

## BSCS – Fall 2021 Semester Project

## **Object Oriented Programming**

# Project: Hospital Management System Section: C13

### **Submitted by:**

- **1.** Ahmed Ali L1F20BSCS0207
- 2. Affan Bin Tariq L1F20BSCS0221
- 3. Mohammed L1F20BSCS0056
- 4. Safoora Masood L1F20SBCS0467

Supervised by: Miss Ramna Maqsood

**Project Deadline:** 07/02/2021

## **Table Of Content**

- 1. Topic Introduction
- 2. Need for the Project
- **3.** Methodology
- 4. UML Class Diagram
- 5. Screen Shots

## Introduction

Hospital Management System was introduced to solve the complications coming from managing all the paper works of every patient associated with the various departments of hospitalization with confidentiality. Hospital Management System provides the ability to manage all the paperwork in one place, reducing the work of staff in arranging and analyzing the paperwork of the patients. In this project, we have worked on a Hospital Management System that almost uses all concepts of Object Oriented Programming. We have implemented concepts like Classes, Objects, Data Hiding, Singleton Design Pattern, Inheritance, Polymorphism and Abstract Classes. We have tried to tackle a real world problem in which the hospital management system is handled manually through paper work which is time consuming and creates room for possible errors. We have used an automated file handling system that handles information related patients or doctor, inventory, pharmacy, possible disease and their symptoms etc.

The advantages of Hospital Management System can be pinpointed to the following:

- Time-saving Technology
- Improved Efficiency by avoiding human errors
- Reduces scope for Error
- Data security and correct data retrieval made possible
- Cost effective and easily manageable
- Easy access to patient data with correct patient history
- Improved patient care made possible
- Easy monitoring of supplies in inventory
- Reduces the work of documentation
- Better Audit controls and policy compliance.

## **Need for this Project**

Through detailed investigation of manual working environment in the hospital I encountered severe problems in many areas. Owing those problems for such a busiest hospital will surely put its reputation in jeopardy. Since hospital receives plenty of patients every day due to its prime location, hospital hasn't that much competent to bear such workload on daily basis. I would like to mentions few fatal problems that is affecting the overall profit of the hospital as well

Handwritten reports are being generated in the manual system by the accountant. Since, the human error cannot not be avoided therefore errors in the calculation have become a common issue. This sometimes causes indiscipline and put bad impression on other patients in the premises of the hospital when relative of the patients makes strong arguments with the management.

The manual system requires a bunch of paper work. Data of the patients, doctors and employees are being stored on registers and kept in the store room when become few months old. These registers and papers are not easily accessible due to the lack of space in the store room that affects searching of a record when needed. Confidential documents are kept openly which is another threat.

The solution of the whole problem is inevitable and a computerized system is the only solution of above problem and it is a final conclusion.

### **Time Consuming Problems:**

When a relative of any patient comes in and get inquiry about the patient that is the point when hard time for the employee at the front desk starts. He has to go through with the patient's register and obviously it takes time and put patient's relative on waiting. Preparing patient's final bill in the account's department patient's discharge process accountant needs to go through with all tests reports and its expenses, consultant fee and room charge for the final

calculation. This process becomes an unbearable situation for the accountant to collect all related document of a particular patient and consumes immense time. Patient admission process needs lot of time to register patients' information and the approval of the availability of a room.

### **Too Much Paper Work:**

Hospital is a manual system in which all process are being done on papers and registers. Due to manual system it consumes lots of papers and affects on overall budget of the hospital.

#### **Delays In Updating Of Records:**

This is not an easy task for the hospital staff. Since it's a busiest hospital in town documentation are being done manually and needs update on regular basis for the account's inventory. Directory Forms are given to the employee after every six month but due to lack of time records are not updated regularly so tracking of employees' record is not possible. Due to unavailability of patient's updated record accounts department suffers a lot. It is not an easy task for them to collect all the related information of a patient to prepare final bill.

### **Retrieval Of Records:**

Retrieval of record is another issue, because of the records are updated once in a year. Records are kept in random order so seeking a file is very difficult.

### File Handling:

As hospital generates lots of records each day due to immense response of the patients, file and documents are generated every day. Handling such a large number of records manually each day is extremely a complicated task.

