



# Bahria University

Discovering Knowledge

Department of Software Engineering

## SEN-221-SOFTWARE DESIGN & ARCHITECTURE SPRING 2022

COURSE INSTRUCTOR  
ENGR. MAJID KALEEM

Assignment No.	04
Assignment Title	Producing Design Models from Requirements
Course Learning Outcome	CLO-05 <i>“Design object oriented design models to reflect implementation details.”</i>
Full Name	
Semester	BSE 4 B
Submission Deadline	29 <sup>th</sup> June 2022



### INSTRUCTIONS:

- ☐ Use only A4 size blank white paper for printing.
- ☐ Use only Times New Roman size 12 font.

- ☐ Do not use color printer to print this title page or assignment.
- ☐ Each heading (underlined, bold and in capital letters) and example must start from a new line.
- ☐ Submit hard copy of your assignment and upload softcopy on LMS as a DOCX file.
- ☐ Do not enclose your assignment in file/folder, staple assignment pages only at the left-top corner.
- ☐ Do not edit (this) assignment file given as a pdf file.
- ☐ Last page of your assignment must contain sources/references (use IEEE referencing style).
- ☐ Assignments will only be accepted in the scheduled class/room.
- ☐ No makeup assignments will be given.
- ☐ Violation of any of the instructions mentioned here will result in marks deduction.



**BAHRIA UNIVERSITY (KARACHI CAMPUS)**  
**Software Design & Architecture (SEN-221)**  
**ASSIGNMENT # 4 – Spring 2022 Based on:**  
**CLO-5**

Submission Deadline: **29<sup>th</sup> June 21**

Class: **BSE-4B**

**ENGR. MAJID KALEEM**

Max Marks: **05**

Course  
Instructor:

PREPARED BY :

