National University of Computer and Emerging Sciences

Lahore Campus

Software Engineering (CS3009)

Sessional-II Exam

Total Time (Hrs): 1

Total Marks: 40

Total Questions: 3

Date: April 3rd 2024

Course Instructor(s)

Ms. Ansa Liaqat, Ms. Mehroze Khan, Ms. Momna Zaneb, Mr. Zeeshan Nazar, Dr. Zeeshan Rana

Solution _____ _____

Roll No Section Student Signature

Do not write below this line

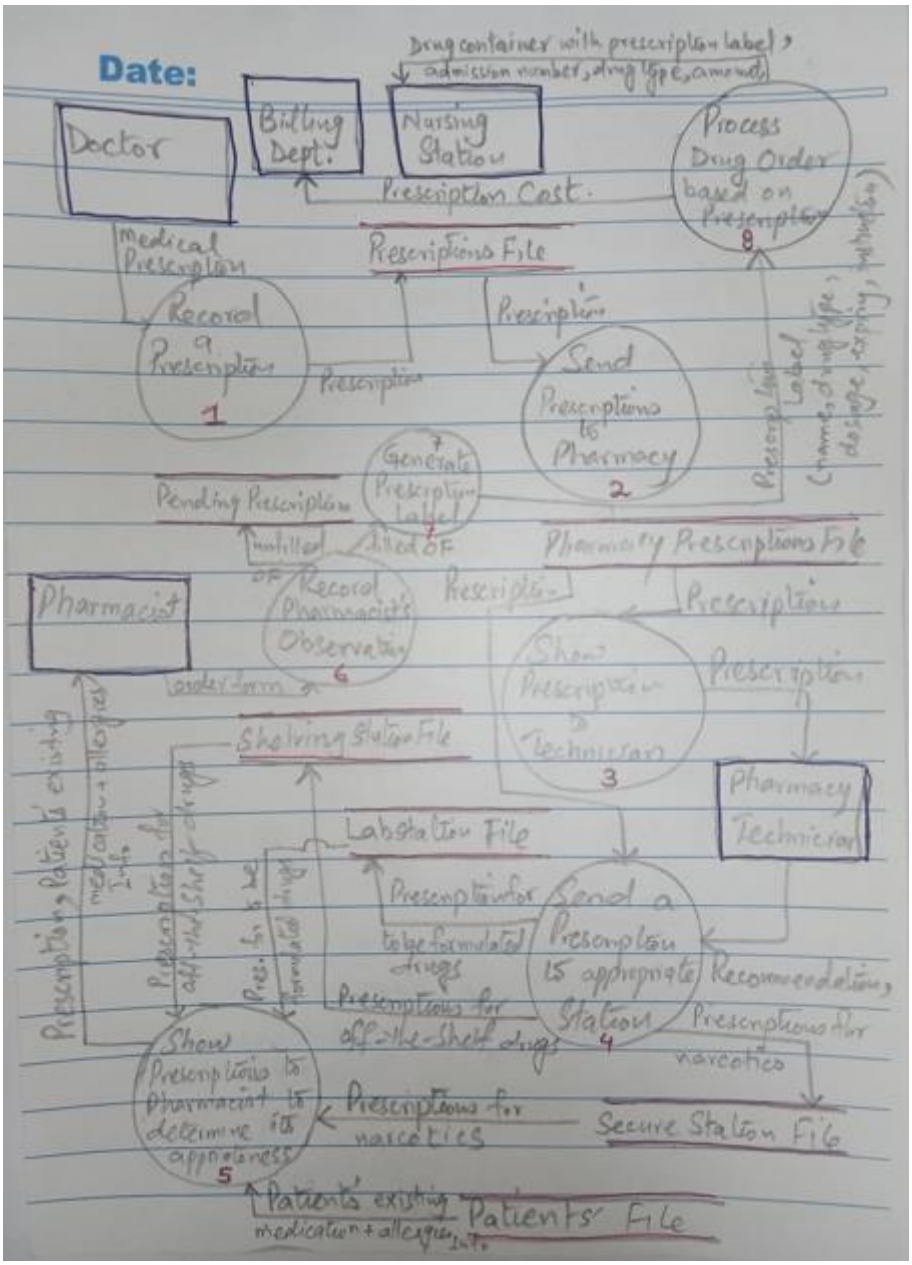
Attempt all the questions. A single-sided, A4-Size, handwritten help sheet is allowed.

