

# Document Details

---

Name: Problem Based Learning - DSA

Prepared by, Prof. Jigar M. Pandya

Assistant Professor, Computer Engineering Department.  
FoT.

D.D.University. Nadiad. Gujarat. India.

[jigarpandya.ce@ddu.ac.in](mailto:jigarpandya.ce@ddu.ac.in)

3rd July, 2018.

Version 1.0

# Problem Based Learning

Data structures and Algorithms

- Name Data Structure/s
- Mention Operations
- Provide Reasoning

1. Devotee is on the way to the Himalayan. Devotee is collecting gifts for the God from cities he travels through. He wishes to present all the gifts in the order of the nearest city from the Himalayan to the farthestmost (i.e. Devotee's hometown) believing that the God will have more interest in his (God's) neighbourhood items. However, the God is asking him to present in the order he bought them. Help devotee via providing solution.
2. A shop keeper wants to take benefit by implementing locality of reference in his shop. Whichever item is sold; he moves the bunch towards front of shop, assuming that another or same customer will have turned in again for the same item. [Of course assuming those which are not sold will be transferred towards rear automatically in the process.] Help shop keeper to manage the references to the items.
3. The digital piano software is required to record the play. Know that each key has a vocal associated. Recorder does not want to store details of vocal every time the key is pressed, instead just store the key ids. All keys' vocal with key ids and details are separate storage. Help the software developer to achieve the task.
4. A wise but worried old man having lot of money wants to manage his nominees (whoever serves him). He has a rule saying amongst many nominees, each will get their share based on the service they provide to him when he is about to die. He wishes to have the details available from the highest share to

lowest with nominee name in no time (ready available all the time/anytime). Help the old man devise the solution.

5. A sport team coach is willing to record players' performances based on everyday activities. Not all players will participate in all activities. He has identified players with code and adds a point to respective code data upon any successful performance. He wants to perform the operation of locating the player current data as soon as possible. Guide the coach design and implement his way to do.
6. Knowing that the entries in the event is limited by capacity; The game organizer Mark is planning to record the data such a way that when he is looking for the information it shall be achieved as earliest as possible. But Mark also wants to record this information year by year going forward and of course he does not know for how many next years he or successors/descendants will be required to continue this. Help Mark design information storage and processing so that his present and future needs fulfils.
7. A person can advance in his life if he continues efforts. Many times the current work look like a waste. But in the future sometime, he realizes that most of the work connects. Represent all the experience points and establish connections. Know that an experience may connect to more than one another experiences when he looks back. Help this person to visualize the life experiences.
8. A manager wants to maintain employees' records. But he realizes that these records can be ordered multiple ways. i.e. by salary, by city, by date of birth, etc. And the new employees will join while few will be retired or dismissed or have resigned. Manage is willing to use his brain like a computer. i.e. new and old, all information persists. Propose solution to the manager, which he can not just deny acceptance of.

9. A business man in the field of construction has lot many sites at hand. He always focuses on sites based on revenue generated. Whenever any site finishes his record will remove it but then the next higher revenue is now focused the highest. Help business man to be able to popup the sites inherently.
10. A computer company is required to balance the load of website requests amongst multiple servers in the background. Moreover, when upgrade of software is due, company needs to take a call and follow upgrade to all servers. But company has this challenge of client support 24x7 (website servicing 24X7). How does the company achieve it all.
11. A chief account maintains 10 accountants for keeping the expenses noted. All the 10 accountants themselves need to be doing it smart fully and whenever chief accountant expect individual report it shall be made available in readable/orderly format. At the end of year, chief accountant need to combine all of those 10 dataset and come up with an all in one report. Again, it needs to be in readable/orderly format. Assist all stake holders to perform their duties.
12. An international airport is required to support arrival and departure of flights. Provided the airport has many terminals and each terminal has many gates, a day long support is critical. Assuming the similar pattern of arrival and departure continues day by day, assist the management to plan a day. Know that there will be a day when opening of a new gate or new terminal with multiple gates is announced. Management need to be elastically supporting the same.
13. The channel through which data flow is happening supports exactly 5 digits long number as outcome. The receiver need to provide sorted list to end user as and when approached. Assume that receiver is your friend, how will you help him for the task so that he can spend more time with you.

- 14.** A football tournament is due next year. Participant Teams are required to be registered. Also the schedule of competition needs to be worked out. As per schedule, statistics will be recorded. Know that the competition is based on the total participating teams hierarchically. But the total number of teams may not be fixed because participation itself is live i.e. on the go - any time even during tournament. Minimizing the number of games overall is the goal to control budget. Do the needful.
- 15.** Social friendly site is required to support users. Friend of a friend can be considered as a friend only but up to two levels. Anytime diagrammatize the network by coloured groups.