Software Design & Architecture
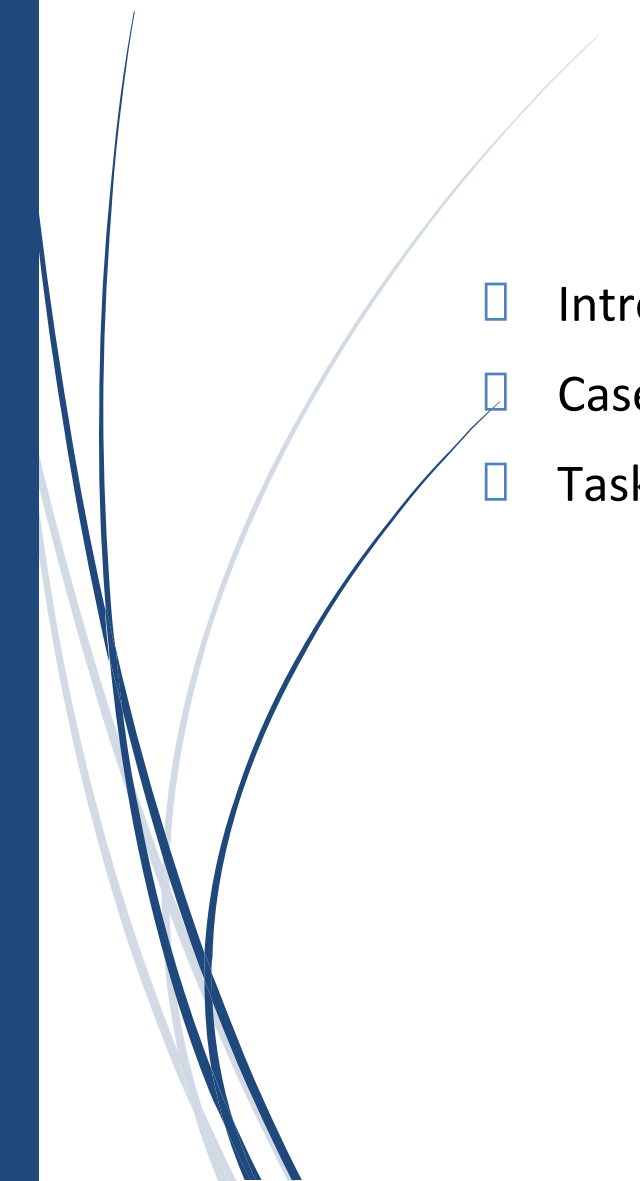## (Lab-1)

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Agenda of Lab # 1

- Introduction to Modeling (UML)
- Case Study Discussion
- Task # 1:

What is Modeling?

 A model is an abstraction of the real world.

 Modeling is a heavily practiced, proven engineering technique.

   architectural modeling of buildings

   mathematical modeling of systems

 Include important details and omit minor aspects.

Why do we model?

- To help us understand what a system should do, and how it should do it

- To communicate our decisions of what and how

- To detect and prevent misunderstandings and miscommunications

- To help understand existing systems (reverse engineering)

What is UML

- Standard language for modeling software-intensive systems

- Can be used to generate code

- Notation independent of development process

- UML is not a methodology or process

Elements of the Analysis Model

Object-oriented Analysis

Structured Analysis

Scenario-based modeling

Use case text
Use case diagrams
Activity diagrams

Flow-oriented modeling

Data structure diagrams
Data flow diagrams

Class-based modeling

Class diagrams
CRC models
Collaboration diagrams

Behavioral modeling

State diagrams
Sequence diagrams

UML Diagram Supports Multiple System Views

- Use case view (Use Cases, Activity)

  behavior of the system as seen by the end users

- Design view (Class, Object)

  both static and dynamic view of classes and objects; their

  relationships and their interaction

- Process view (Timing, Interaction, Statechart)

