



# **DATA STRUCTURES AND ALGORITHMS**

**(J-COMPONENT)**

## **HOSPITAL MANAGEMENT SYSTEM**

**USING LINKED LISTS**

### **AUTHORS:**

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This is a project in C programming language. Hospital management system project is just a console application without graphics which uses Data Structure Concept. The key features in hospital management system are:

1. Add new patient record:

In this feature, user can add a new patient record choosing between O.P.D. service and Emergency service. In O.P.D. service (shown in output screen below), name, address, age, sex, disease description and specialist room number to be referred are available. Thus given information is stored in file. The information to be given are same in Emergency service.

2. Search or edit patient record:

In this project, two features – searching and editing patient records are placed under a single feature. User can search or edit via. record number of the patient or his/her full name.

All the information corresponding to the respective patient are displayed. These include the ones provided while adding a new patient record. If wrong information about record number or patient full name is provided, the program displays a message saying that no records were available.

Also, user can view the list of expenditures of the particular patient whose record is sought. In the program, the financial information include total charge, total deposited and total money to return.

### 3. Doctors profile:

In hospital management system, users can list doctors list by choosing any one of the given options listed below:

Records of doctors in seniority level

Records of doctors timings

Records of doctors doing surgeries or not As mentioned above users can view the doctors list according to there department of consultation.And they can know the doctors available for there problems according to the doctors degree or post and his timings.

4. List record of doctors, staffs according to their increasing id. Doctors and staffs are allowed to choose their own id .

### 5. List of other records:

In hospital management other records like ambulance records, medicines or drugs lists, staff records, etc. are there.

The users can get these records easily by this management system.

This program is completely based on **Linked List** Abstract Data Type. All the operations like searching, sorting, modifying, etc. all are done using **Linked List** operations.

- 1) Four structures are created for storing the records of doctors, medicine list, patients records and staffs records.
- 2) Every time the user has to enter new data, he/she can select the insertion option displayed in the action menu and perform the required actions.
- 3) Similarly, in order to delete the data of a retired doctor or staff the user can delete the data of the staff, doctor and update the data in the hospital database.
- 4) The doctors and staff can make choice of their own id, if the id already exists there is error prompt showing that the id already exists and asks for a different id from the user.
- 5) The code also has a feature for searching the doctor of the patients choice in the hospital, using the doctor's id.
- 6) If the doctor of that id is not available or does not exist in the records then an error is displayed saying that " Invalid Id ".
- 7) The database can be regularly updated by modifying the data i.e., adding or deleting data to the doctor, staff and patient database.
- 8) If there is a new user and wants the data of all the doctors working in the hospital and their specializations, he/she can make use of the "Total display" program to have a view of details of all the available doctors and staffs.
- 9) The hospital management system also provides one the feature of checking the availability of medicine and drugs, rate card of medicines and the expiry date of the medicines, which in-turn helps to keep the medicinal storage updated.
- 10) The linked list implementation in this hospital management system allows to automatically arrange the data in-order of their ID and print it in the similarly way.

- 11) The input data is taken randomly from the user, irrespective of the order. This makes the data unsorted. And hence, the implementation of linked lists plays a role here by sorting it in an optimal time.
- 12) Linked list provides the hospital management system an upper-hand in utilizing the memory resources when compared to the arrays.
- 13) In arrays, the data is stored in sequential order, and hence it requires a memory that has the space equal to the array size as defined in the same location. Whereas, in Linked lists the data is inter-related since every node has the address of the succeeding node, the data can be stored randomly in the memory storage wherever there is availability of space.
- 14) As stated in the previous point, linked list helps the hospital management system make use of the available memory space and avoid memory wastage.
- 15) This feature of linked list that makes efficient usage of the available memory makes it a suitable data structure that is to be used for a database management implementation.
- 16) Once the data is deleted from the database, the memory space is released.
- 17) In array, once the data is deleted from in-between, the memory space remains unused and gets wasted. Whereas, in linked lists, if the data is deleted from in between the list the memory location freed and is used for further storage of data.
- 18) The amount can be easily be calculated by accessing the node of the patient whose bill is to be calculated and hence linked list makes it easier to search, access, manipulate and calculate the amount efficiently and accurately.
- 19) Since linked list is dynamic data type and its size is not pre-defined, any amount of data can be stored making it efficient for a hospital management project.
- 20) The data of all the previously admitted and discharged patients is always available in the hospital management database.
- 21) The patient can be searched only using his/her name. this helps to maintain the privacy of the patient by not disclosing the name of patient

