

DS VIVA QUESTIONS AND ANSWERS

1) What is data structure?

Data structures refer to the way data is organized and manipulated. It seeks to find ways to make data access more efficient. When dealing with data structure, we not only focus on one piece of data, but rather different set of data and how they can relate to one another in an organized manner.

2) Differentiate file structure from storage structure.

Basically, the key difference is the memory area that is being accessed. When dealing with the structure that resides the main memory of the computer system, this is referred to as storage structure. When dealing with an auxiliary structure, we refer to it as file structures.

3) When is a binary search best applied?

A binary search is an algorithm that is best applied to search a list when the elements are already in order or sorted. The list is search starting in the middle, such that if that middle value is not the target search key, it will check to see if it will continue the search on the lower half of the list or the higher half. The split and search will then continue in the same manner.

4) What is a linked list?

A linked list is a sequence of nodes in which each node is connected to the node following it. This forms a chain-like link of data storage.

5) How do you reference all the elements in a one-dimension array?

To do this, an indexed loop is used, such that the counter runs from 0 to the array size minus one. In this manner, we are able to reference all the elements in sequence by using the loop counter as the array subscript.

6) In what areas do data structures applied?

Data structures are important in almost every aspect where data is involved. In general, algorithms that involve efficient data structure is applied in the following areas: numerical analysis, operating system, A.I., compiler design, database management, graphics, and statistical analysis, to name a few.

7) What is LIFO?

LIFO is short for Last In First Out, and refers to how data is accessed, stored and retrieved. Using this scheme, data that was stored last, should be the one to be extracted first.

This also means that in order to gain access to the first data, all the other data that was stored before this first data must first be retrieved and extracted.

8) What is a queue?

A queue is a data structures that can simulates a list or stream of data. In this structure, new elements are inserted at one end and existing elements are removed from the other end.

9) What are binary trees?

A binary tree is one type of data structure that has two nodes, a left node and a right node. In programming, binary trees are actually an extension of the linked list structures.

10) Which data structures is applied when dealing with a recursive function?

Recursion, which is basically a function that calls itself based on a terminating condition, makes use of the stack. Using LIFO, a call to a recursive function saves the return address so that it knows how to return to the calling function after the call terminates.

11) What is a stack?

A stack is a data structure in which only the top element can be accessed. As data is stored in the stack, each data is pushed downward, leaving the most recently added data on top.

12) Explain Binary Search Tree

A binary search tree stores data in such a way that they can be retrieved very efficiently. The left subtree contains nodes whose keys are less than the node's key value, while the right subtree contains nodes whose keys are greater than or equal to the node's key value. Moreover, both subtrees are also binary search trees.

13) What are multidimensional arrays?

Multidimensional arrays make use of multiple indexes to store data. It is useful when storing data that cannot be represented using a single dimensional indexing, such as data representation in a board game, tables with data stored in more than one column.

14) Are linked lists considered linear or non-linear data structures?

It actually depends on where you intend to apply linked lists. If you based it on storage, a linked list is considered non-linear. On the other hand, if you based it on access strategies, then a linked list is considered linear.

15) How does dynamic memory allocation help in managing data?

Aside from being able to store simple structured data types, dynamic memory allocation can combine separately allocated structured blocks to form composite structures that expand and contract as needed.

16) What is FIFO?

FIFO is short for First-in, First-out, and is used to represent how data is accessed in a queue. Data has been inserted into the queue list the longest is the one that is removed first.

17) What is an ordered list?

An ordered list is a list in which each node's position in the list is determined by the value of its key component, so that the key values form an increasing sequence, as the list is traversed.

18) What is merge sort?

Merge sort takes a divide-and-conquer approach to sorting data. In a sequence of data, adjacent ones are merged and sorted to create bigger sorted lists. These sorted lists are then merged again to form an even bigger sorted list, which continues until you have one single sorted list.

19) Differentiate NULL and VOID.

Null is actually a value, whereas Void is a data type identifier. A variable that is given a Null value simply indicates an empty value. Void is used to identify pointers as having no initial size.

20) What is the primary advantage of a linked list?

A linked list is a very ideal data structure because it can be modified easily. This means that modifying a linked list works regardless of how many elements are in the list.

21) What is the difference between a PUSH and a POP?

Pushing and popping applies to the way data is stored and retrieved in a stack. A push denotes data being added to it, meaning data is being "pushed" into the stack. On the other hand, a pop denotes data retrieval, and in particular refers to the topmost data being accessed.

22) What is a linear search?

A linear search refers to the way a target key is being searched in a sequential data structure. Using this method, each element in the list is checked and compared against the target key, and is repeated until found or if the end of the list has been reached.

23) How does variable declaration affect memory allocation?

The amount of memory to be allocated or reserved would depend on the data type of the variable being declared. For example, if a variable is declared to be of integer type, then 32 bits of memory storage will be reserved for that variable.

24) What is the advantage of the heap over a stack?

Basically, the heap is more flexible than the stack. That's because memory space for the heap can be dynamically allocated and de-allocated as needed. However, memory of the heap can at times be slower when compared to that stack.

25) What is a postfix expression?

A postfix expression is an expression in which each operator follows its operands. The advantage of this form is that there is no need to group sub-expressions in parentheses or to consider operator precedence.

26) What is the difference between the HEAP and the STACK?

(Solution: HEAP is used to store dynamically allocated memory (malloc). STACK stores static data (int, const).)

27) Where in memory are HEAP and the STACK located relative to the executing program?

(Solution: The STACK and HEAP are stored "below" the executing program. The HEAP "grows" toward the program executable while the STACK grows away from it.)

28) Describe the data structures of a double-linked list.

(Solution: A double-linked list structure contains one pointer to the previous record in the list and a pointer to the next record in the list plus the record data.)

29) How do you insert a record between two nodes in double-linked list?

(Solution: Previous R; Data R; Next R; To insert a record (B) between two others (A and C): Previous.B = A; Next.B = C; Next.A = B; Previous.C = B;)

30) In which data structure, elements can be added or removed at either end, but not in the middle?

(Solution: queue)

31) Which one is faster? A binary search of an ordered set of elements in an array or a sequential search of the elements.

(Solution: binary search)

32) What is a balanced tree?

(Solution: A binary tree is balanced if the depth of two subtrees of every node never differ by more than one)

33) Which data structure is needed to convert infix notations to post fix notations?

(Solution: stack)

34) What is data structure or how would you define data structure?

(Solution: In programming the term data structure refers to a scheme for organizing related piece of information. Data Structure = Organized Data + Allowed Operations.)

35) Which data structures we can implement using link list?

(Solution: queue and stack)

36) List different types of data structures?

(Solution: Array, Link list, queue, stack, trees, files, graphs)

37) Define a linear and non linear data structure.

Linear data structure: A linear data structure traverses the data elements sequentially, in which only one data element can directly be reached. Ex: Arrays, Linked Lists
Non-Linear data structure: Every data item is attached to several other data items in a way that is specific for reflecting relationships. The data items are not arranged in a sequential structure. Ex: Trees, Graphs