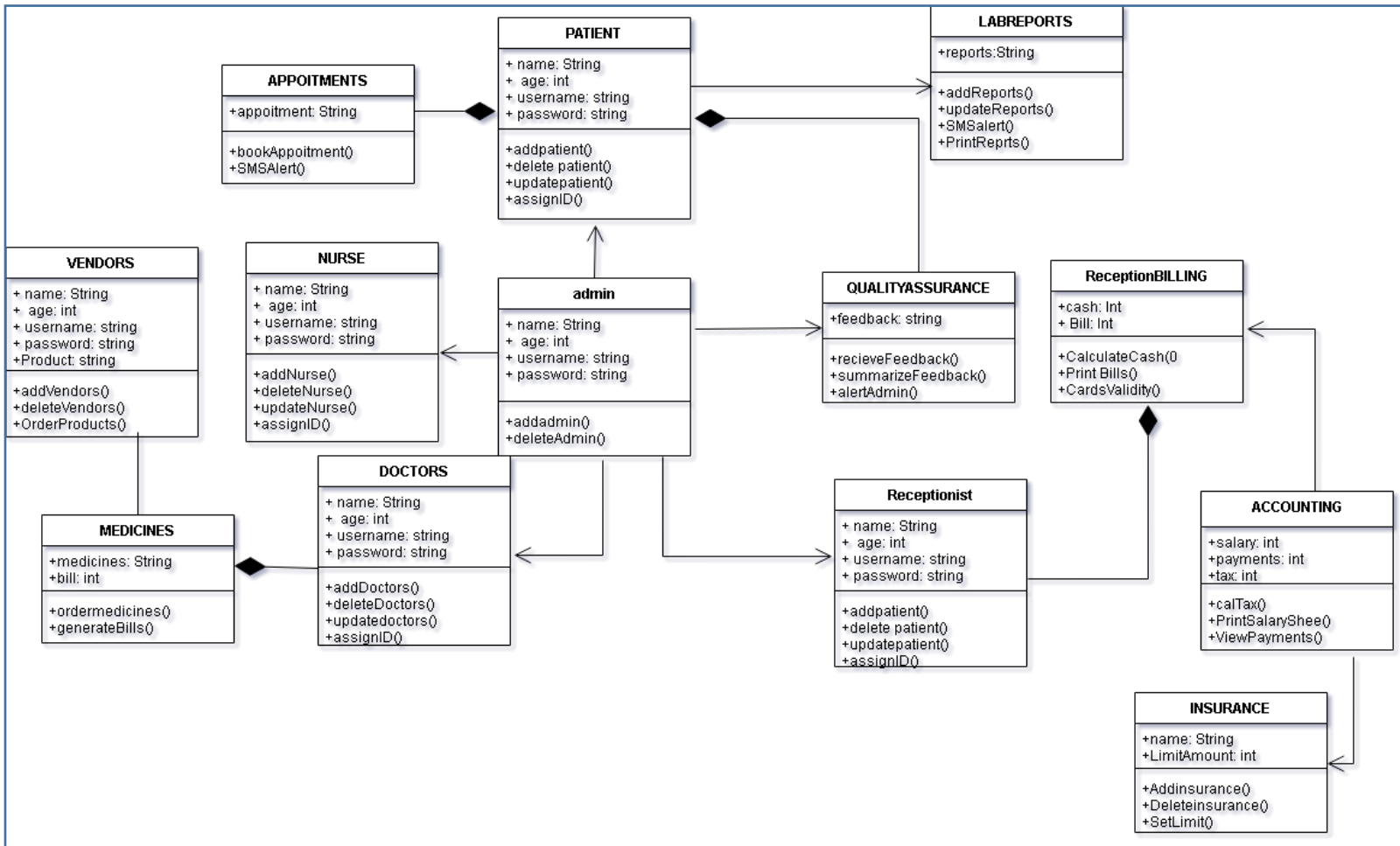
SYED ABDULLAH HUSSAINI

MUSTUFA

ABDUL QUDOOS

FARHAN ALI

## CLASS DIAGRAM:



# USECASE DIAGRAM



Use Case ID:	1		
Use Case Name:	Add patient		
Created By:	abdullah	Last Updated By:	
Date Created:	23 oct	Date Last Updated:	

Actors:	receptionist
Description:	This function get details of a patient and add record to the patient file and generate a patient registration number
Trigger:	User click on the details form
Preconditions:	The operator should login with user account
Postconditions:	
Normal Flow: Sunny Day Scenario:	<ol style="list-style-type: none"> <li>1. User selects “add patient entry “at home page</li> <li>2. Patient entry form displayed</li> <li>3. Users enter data to required fields</li> <li>4. User selects “Add entry” button</li> <li>5. “Successfully record added” message displayed.</li> </ol> System generates a patient Id and display
Alternative Flows: Rainy Day Scenario:	
Exceptions:	
Includes:	
Priority:	
Frequency of Use:	
Business Rules:	
Special Requirements:	
Assumptions:	
Notes and Issues:	

Use Case ID:	1		
Use Case Name:	View patient records		
Created By:	abdullah	Last Updated By:	
Date Created:	23 October 2019	Date Last Updated:	30 December 2021

Actors:	Receptionist, Admin, doctor, patient, lab engineer
Description:	This function get details of a patient and add record to the patient file and generate a patient registration number
Trigger:	
Preconditions:	Patient must register to the system

Postconditions:	
Normal Flow: Sunny Day Scenario:	<ol style="list-style-type: none"> <li>1. User selects “view patient info”</li> <li>2. Enter Patient ID in search</li> </ol> <p>You can now access the patient info.</p>
Alternative Flows: Rainy Day Scenario:	
Exceptions:	
Includes:	
Priority:	
Frequency of Use:	
Business Rules:	
Special Requirements:	
Assumptions:	
Notes and Issues:	

Use Case ID:	1		
Use Case Name:	Add cash and Generate bills		
Created By:	abdullah	Last Updated By:	
Date Created:	23 October 2019	Date Last Updated:	30 December 2021

Actors:	<b>Receptionist</b>		
Description:	This function calculate and add cash to account cash and print bill of paid cash		
Trigger:			
Preconditions:	The patient must be added to system.		
Postconditions:			
Normal Flow: Sunny Day Scenario:	<ol style="list-style-type: none"> <li>1. User select the “services” tab</li> <li>2. Select the medical services patient need</li> <li>3. Software will auto calculate the services amount</li> <li>4. Receptionist enter the given amount by clicking “add cash”</li> <li>5. On clicking software will auto print the bill</li> </ol>		
Alternative Flows: Rainy Day Scenario:			
Exceptions:			
Includes:			
Priority:			
Frequency of Use:			
Business Rules:			
Special Requirements:			
Assumptions:			