  illustrates concurrency and synchronization issues
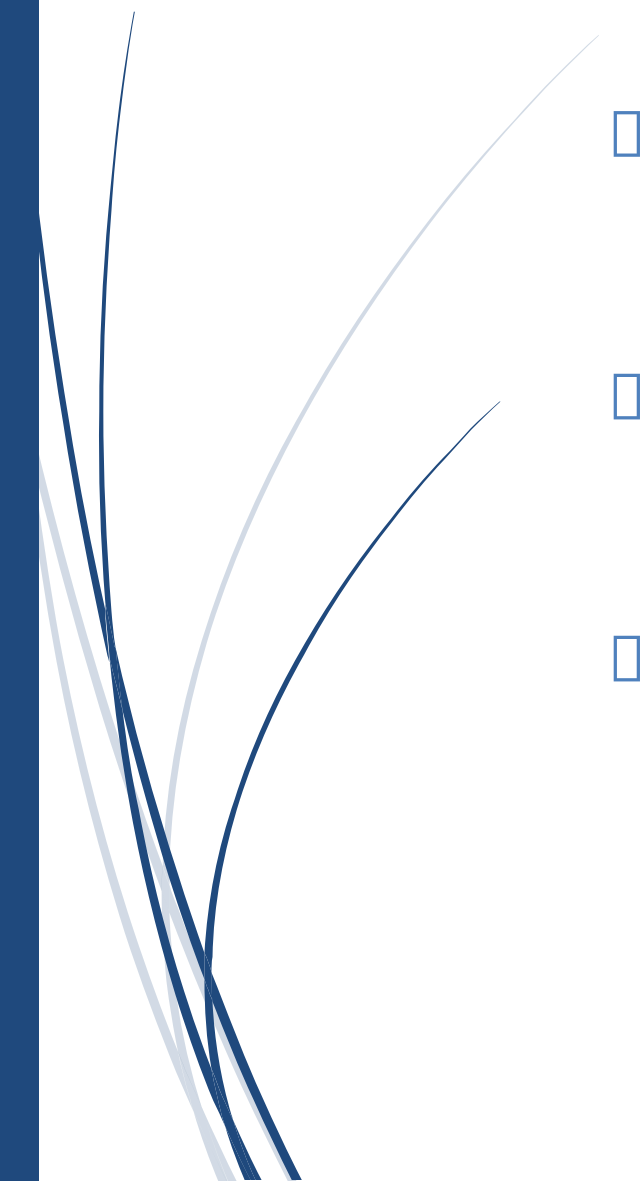
UML Diagram Supports Multiple System Views

- Implementation view (Component, Package)

- Deployment view (Deployment)

  distribution of parts among hardware elements

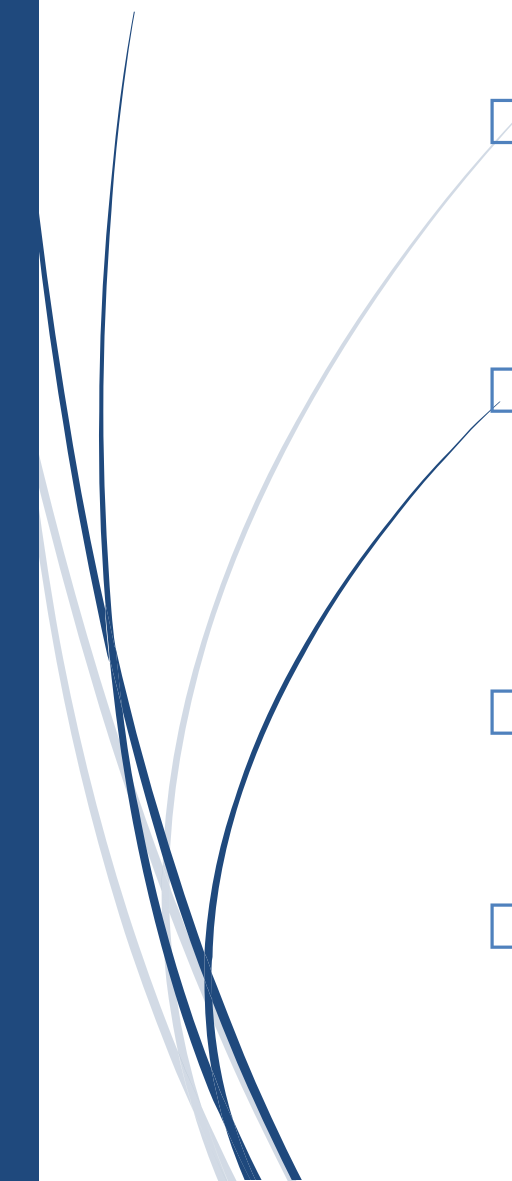# Case Study
(Hospital Management System)

Hospital Management System

- The Hospital Management System (HMS) is a web application, which used for the control of hospital services.

- The HMS web application can be accessed by either mobile or computer browser.