when searched for patients searching for a common disease. For example: A patient suffering from HIV-AIDS does not want to disclose his/her disease and hence hospital management system does not displays the name of the patients when searched using their disease as the key for searching. Therefore, safeguarding the privacy of the patients.

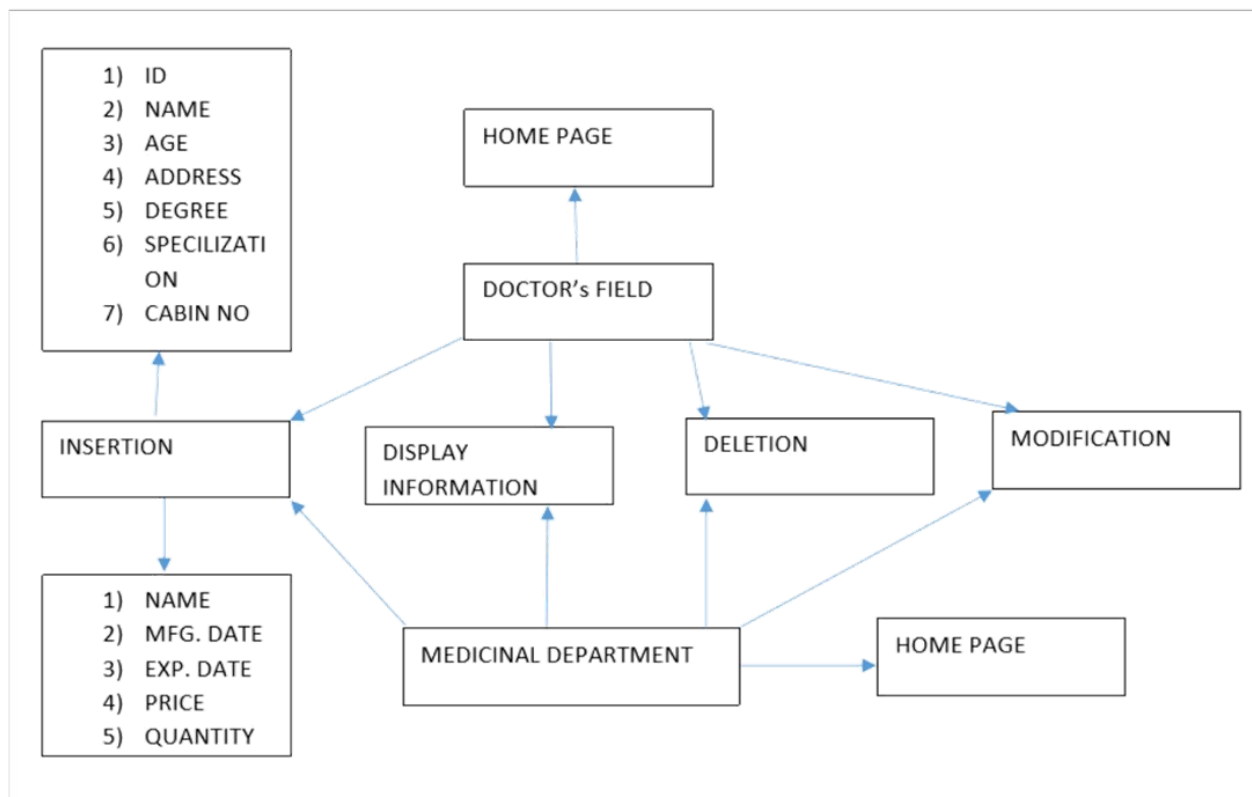
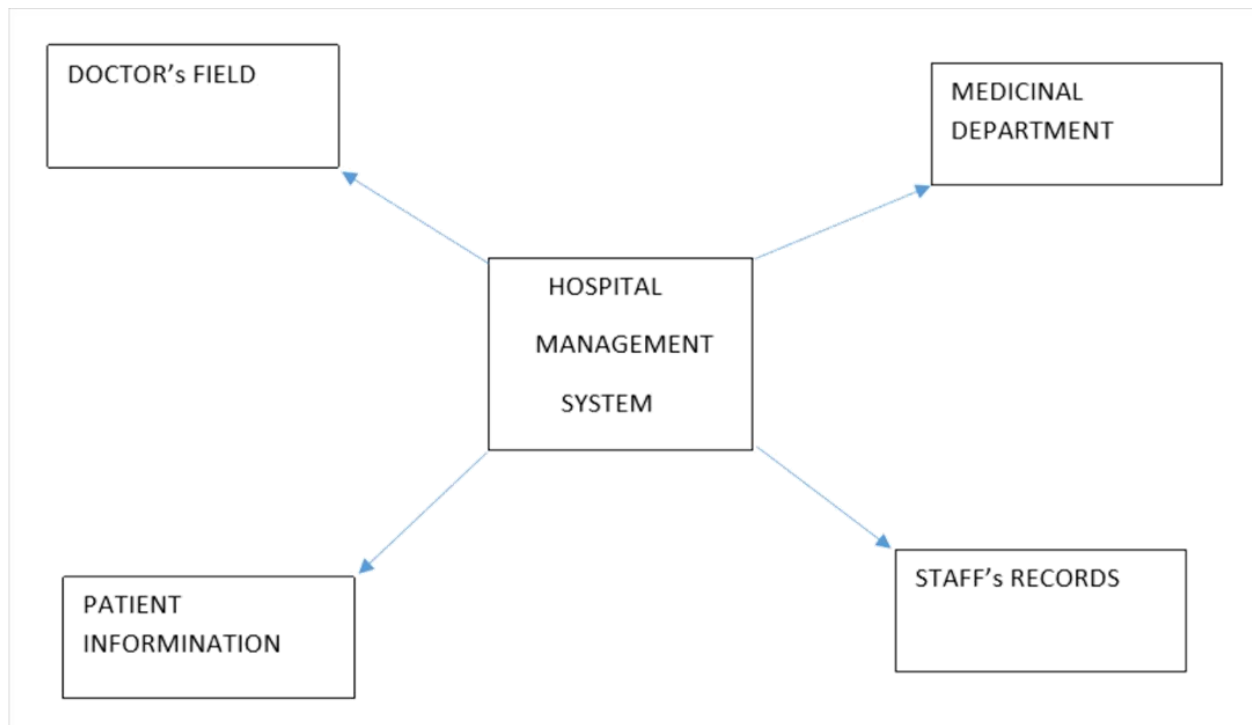
- 22) This system also helps to calculate the total payable amount by the patient based on the number of days stay by the patient, the medicinal charges and the disease he/she is suffering.