### **Lack of Space:**

Hospital doesn't have extra space in its premises so accommodating new employee and creating more rooms for the patient is difficult. Records and files are kept on shelves and tables disorderly.

### **Security Problems:**

Due to the casual file handling, confidential records are insecure and can be seen by anyone which definitely could be a serious threat to the hospitals reputation.

### **Mixing Of Records:**

As files and paper documents are not put in order so loose documents from the files mixes up with other documents that put hospital staff in jeopardy. Sometimes identical names of two different patients or employees make a big confusion to handle. This mixing up document problem takes lots of time to resolve the issue.

### **Data Duplication:**

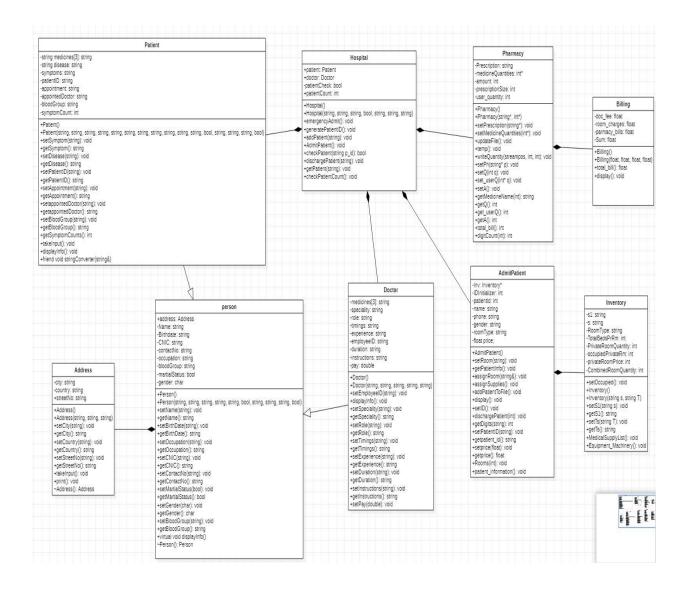
Sometimes record of a patient or an employee generated twice by mistake or lost of the papers. This gives problems such as double invoice billing, double entry on the ledger or double entry of particular patients or employee data.

## **METHODOLOGY**

### We have implemented the following concepts to tackle this problem:

- Classes and Objects
- File Handling
- Data Hiding
- Encapsulation
- Inheritance
- Composition
- Singleton Design Pattern
- Polymorphism
- Abstract Classes
- Friend Functions

## **UML Diagrams**



#### **Pharmacy**

Prescription : string\*medicineQuantities : int\*

amount : intprescriptionSize : intuser\_quantity : intbilling:Billing

+ Pharmacy()

+ Pharmacy(string\*, int\*)

+ setPrescription(string\*,int) : void

+ setMedicineQuantities(int\*): void

updateFile(): void

+ writeQuantity(streampos, int, int): void

setAmount(): void

+ getPrescription(): string\*

digitCount(int): int

#### **Billing**

Bill:double
prices: int\*
amount: int\*
size: int\*

product: String

+ Billing()

+ Billing(double, double, double, double)

+ findPrices(string\*,int\*,int): viod

totalBill(int) : void

+ display(): void

#### **Inventory**

- s1: string

ts:string

RoomType : string

TotalBedsPrRm : int

 $- \qquad {\tt Private Room Quantity: int}$ 

occupiedPrivateRm : int

privateRoomPrice : intCombinedRoomQuantity : int

BedsPerRoom[12]: int

BedsPerkoom[12]: IIITotalBedsCmRm: int

bedCount : int

+ name: string

+ s4: string

+ s3; : string

+ Occupide[8]:int

+ setOccupied(): void

+ Inventory()

Inventory(string s, string T);

setS1(string s): void

+ getS1(): string

setTs(string T): void

+ getTs(): string

MedicalSupplyList(): void

+ Equipment\_Machinery(): void

+ PrivateRoom(): void

+ CombinedRoom(): void

+ setBedsPerRoom(): void

+ setRoomType(string rt) : void

+ getRoomType(): string

+ DomainCheck(string s) : void

+ RoomTypeCheck(string rt): void

#### Hospital

patientCount : int
 doctorCount : int
 hospital : Hospital\*
 patientCheack : bool

- Hospital()

Hospital(string, string, string, bool, string, string,

string)

