertices in which one vertex is reachable from the other via a path
recurrence relation :	Recurrence relation is a recursively defined function (an equation which is defined in terms of itself.). Divide-and-conquer is an important design technique, and it naturally gives rise to recursive algorithms. Recurrence relation is used to express time complexity of a recursive algorithm.
Running Time :	Time taken by an algorithm during execution called running time.
set :	Definition: An unordered collection of values where each value occurs at most once. A group of elements with three properties: (1) all elements belong to a universe, (2) either each element is a member of the set or it is not, and (3) the elements are unordered. Formal Definition: As an abstract data type, a set has a single query function, isIn(v, S), which tells whether an element is a member of the set or not, and two modifier functions, add(v, S) and remove(v, S).

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	These may be defined with axiomatic semantics as follows. new() returns a set isIn(v, new()) = false isIn(v, add(v, S)) = true isIn(v, add(u, S)) = isIn(v , S) if v ≠ u remove(v, new()) = new() remove(v, add(v, S)) = remove(v, S) remove(v, add(u, S)) = add(u, remove(v, S)) if v ≠ u where S is a set and u and v are elements. The predicate isEmpty(S) may be defined with the following additional axioms. isEmpty(new()) = true isEmpty(add(v, S)) = false Generalization (I am a kind of ...)
Sieve technique :	It's a divide and conquer based technique that applies to problems where we are interested in finding a single item from a larger set of n items. Like to fine kth element in a set.The sieve technique works in phases.
simple graph :	a graph that contains no loops or parallel edges
strongly-connected :	describes the connectedness of a simple directed graph in which, for any two vertices, both vertices are reachable from the other
subgraph :	if every edge of graph A is also an edge of graph B, then graph A is a subgraph of graph B
terminal vertex (or endpoint) :	a vertex of degree one
total degree :	the sum of the indegree and outdegree of a vertex
transport network :	a connected, directed graph (with no self loops) that has only one vertex of indegree zero (the source), and one vertex of outdegree zero (the sink). Each edge is associated to a number which represents the limit to the rate of transportation of the product (called the capacity).
tree :	a connected graph in which there is only one path connecting each pair of vertices
undirected graph :	a graph in which every edge is undirected
unilaterally-connected :	describes the connectedness of a simple directed graph in which, for any two vertices, at least one vertex is reachable from the other of the pair
Upper bound :	It is the upper limit of growth rate that an algorith may have a what is the worst that can happen for a given data size. This is represented by Big-oh Asumptotic notation.
vertex :	a point or node in a graph
weakly-connected :	describes the connectedness of a simple directed graph in which the direction of the edges is
weight :	a number assigned to an edge
weighted graph :	a connected graph in which a positive real number has been assigned to each edge
worst case :	A scenario in which cost (possible use of resources) of an algorithm is maximum to process an input sequence called worst case

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