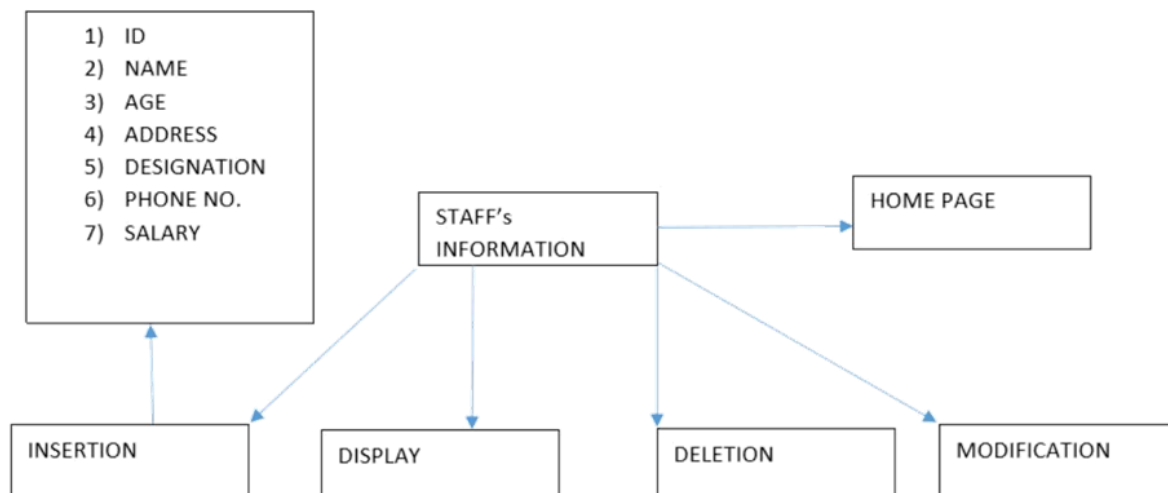
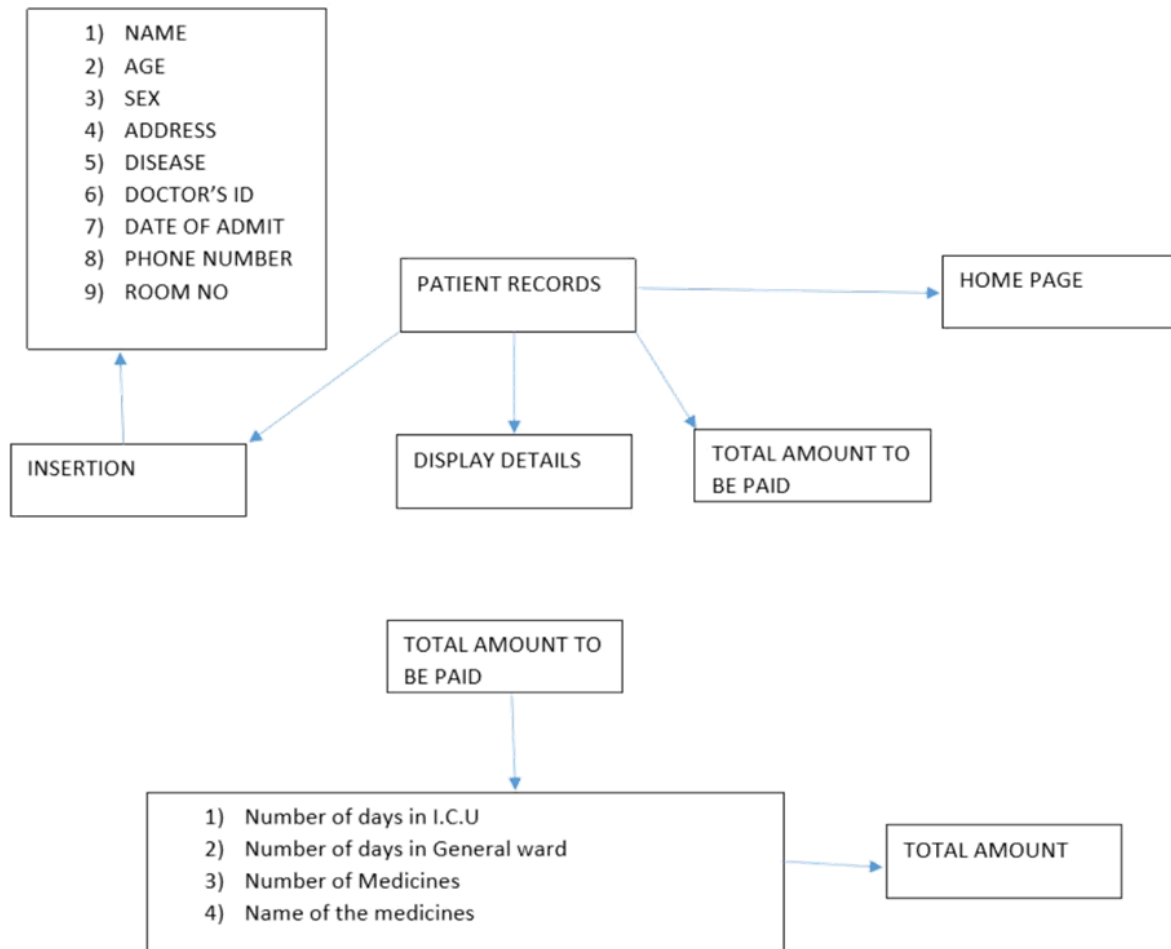
#### ADVANTAGE OF LINKED LISTS OVER ARRAYS:

- The size of the arrays is fixed: So we must know the upper limit on the number of elements in advance. Also, generally, the allocated memory is equal to the upper limit irrespective of the usage, and in practical uses, upper limit is rarely reached.

LINKED LISTS	ARRAYS
1) Memory utilization is very high in linked list.	Memory wastage is more. Due to static memory. And setting a dynamic array is a tedious process.
2) Inserting or deleting nodes from a linked list is very easy at any place of the linked list.	Inserting and deleting in-between of the array is a difficult task.
3) And data can be dis-similar types.	All data is of the same type.
4) capable of changing size at runtime according to the needs of the program	an array is simply a pre-allocated block of data elements. Once allocated at compile/link time its size can never be changed.

## BLOCK DIAGRAM OF HOSPITAL MANAGEMENT SYSTEM







Software used: Dev C++

The home page will allow the user to select one fields out of the given fields.

```

                                HOSPITAL MANAGEMENT SYSYTEM
Choose the option:
1) Doctor
2) Medicine Dept.
3) patient
4) Staff
5) Exit.

Enter the option:
```

Out of the given field, user will choose any options.

But if user give value other than the 1-5 then it will show invalid input.

i.e

```

                                HOSPITAL MANAGEMENT SYSYTEM
Choose the option:
1) Doctor
2) Medicine Dept.
3) patient
4) Staff
5) Exit.

Enter the option: 9

Invalid Input
```

And program will ask for correct input.

An infinite loop is working here will continue to ask for input unless user give a valid input.

### 1) Doctor Field:

After opening the field , it will ask for the different categories, i.e

```
DOCTOR's FIELD
1) Enter Doctor's Details
2) Display Doctor's Dtails
3) Delete the Record
4) Records Modification
5) Display doctor's name and id
6) exit

Enter the option:
```

Here, different categories are mentioned as

- 1) Enter Doctor's Details
- 2) Display Doctor's Details
- 3) Delete the record
- 4) Records modification
- 5) Display doctor's name and id
- 6) Exit function to reach home page

### 1) Enter Doctor's Details

```
Enter the details:
Doctor's id(3 digits): 123
Name: SHUBHAM GUPTA
Age: 23
Address: B. K. DUTTA LANE, New Jakkanpur, Patna-1
Degree: M.B.B.S
Speciliaziton Details: Heart Disease Problems
Cabin no: 121
Timming: 11 am to 4 pm

Do You add more(Y/N): Y
```

After entering the details , it will to add more or not. If yes, it will add more values otherwise it will move to main menu.

### I. **Display Doctor's Details**

Here user will get two options:

- a) To display details for selected id
- b) To display details for all ids

```
DOCTORS INFORMATION
1) to display selected id
2) for total display:
Choose the option:
```

On selecting 2<sup>nd</sup> option, it will display details all the doctors.

```
Details of Given id

Name: Kumar Abhishek
Id: 14
Age: 29
Address: Vellore
Degree: M.B.B.S
Specialization: Stomach problems
Cabin number: 122
Timing: 12 am to 4 pm

Name: SHUBHAM GUPTA
Id: 123
Age: 23
Address: B. K. DUTTA LANE,New Jakkanpur,Patna-1
Degree: M.B.BS
Specialization: Heart Disease Problems
Cabin number: 121
Timing: 11 am to 4 pm
```