+ patients: Patient + doctor: Doctor + pharmacy: Pharmacy + admitPatients: AdmitPatient\*

#### Hospital \* getHospital()

emergencyAdmit(): void generatePatientID(): void admitPatient(string): void checkPatient(string): void checkPatient(string): void getPatient(string): void getPatient(string): void checkPatientCount(): void getPatientCount(): void getPatientCount(): int getDoctorCount(): int appointDoctor(): string resetPatientCount(): void AboutUs(): void showDiseases(): void showPatientHistory(): void

#### **AdmitPatient**

+ Inv: Inventory\*
 - IDInitializer: int
 - patientId: int
 - name: string
 - phone: string
 - gender: string
 - roomType: string
 - price: float

+ AdmitPatient()
 + setRoom(string) : void
 + getPatientInfo() : void
 + assignRoom(string&) : void
 + addPatientToFile() : void

+ display(): void + setID(): void

dischargePatient(int): void

getDigits(string): int

+ setPatientID(string) : void

getpatient\_id() : string

+ setprice(float) : void
+ getprice() : float

+ Rooms(int) : void

+ patient\_information(): void

#### Person

Name: string Birthdate : string contactNo: string occupation: string bloodGroup: string martialStatus: bool gender: char address : Address

Address : Address

Person()

Person(string, string, string, string, bool, string, string, string, bool)

setName(string): void getName(): string

setBirthDate(string): voidgetBirthDate(): string setOccupation(string): void getOccupation(): string setContactNo(string): void getContactNo(): string

setMartialStatus(bool): void getMartialStatus(): bool

setGender(char): void getGender(): char

setBloodGroup(string): void getBloodGroup(): string

virtual void displayInfo() = 0;

~Person()

#### **Address**

city: string country: string streetNo: string

concatinated Address: string

Address()

Address(string, string, string)

setCity(string): void getCity(): string

setCountry(string): void

getCountry(): string

setStreetNo(string): void

getStreetNo(): string setAddress(): void

getAddress(): string

inputAddress():void

printAddress():void

~Address()

#### Doctor

Speciality: string
Role: string
Timings: string
Experience: string
employeeID: string
duration: string
instructions: string
pay: double

- + Doctor()
- Doctor(string, string, string, string)
- + setEmployeeID(string) : void
- getEmployeeID(): string
- + setSpeciality(string) : void
- getSpeciality(): string
- + setTimings(string) void
- + getTimings(): string
- setExperience(string): void
- + getExperience(): string
- + setDuration(string) : void
- + getDuration(): string
- + setInstructions(string): void
- getInstructions():string
- setPay(double): void
- getPay() : double
- + findDisease(string, bool&): string
- + generatePrescription(string, int\*&, int&): string\*
- setTimings(): void
- + displayInfo(): void
- + readData(int) : void
- + displayList(int) · void

#### **Patient**

string medicines[3]: string
 string disease: string
 symptoms: string
 patientID: string
 appointment: string
 appointedDoctor: string
 bloodGroup: string
 symptomCount: int

- + Patient()
- + Patient(string, string, string, string, string,
  - string, string, string, string, string, string, string, string, string, bool)
- + setSymptom(string) : void
- + getSymptom(): string
- + setDisease(string) : void
- + getDisease(): string
- + setPatientID(string) : void
- + getPatientID(): string
- + setAppointment(string) : void
- + getAppointment(): string
- + setappointedDoctor(string): void
- + getappointedDoctor(): string
- + setBloodGroup(string) : void
  - getBloodGroup(): string
- + setMedicines(string\*): void
- getMedicines(): string\*
- + setMedicineQuantity(int\*): void
- getMedicineQuantity() : int\*
- + storeSymptom(string) : void
- + getSymptomCount():int
- + setSymptomCount(int) : void
- + setMedicineCount(int): void
- + getMedicineCount():int
- + takeInput(): void
- + displayInfo(): void
- + resetPatient(): void
- + displayList(int) : void

## Screenshots

Menu display - In this part the user has to enter Choice to enter the Required department of the hospital management system.

1. Checkup	2. Emergency Admit	3. Discharge Patient
4. List of Patients	5. List of Doctors	6. Patient History
7. Diseases With their Symptoms	8. About Us	9. Exit Program

### Choice 1:

### Old patient.

Here the user has to give correct Patient ID to visit their respective specialists for treatment.