- The HMS application combines all details regarding doctors, patients, nurses, hospital administrative, etc. into one software.
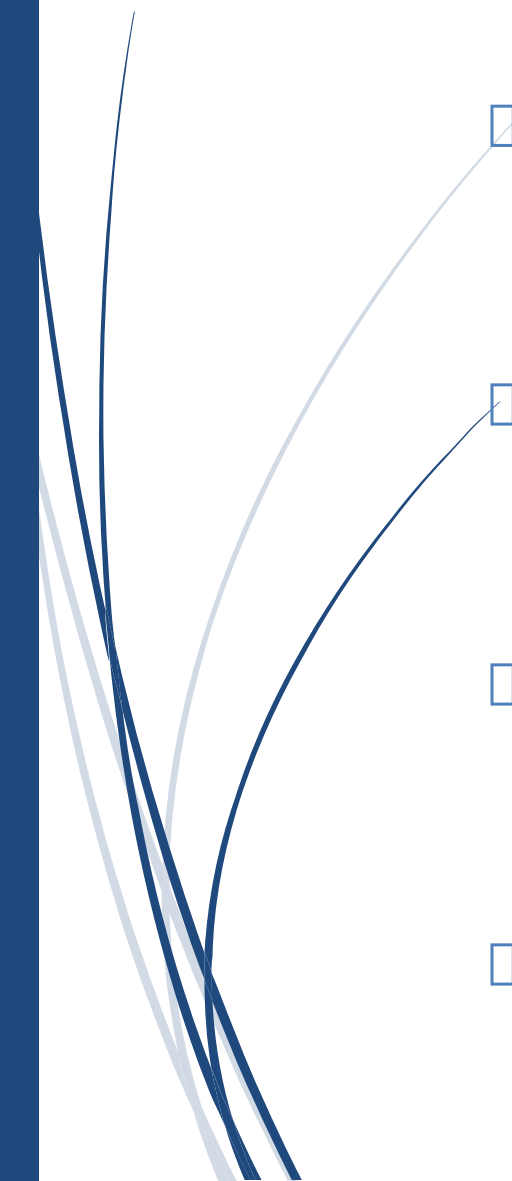
Hospital Management System

- HMS System allows the patients to register via a registration module (form), which gathers and stores all required patient's data such as name, e-mail, gender, etc.

- Registered patients can skip this step and login directly using their username and password through the login module. Nevertheless, unregistered users can only take advantage of major system features such as viewing the hospital timings.

- After the patient creates an account and register, he can access the allowed system features/functionalities for patients.

- Patients can view available appointments, book an appointment and manage his/her own profile. After the patient book an appointment, he can visit the hospital according to his appointment.

Hospital Management System

- Once the patient reaches the hospital, the receptionist will issue a clinic number for him since the receptionist has access to the system to view the appointments list and status with nurses and doctors.

- The HMS system also allows the receptionist to create patient accounts and book an appointment, referring to the doctors' schedule, for unregistered patients.

- Once patient's turn came, the patient can explain his condition to the consulting nurse, so that the nurse performs the pre-assessment examinations to diagnose the problem and then redirect him to the concerned doctor/clinic.

- The HMS system enables the nurse to allot patients for the concerned doctors, to view doctors' status and to update patients' account.

Hospital Management System

- Then, the concerned doctor will diagnose the patient, and then enter the prescription needed for the patient. If the doctor sees that the patient needs any further examinations like collecting and processing specimens, the system allows the doctor to redirect the patient to the Nurse again.

- After the nurse collects the specimens, the specimens will be sent to the laboratory so that the lab assistant can process, analyze the specimens, and then generate and enter the test results into the system.

- Furthermore, the doctor can redirect the patient to the lab assistant if there is a need to perform examinations such as X-Ray images, CT scan, MRI. The lab assistant can access the system and generate test reports regarding the examinations or test performed.

Hospital Management System

 On the other hand, the doctor keeps track of the examination results entered by the lab assistant and then recommend further actions to be taken if required, as well as enters a new prescription for the patient.

 The system also allows the patient to access his account to see prescription details and view his reports along with doctor advice.

 This feature is very useful since test reports usually take a long time to be generated, so that the patient may leave the hospital and view the results along with doctor's advice through his account without the need of going to the hospital again.

Hospital Management System

- Once the prescription is ready, the pharmacist will prepare the medicines for the patient and enters the dose and guidelines of each medicine into the system.

- When the patient goes to the pharmacy of the hospital, he/she will find the medicines ready so that he/she can pick and go easily.

- The patient has two options to know the dose and guidelines of each medicine, either by asking the pharmacist directly or by accessing his/her account to see it.

- This will help the patient be aware of the medicines' dose if he/she forgets it. Finally, the patient will need to go to the cashier to pay for his/her visit.

- The system allows the cashier to create and order invoice for payment through the billing module. In addition, the cashier can watch the payment history of the patients.

Task # 1

Create a working plan for HMS (Hospital Management System) case study using agile process model (Extreme programming). You are required to

☐ Identify functional requirements (FR's) from the case study and write User Stories for each FR in order to have detail understanding.

☐ Create Iteration Plans.

☐ Perform Test First Development (Write test descriptions for user story cards).

HAVE A GOOD DAY !