**Note:** A program is here working whose aim is to arrange the details according to ids in increasing order.

## II. Delete the Records.

```
Enter the id which u want to delete:
```

If invalid id is given it, will show error

```
Invalid Input
```

## III. Record's modification

```
Enter the id: 124
Invalid Input
Do u want to modiify more(Y/N): Y
Enter the id: 123
Name: Shubahm
Age: 29
Address: VARANASI
Degree: M.B.B.S
Speciliaziton Details: Lungs related diseases
Cabin no: 126
Timming: 11 am to 3 am
```

## IV. Display doctor's name and id

It is an additional feature added to the program to allow the user to see all the name and id in a single list in increasing order of id

```
Id = 14      Name: Kumar Abhishek
Id = 123     Name: Shubahm
```

## V. Exit function to go to the home screen

## 2) Medicine field:

Here also the same things where user is asked to choose fields as per requirement.

```
MEDICINE INFORMATION
1) Medicines' Deatils
2) Medicine Display
3) Record's Modification
4) Deletion of record
5) exit:
Enter Option:
```

1<sup>st</sup> field contains the name, mfg. date, exp. Date of the medicine along with rate of 1 packet and total packets present in the hospital. It helps the management to check the quantity of the medicine in the hospital.

```
Medicine name: abc
Manufacturing date: 22/10/2016
Expiry date: 22/09/2020
Price of 1 pac.: 22.360001
Quantity: 124
```

### Medicine details

In this field also, user is allowed to modify or delete the record as per requirement.

### 3) Patient Department

In this area, records of the patient are maintained

```
PATIENT RECORD
1) insertion
2) display
3) total amount to be paid
4) exit:
Enter the option:
```

In insertion part, it will for name, age, sex, address, disease, consulting doctor id, etc.

```
Enter patient's name: ram
Enter age: 26
Enter sex(M/F/T): M
Enter address: Vellore
Enter disease details: Cough
Enter consulting doctor id:126

Invalid input
Enter consulting doctor id:14
Enter date of admit: 22/01/2018
Enter patient room number: 128
```

On selecting option 3, one can calculate the total amount that the patient need to pay.

```
Enter patient's name: ram
Total amount to be paid for ram:
Number of days in ICU: 3

Number of days in general ward: 2

Number of medicines: 1

Enter the medicine1 name abc

Enter total number of packets: 5

Total amount to be paid: 6511.000000
```

This will reduce the human effort in calculation.

#### 4) Staff's record

```
                                STAFF's INFORMATION

Choose the option:
1) Data Entry
2) Data Display
3) Data modification
4) Data Deletion
5) Exit
Enter the option:
```

```
Enter id(4 digits): 1224
Enter name: shyam
Enter age: 35
Enter address: chennai
Enter Designation: ward boy
Enter phone number: 9334455663
Enter salary: 12000

Do you want to add more(Y/N):
```

### Data entry

```
                Staff Information Display
1) for selected id
2) for total display
Enter the option: 1

Enter the staff's id'1224

                Details of Given id

Id: 1224
Name: shyam
Age: 35
Address: chennai
Designation: ward boy
Phone Number: 744521071
Salary: 12000.000000
```

### Displaying details of selected id



**FOR COMPLETE CODE REFER THE FOLLOWING LINK:**

<https://drive.google.com/open?id=1prTgOGiKnOcX0QzgnZfJ5MHl3dzHjH9a>

### **Conclusion:**

The project **Hospital Management System(HMS)** is for computerizing the working in a hospital. It is a great improvement over the manual system. The computerization of the system has speed up the process. In the current system, the front office managing is very slow. The hospital management system was thoroughly checked and tested with dummy data and thus is found to be reliable. The software takes care of all the requirements of an average hospital and is capable to provide easy and effective storage of information related to the patients that come up to the hospital.

It generates test reports and also provides the facility for searching the details of the patient. It also provides billing facility on the basis of patient's status.

### **FUTURE ENHANCEMENTS**

The proposed system is Hospital Management System. We can enhance this system by using Adhaar Number as the unique id. We can add other features like Blood Bank details, Ambulance details, etc.

## REFERENCES:

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