All the details of that patient will be displayed from the file.

```
1. Checkup2. Emergency Admit3. Discharge Patient4. List of Patients5. List of Doctors6. Patient History7. Diseases With their Symptoms8. About Us9. Exit Program
Enter Choice: 1
1. Are You an Old Patient?
2. Are You a New Patient?
Please Enter Your Choice: 1
Please Enter Your Patient ID: 19
Patient Count: 6
                  Patient Information
         Patient ID: HSPR19
         Disease: Legionnaires Disease
         Name: safoora masood
         Date of Birth: 18/3/2002
         Gender: Female
         Address: street#52,karachi,pakistan
         Contact No: 03462820859
         Blood Group: 0+
         Occupation: ameer_log
         Martial Status:Non-Married
                                 Please Press A Key To Continue...
```

### Choice 1: New patient

Here the user has to give proper and correct information about themselves and correct Symptoms to be diagnosed and prescription from the doctor.

```
Enter Choice: 1
1. Are You an Old Patient?
2. Are You a New Patient?
Please Enter Your Choice: 2
Patient Count: 6
                                     Enter Patient Information
                             Enter Name: Sara khan
                                ~~~Please Enter Your Birth Date~~~
                             Enter Day: 23
                             Enter Month: 12
                             Enter Year: 1
                             Sorry, We cannot treat Patient of this age.
                             Please Enter Year Again: 1999
                                ~~~Please Enter Your Address~~~
                             Enter Street No: street90
                             Enter City: karachi
                             Enter Country: lahore
                             Enter Occupation: teacher
```

Then the patient is requested to visit the pharmacy to purchase the required medicines. If the medicines are available, the patient will be given those medicines.

```
Testing.
Progress: 100%
Test Completed.
            Press a Key to get Presciption!
         Symptoms: Diarrhea, Vomiting, Throat Irritation
         Disease: Blue-green Algae
         Duration: 2 weeks course
        Instructions: 2 pills/day after every meal Medicine "Paracetamol" Is Not Available.
               Quantity
Medicine
                                        Price
                            330
450
 Panado1
Panadol 3
Paracetamol 3
Total Bill : 2340 PKR
         Thank You For Visiting By!
        Please Press A Key To Continue..
```

If not then the patient is requested to visit another pharmacy.

```
Testing..

Progress: 100%
Test Completed.

Press a Key to get Presciption!

Symptoms: Pneumonia
Disease: Legionnaires Disease

The Medicines for this Disease aren't Available at the moment!
Please Visit A Nearby Pharmacy

Thank You For Visiting By!

Please Press A Key To Continue..
```

Choice: 2 Emergency

If the patient selects Private room then if any rooms are available then they will be allocated that room with the required Utilities and medical supplies from the file.

```
You have been Assigned Room no. 2
Price per day is: 8000

You Have Been Allocated Following Medical Supplies:

EKG/ECG
ESU
EMS
Defibrillation
Needles/Blades

You Have Been Allocated The Following Utilities:

EKG/ECG Machines
Forceps
Hospital Stretchers

Please Press A Key To Continue..
```

If the patient selects Combined room then a bed in any available room will be assigned and the required utilities and medical supplies will be provided from the inventory(file).

You Have Been Allocated Following Medical Supplies:  1. Surgical
2. Single and Drape Packs
You Have Been Allocated The Following Utilities:  1. Saws  2. EKG/ECG Machines

#### Choice 2:

### **Discharge Admitted Patient**

Here the user is required to enter patient ID to discharge that patient.

### Choice 3:

### Discharge Normal Patient

Here the user is required to enter the correct patient ID to discharge that patient.