Notes and Issues:	
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Use Case ID:	1		
Use Case Name:	Monitor system activities		
Created By:	abdullah	Last Updated By:	
Date Created:	23 October 2019	Date Last Updated:	30 December 2021

Actors:	Receptionist		
Description:	This function monitor daily activities		
Trigger:			
Preconditions:	The admin must login into the system		
Postconditions:			
Normal Flow: Sunny Day Scenario:	<ol style="list-style-type: none"> <li>1. The user click on “monitor operations” tab</li> <li>2. In this section, summary reports of each department operations will be displayed</li> <li>3. By this user can analyze the daily performance of hospital.</li> </ol>		
Alternative Flows: Rainy Day Scenario:			
Exceptions:			
Includes:			
Priority:			
Frequency of Use:			
Business Rules:			
Special Requirements:			
Assumptions:			
Notes and Issues:			

Use Case ID:	1		
Use Case Name:	Generate reports		
Created By:	abdullah	Last Updated By:	
Date Created:	23 October 2019	Date Last Updated:	30 December 2021

Actors:	admin		
Description:	this function enable user to generate performance reports		
Trigger:			
Preconditions:	User should login with the user account		

Postconditions:			
Normal Flow: Sunny Day Scenario:	<ol style="list-style-type: none"> <li>1. The user click on “monitor operations” tab</li> <li>2. In this section, summary reports of each department operations will be displayed</li> <li>3. Here you click “print report”</li> <li>4. System will print the report.</li> </ol>		
Alternative Flows: Rainy Day Scenario:			
Exceptions:			
Includes:			
Priority:			
Frequency of Use:			
Business Rules:			
Special Requirements:			
Assumptions:			
Notes and Issues:			
Use Case ID:	1		
Use Case Name:	Manage staff		
Created By:	abdullah	Last Updated By:	
Date Created:	23 October 2019	Date Last Updated:	30 December 2021

Actors:	admin
Description:	This function enable to order and communicate with staff
Trigger:	
Preconditions:	User should login with the user account
Postconditions:	
Normal Flow: Sunny Day Scenario:	<ol style="list-style-type: none"> <li>1. User click on tab “manage staff”.</li> <li>2. Select the user from list to whom you want to communicate</li> <li>3. Type the commanding message</li> <li>4. The alert will be displayed to targeted user.</li> </ol>
Alternative Flows: Rainy Day Scenario:	
Exceptions:	
Includes:	
Priority:	
Frequency of Use:	
Business Rules:	
Special Requirements:	
Assumptions:	
Notes and Issues:	



Use Case ID:	1		
Use Case Name:	Edit/Delete Patient record		
Created By:	abdullah	Last Updated By:	
Date Created:	23 October 2019	Date Last Updated:	30 December 2021

Actors:	Any staff/patient requested editing/deletion of record
Description:	This function enable user to edit/delete patient record
Trigger:	
Preconditions:	User should login with the user account
Postconditions:	
Normal Flow: Sunny Day Scenario:	<ol style="list-style-type: none"> <li>1) user selects “edit/delete” tab</li> <li>2) here requests will be viewed in order</li> <li>3) so he click on “edit” or “delete” button for required editing/deletion</li> <li>4) then “save” to save editing/deletion</li> </ol>
Alternative Flows: Rainy Day Scenario:	
Exceptions:	
Includes:	
Priority:	
Frequency of Use:	
Business Rules:	
Special Requirements:	
Assumptions:	
Notes and Issues:	

Use Case ID:	1		
Use Case Name:	Upload lab reports		
Created By:	abdullah	Last Updated By:	
Date Created:	23 October 2019	Date Last Updated:	30 December 2021

Actors:	Lab engineer
Description:	This function enable user to upload lab reports online
Trigger:	
Preconditions:	User should login with user account
Postconditions:	

Normal Flow: Sunny Day Scenario:	<ol style="list-style-type: none"> <li>1. User selects “upload report” tab</li> <li>2. Enter “patient ID” in ID section</li> <li>3. Then click on “upload” button</li> <li>4. Then the prompt show “uploaded</li> </ol>
Alternative Flows: Rainy Day Scenario:	
Exceptions:	
Includes:	
Priority:	
Frequency of Use:	
Business Rules:	
Special Requirements:	
Assumptions:	
Notes and Issues:	