CLO 2: Develop a model of requirements for a software system

Q1: The pharmacy at the National Hospital fills medical prescriptions for all patients and distributes these medications to the nursing station responsible for the patient's care. The system records the medical prescriptions written by doctors and sends the prescriptions to the pharmacy. A pharmacy technician is shown prescriptions in the system and on the technician's recommendation the prescriptions are sent to the appropriate pharmacy station. For example, the prescriptions for the drugs that must be formulated are sent to the lab station file, prescriptions for off-the-shelf are sent to the shelving station file, and prescriptions for narcotics are sent to the secure station file. At each station, the system allows a pharmacist to determine the appropriateness of the prescriptions by reviewing the relevant prescription file and the patient file (a prescription is appropriate if the dosage is at a safe level and will not negatively interact with the other medications or allergies indicated in the Patient's file). The system then records the pharmacist's observation provided through an order form. If the pharmacist does not fill the order form, the system places the prescription in the pending prescriptions file and prescribing doctor is contacted offline to discuss the situation. In this case, the order may ultimately be filled or the doctor may write other prescriptions depending on the outcome of the discussion. Once filled, a prescription label is generated listing the Patient's name, the drug type and dosage, an expiry date, and any special instructions. The label is pasted on the drug container and the order is sent to the appropriate nursing station. The patient's admission number, the drug type and amount dispends, and the prescription cost are then sent to the billing department.

To do: Provide a level 1 data flow diagram for the above scenario. Use the notation discussed in class. Strictly **follow** the notation. Failure to follow the notation will result in deduction of marks
[12+3=15 marks]

Note: State your assumption(s) clearly.



CLO 2: Develop a model of requirements for a software system

Q2: Consider a chemical tracking system in a lab where chemists can request a chemical and the system returns one container of the requested chemical to the chemist. While fulfilling the requests for the chemicals, the system checks if the chemical is available in the stock or not. If found in stock, the inventory is updated and the chemical is handed over to the chemist. Otherwise, a new order is sent to the vendors from the list available in the vendors' catalogue. Each record is also saved in the respective repository. Level 1 data flow diagram for this system is given in Figure 1.