## Choice 4: List of patients will be displayed

		5. List	of Doctor	rs 6. Patie	narge Patient   ent History   Program
r Choice: 4 ent Count: 6					
Patient ID	Name	DOB	Gender	Disease	Appointed Doctor
		10/11/2002	Male	Blue-green Algae	Dr.Ahmed
HSPR9	Ahmed Ali	10/11/2002	HULL	Diac Biccii Higac	DI IIIIICO
HSPR9 HSPR13		28/4/2001		Alzheimer's Diseases	
HSPR13	Khizar Ali		Male	3	Dr.Ahmed
HSPR13	Khizar Ali Ahmed Ali	28/4/2001 10/11/2002	Male Male	Alzheimer's Diseases	Dr.Ahmed Dr.Ahmed
HSPR13 HSPR14	Khizar Ali Ahmed Ali Ahmed Ali	28/4/2001 10/11/2002 1/1/2002	Male Male Male	Alzheimer's Diseases Colon Cancer	Dr.Ahmed Dr.Ahmed Dr.Ahmed

Choice 5: List of Doctors will be displayed

		We] cor	ne to our	· Hospital Management	Systeml		
				:=====================================			
	1. Checkup			2. Emergency Admit		scharge Patient	 
				5. List of Doctors		tient History	
- 1	/. Diseases Wit	h their Symp	toms 8	3. About Us	9. EX1	it Program	
En	ter Choice: 5						
Do	ter Choice: 5 ctor Count: 5 	DOB	Gender	Speciality	 Experience	 Pav	 Timings
Do ID	octor Count: 5 Name				Experience		Timings
Do	ctor Count: 5NameMaham Amjad	11/04/1989	Female	Psychiatry	5 years	PKR 250000	11:00-15:3
Do ID 101	ctor Count: 5 Name Maham Amjad Farukh Ahmed	11/04/1989 23/07/1996	Female Male		5 years 2 years	PKR 250000 PKR 120000	11:00-15:3 09:30-13:0
Do ID 101 102 103	Name Maham Amjad Farukh Ahmed Ramna Magsood	11/04/1989 23/07/1996 04/10/1994	Female Male Female	Psychiatry Insentive Care	5 years 2 years 7 years	PKR 250000 PKR 120000 PKR 430000	Timings 11:00-15:3 09:30-13:0 12:30-15:3 17:00-19:0

### Choice 6:

All patient history will be displayed from the file.

```
Welcome to our Hospital Management System!

    Emergency Admit
    List of Doctors

    Discharge Patient
    Patient History

                1. Checkup 2. Emergency
4. List of Patients 5. List of I
7. Diseases With their Symptoms 8. About Us
                                                                                                           9. Exit Program
              Enter Choice: 6
                      Patient History
  : 10/11/2002
Ahmed_Ali
Address : 12,Lahore,Pakistan
 Gender : Male
Phone number: 03306989888
Other Data: Non-Married O+ Student Blue-green_Algae Diarrhea,Vomiting,Throat_Irritation Dr.Ahmed 3
13 : 28/4/2001
Khizar_Ali
Address : 21,Lahore,Pakistan
Gender : Male
Phone number: 03306123434
Other Data: Non-Married A- Student Alzheimer's_Diseases Memory_Loss Dr.Ahmed 1
14 : 10/11/2002
Ahmed_Ali
Address : 12,Lahore,Pakistan
Gender : Male
Phone number: 03306989888
Other Data: Non-Married A- Student Colon_Cancer Diarrhea,Constipation Dr.Ahmed 2
17: 1/1/2002
Ahmed_Ali
Address : 1,Lahore,Pakistan
Gender : Male
 Phone number: 03306989888
Other Data : Non-Married A- SAD Alzheimer's_Diseases Memory_Loss Dr.Ahmed 1
20 : 2/3/2001
Affan
Address : 5621,lahore,pakistan
Gender: Male
Phone number: 03004361384
Other Data: Non-Married A+ student Blue-green_Algae Diarrhea, Vomiting, Throat_Irritation Dr. Ahmed 11
22 : 8/3/2003
Address : street56,lahore,pakistan
 Gender : Female
Oction: . remaie
Phone number : 03572947346
Other Data : Non-Married A- Teacher Blue-green_Algae Diarrhea,Vomiting,Throat_Irritation Dr.Ahmed 3
```