Use Case ID:	1		
Use Case Name:	Print lab records		
Created By:	abdullah	Last Updated By:	
Date Created:	23 October 2019	Date Last Updated:	30 December 2021

Actors:	Lab engineer
Description:	The user can print lab reports that has been uploaded in system on request
Trigger:	
Preconditions:	User sound login to the system
Postconditions:	
Normal Flow: Sunny Day Scenario:	<ol style="list-style-type: none"> <li>1) user selects “Print” tab</li> <li>2) enter report number which will be print on receipt</li> <li>3) now reports will be visible</li> <li>4) click on “Print” button</li> </ol>
Alternative Flows: Rainy Day Scenario:	
Exceptions:	
Includes:	
Priority:	
Frequency of Use:	
Business Rules:	
Special Requirements:	

Assumptions:	
Notes and Issues:	

Use Case ID:	1		
Use Case Name:	View payments /Generate transaction		
Created By:	abdullah	Last Updated By:	
Date Created:	23 October 2019	Date Last Updated:	30 December 2021

Actors:	Finance officer
Description:	The user can view daily payments and generate payment history on daily or monthly basis
Trigger:	
Preconditions:	User should login to the system
Postconditions:	
Normal Flow: Sunny Day Scenario:	<ol style="list-style-type: none"> <li>1) user selects "Payments" tab</li> <li>2) here you can find two options "View Payments" and "Generate monthly history"</li> <li>3) The user can click one of these option</li> <li>4) On clicking, the system will view payment or generate transaction history</li> </ol>
Alternative Flows: Rainy Day Scenario:	
Exceptions:	
Includes:	
Priority:	
Frequency of Use:	
Business Rules:	
Special Requirements:	
Assumptions:	
Notes and Issues:	

Use Case ID:	1		
Use Case Name:	Lab Equipment		
Created By:	abdullah	Last Updated By:	
Date Created:	23 October 2019	Date Last Updated:	30 December 2021

Actors:	Lab engineer
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Description:	This function enables user to request lab equipment which is registered to supplier
Trigger:	
Preconditions:	The supplier must be connected to system
Postconditions:	
Normal Flow: Sunny Day Scenario:	5) User click on “Equipment” tab 6) Here user can view list of supplier 7) So user select supplier 8) Now he filled the available form in which he mention the required items 9) On clicking “submit” the form will be emailed to supplier
Alternative Flows: Rainy Day Scenario:	
Exceptions:	
Includes:	
Priority:	
Frequency of Use:	
Business Rules:	
Special Requirements:	
Assumptions:	
Notes and Issues:	

## SOFTWARE DESIGN PATTERNS:

Design patterns use in Hospital management system are:

### 1) Singleton Pattern:

All users (doctors, patients and receptionist) can login and logout from the system; here the user able to remain login in one window like WhatsApp if we request login on other window, so it logout the previous window.

### 2) Bridge

Here when a patient visits hospital; for medication, patient goes to reception and after paying fees patient shows to doctor and then on the prescription of doctor the nurse will provides the medicines to the patient. So receptionist is acting as bridge between doctor and patient.

### 3) Command Pattern

The admin officer is the one who is managing all stakeholders of this system. As admin have the access of each stakeholders info and admin has executive control and can command each act of users from his//her account

#### 4) Visitor Pattern

As doctors are listed in the system so when patient book an appointment online so he/she only select their own illness and system will suggest the doctors according to their illness i.e if they have fever , system will suggest them to visit OPD clinic in hospital.

### **SOFTWARE ARCHITECTURE PATTERN:**

Here we will apply MVC architecture for the web based hospital management system. Here view will be the User Interface represent to different users on their account. Receptionist can also update back info to the patient, more admin can CRUD the info of different users incl. doctors, patients and receptionist so it plays the role of model in MVC. Here controller acts as bridge or brain between view and model. Controller handles all interactions and inputs from users and update database using model i.e. Controller will handle updates request from receptionist and update back patient info using model.

### **PROGRAMMING LANGUAGE**

Type of programming language used in management system will object oriented programming approach due to different users. It might be helpful to work in different classes and apply object oriented relations between those classes as discussed in class diagram.

For storage services we need to apply SQL Language for database creating and insertion of data (info) in this system.