

Assignment No (1)

Name:		Date	
Topic:		Lecture No:	

Answer all of the following questions:

Question 1:

Define each of the followings give example for each:

- Data item, Group item, An Entity, An Entity set, Field, Records, Files, Primary key.

Question 2: Compare between: fixed-length record and variable-length record.

Question 3: Compare between: data base and data structure.

Question 4: Give a brief description of (a) traversing, (b) sorting, (c) searching, (d) inserting and (e) deleting.

Question 5: List examples of linear data structures.

Question 6: Briefly describe the notions of (a) the complexity of an algorithm and (b) the space-time trade-off of algorithms.

Question 7:

A professor keeps a class list containing the following data for each student:

Name, Major, Student Number, Test Scores, Final Grade

- State the entities, attributes and entity set of the list.
- Describe the field values, records and file.
- Which attributes can serve as primary keys for the list?

Question 8:

A hospital maintains a patient file in which each record contains the following data:

Name, Admission Date, Social Security Number, Room, Bed Number, Doctor

- Which items can serve as primary keys?
- Which pair of items can serve as a primary key?
- Which items can be group items?

Question 9:

Which of the following data items may lead to variable-length records when included as items in the record: (a) age, (b) sex, (c) name of spouse, (d) names of children, (e) education, (f) previous employers?

Question 10:

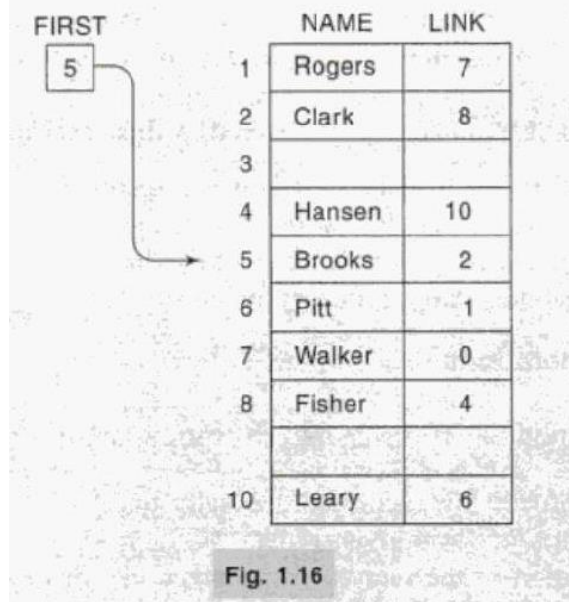
Consider the linear array NAME in Fig. 1.15, which is sorted alphabetically.

- (a) Find NAME[2], NAME[4] and NAME[7].
- (b) Suppose Davis is to be inserted into the array. How many names must be moved to new locations.
- (c) Suppose Gupta is to be deleted from the array. How many names must be moved to new locations?

NAME	
1	Adam
2	Clark
3	Evans
4	Gupta
5	Jones
6	Lane
7	Pace
8	Smith

Question 11:

Consider the linear array NAME in Fig. 1.16. The values of FIRST and LINK[K] in the figure determine a linear ordering of the names as follows. FIRST gives the location of the first name in the list, and LINK[K] gives the location of the name following NAME[K], with 0 denoting the end of the list. Find the linear ordering of the names.



Question 12:

Consider the algebraic expression $(7x + y)(5a - b)^3$. (a) Draw the corresponding tree diagram as in Example 1.5. (b) Find the scope of the exponential operation. (The scope of a node v in a tree is the subtree consisting of v and the nodes following v .)

Question 13:

The following is a tree structure given by means of level numbers as discussed in Example 1.4:

01 Employee 02 Name 02 Number 02 Hours 03 Regular 03 Overtime 02 Rate
Draw the corresponding tree diagram.

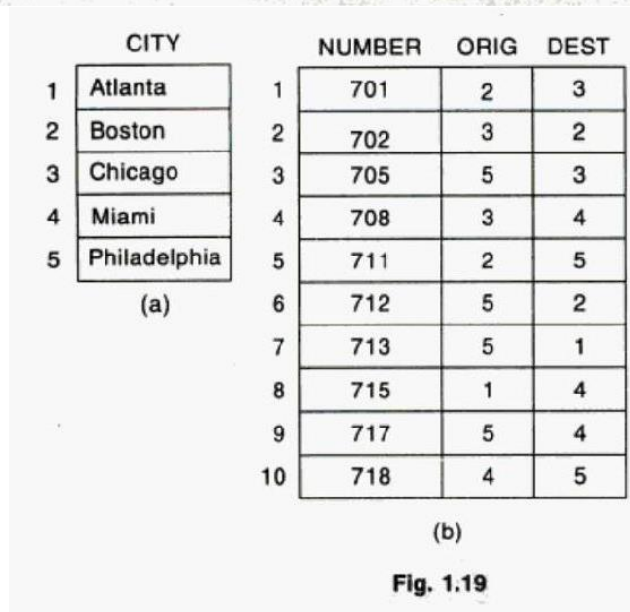
Question 14:

Discuss whether a stack or a queue is the appropriate structure for determining the order in which elements are processed in each of the following situations.

- (a) Batch computer programs are submitted to the computer center.
- (b) Program A calls subprogram B which calls subprogram C, and so on.
- (c) Employees have a contract which calls for a seniority system for hiring and firing.

Question 15:

The daily flights of an airline company appear in Fig. 1.19. CITY lists the cities, and ORIG[K] and DEST[K] denote the cities of origin and destination, respectively, of the flight NUMBER[K]. Draw the corresponding directed graph of the data. (The graph is directed because the flight numbers represent flights from one city to another but not returning.)



Question 16:

Suppose a data set S contains n elements.

- (a) Compare the running time T_1 of the linear search algorithm with the running time T_2 of the binary search algorithm when (i) $n = 1000$ and (ii) $n = 10\,000$.
- (b) Discuss searching for a given item in S when S is stored as a linked list.

Question 17:

Consider the data in Fig. 1.19, which gives the different flights of an airline. Discuss different ways of storing the data so as to decrease the time in executing the following:

- (a) Find the origin and destination of a flight, given the flight number.
- (b) Given city A and city B, find whether there is a flight from A to B, and if there is, find its flight number.

Question 18:

MULTIPLE CHOICE QUESTIONS

- 1.1 _____ refers to a single unit of values.
(a) Group item (b) Data item
(c) Elementary item (d) Basic item
- 1.2 A _____ is something that has certain attributes or properties which may be assigned values.
(a) Field (b) Record
(c) Entity (d) File
- 1.3 _____ is the collection of records of the entities in a given entity set.
(a) Field (b) Record
(c) Entity (d) File
- 1.4 The value in a _____ field uniquely determines the record in a file.
(a) Primary key (b) Secondary key
(c) Key (d) Pointer
- 1.5 In _____ length records, file records may contain different lengths.
(a) Fixed (b) Primary
(c) Variable (d) Entity
- 1.6 _____ is the logical or mathematical model of a particular organization of data.
(a) Structure (b) Variable
(c) Function (d) Data Structures
- 1.7 Which of the following is not a primitive data structure?
(a) Boolean (b) Integer
(c) Arrays (d) Character
- 1.8 Which of the following is a non-linear data structure?
(a) Array (b) Linked List
(c) Stack (d) Graph
- 1.9 _____ is also called last-in-first-out (LIFO) system
(a) Queue (b) Stack
(c) Graph (d) Tree
- 1.10 _____ is also called first-in first-out (FIFO) system.
(a) Tree (b) Stack
(c) Queue (d) Graph
- 1.11 Which of the following operations accesses each record exactly once so that certain items may be processed?
(a) Inserting (b) Deleting
(c) Traversing (d) Searching
- 1.12 _____ is a data structure that contains a relationship between a pair of elements, which is not necessarily hierarchical in nature.
(a) Tree (b) Graph
(c) Array (d) String
- 1.13 _____ involves arranging the records in a logical order.
(a) Merging (b) Sorting
(c) Traversing (d) Searching
- 1.14 _____ is a set of data values and associated operations that are specified accurately, independent of any particular implementation.
(a) Stack
(b) Tree
(c) Abstract Data Type
(d) Graph
- 1.15 Which of the following operations combine records in two different sorted files into a single sorted file?
(a) Inserting (b) Sorting
(c) Searching (d) Merging