# Choice 7: All diseases and there symptoms will be displayed from the file

```
Diseases with Symptoms
01. Acute Flaccid Myelitis (AFM): Slurred Speech, Arm Pain, Neck Pain
02. Alphaviruses: Fever, Arthralgia, Headache
03. Alzheimer's Diseases: Memory Loss
04. Arthritis: Stiffness, Swelling
05. Babesiosis: Sweat, Loss of Appetite, Nausea
06. Blue-green Algae: Diarrhea, Vomiting, Throat Irritation
07. Prostrate Cancer: Frequent Urination
08. Cervical Cancer: Blood Spots
09. Colon Cancer: Diarrhea, Constipation
10. Kidney Cancer: Low Back Pain
11. Liver Cancer: Weight Loss, Vomiting
12. Multiple Myeloma: Bone Pain, Fatigue
13. Stomach Cancer: Heartburn, Indigestion
14. Carbon Monoxide Poisoning: Headache, Dizziness, Weakness
15. Celiac Disease: Abdominal Pain, Constipation
16. Chickenpox: Fever, Tiredness, Red spots
17. Chronic Obstructive Pulmonary: Frequent Coughing, Wheezing
18. Conjunctivitis: Pink Colour of Eye, Tears
19. Diabetes: Hungry, Thirsty, Weakness
20. HIV/AIDS: Rashes, Headache
21. Arboviral Encephalitis: Drowsiness, Fever
22. Asthma: Short Breaths, TightChest
23. Colorectal Cancer: Diarrhea
24. Leukemia Cancer: Fever, Chills
25. Lung Cancer: Wheezing
26. Oral Cancer: Bleeding, Numbness in Teeth
27. Carbapenem-Resistant Enterobacteriaceae: Bellyache, Vomits
28. Cardiovascular Disease: Chestache, Numbness
29. Chagas Disease: Heachache, Fatigue
30. Chronic Fatigue Syndrome: Sore Throat, Dizziness
31. Clostridium Difficile: Fever, Blood Vomits
32. Creutzfeldt-Jakob Disease: Insomnia, Incoordination
33. Cyclospora: Bloating, Cramping
34. Depression: Sadness, Tearfulness
35. Diphtheria: Tiredness, Fever
36. EEV Virus: High Fever, Headache, Drowsiness
37. Ebola Virus: Fever, Weakness
38. Enterovirus: Fever, Sneezing
39. Fibromyalgia: Depression, Anxiety
40. Haff Disease: Swelling, Breakdown, Vomiting
41. Hepatitis: Jaundice
42. Ehrlichiosis: Nausea, Vomiting, Diarrhea
43. High Blood Pressure: Irregular Heartbeat
44. Influenza: Fever, Coughing
45. Legionnaires Disease: Pneumonia
46. Listeriosis: Confusion, Vomiting, Fever
47. Lyme Disease: Migraine, Headache
```

#### Choice 8:

Hospital history will be displayed from the file.

```
Enter Choice: 8
Shalamar Hospital is committed in the delivery of its tripartite mission of exemplary patient care, high-impact research
and education. Over the last 44 years, Shalamar Hospital has evolved into a premier tertiary care medical facility with
500 beds and 25 clinical departments and specialties equipped with world-class diagnostic and treatment facilities.
Situated at Shalimar Link Road, the 18-acre establishment was originally instituted as a Businessmen Hospital Trust as
50 bed organisation in 1978 with six outpatient departments. It was the culmination of strenuous efforts by its members
Chaudary Nazar Mohammad (late) and his esteemed partners, Mr Mohammad Hussain (late), Mr. Naseem Saigol, Mr. Mumtaz A
Sheikh, and Syed Babar Ali with kind assistance from the Punjab government. At Shalamar Hospital, we strongly believe in
equitable health care as we dedicate our efforts to ensure premium medical care and optimum patient welfare.
Our world class specialties are continuously modified and improved to better suit the needs of our community. Caring for
patients from some of the most deprived communities, the hospital organises community-based outreach programmes
alongside our Patient Welfare Department to ensure that every person, regardless of their financial position, can
receive quality healthcare without any discrimination. Our pioneering culture led us to form Shalamar Institute of
Health Sciences (SIHS) as the umbrella organisation for Shalamar Hospital, Shalamar Medical & Dental College (SMDC),
Shalamar Nursing College (SNC) and Shalamar School of Allied Health Sciences. These educational institutions were established to improve service delivery in tertiary healthcare. Our Shalamar Medical & Dental College is ranked amongst
the top medical colleges affiliated with UHS. We aim to drive forward the strategic partnership between all
complimentary units to develop and enhance intellectual rigour, practical clinical skills required to work in diverse settings, and instil a deep commitment to patient welfare.
                                                 Please Press A Key To Continue..
```

### Choice 9:

The program will be terminated.