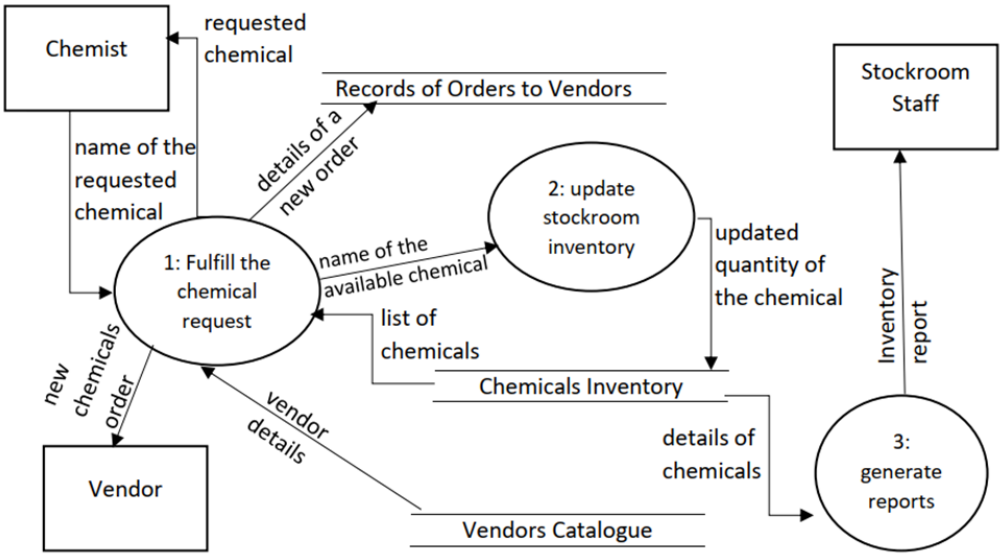
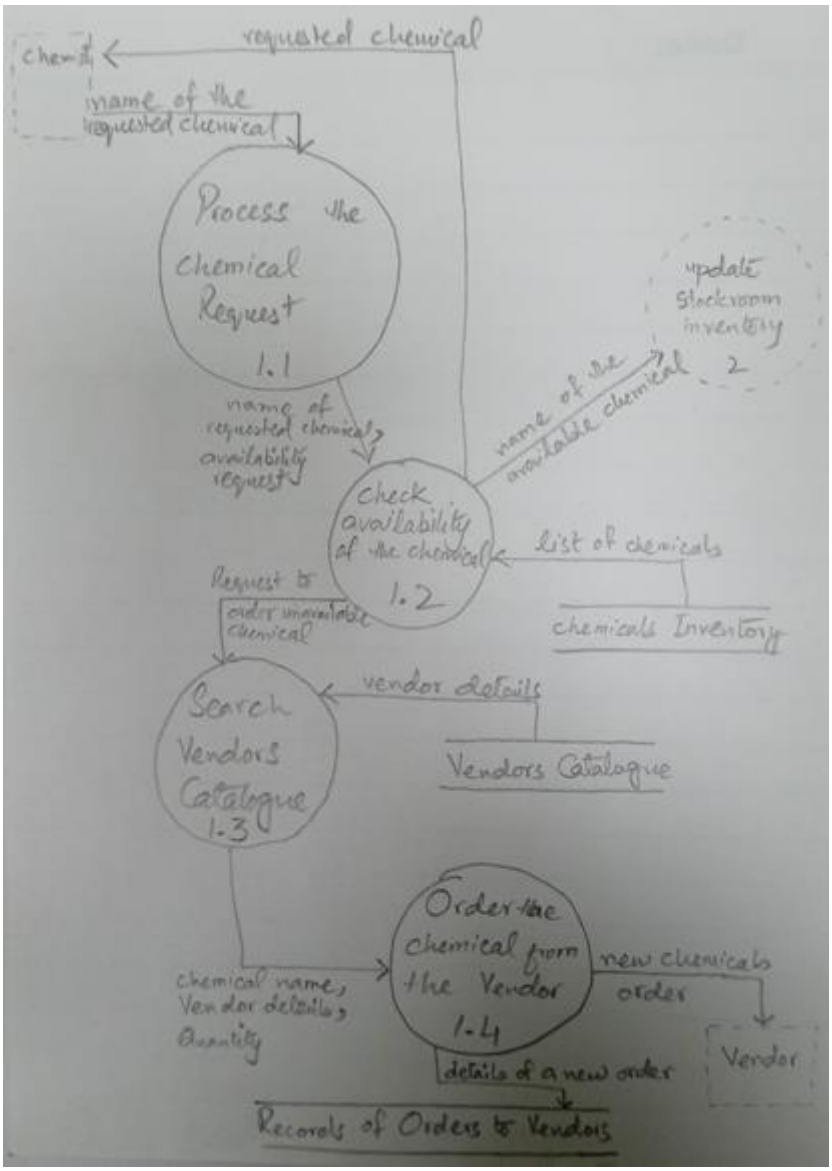


Figure 1: Level 1 DFD for Chemical Tracking System

To do: Identify and **list** the potentially non-primitive process(es) in figure 1, refine the diagram to level 2 and **draw** the refined diagram. Strictly **follow** the notation. Failure to follow the notation will result in deduction of marks. [2+5+3=10 marks]
Note: State your assumption(s) clearly.

Solution: Process 1 is non-primitive because it has more than one incoming and outgoing arrows. It also performs multiple tasks including lookup chemicals inventory and vendors catalogue, prepare and place orders to the vendors, and record the order details etc. One possible level 2 DFD* is as follows:



*The dotted components of the diagram are not part of the level 2 DFD and are not required from the students. They are shown here for better understanding only.

CLO 3: Design architecture of a software system by choosing the most appropriate architecture styles

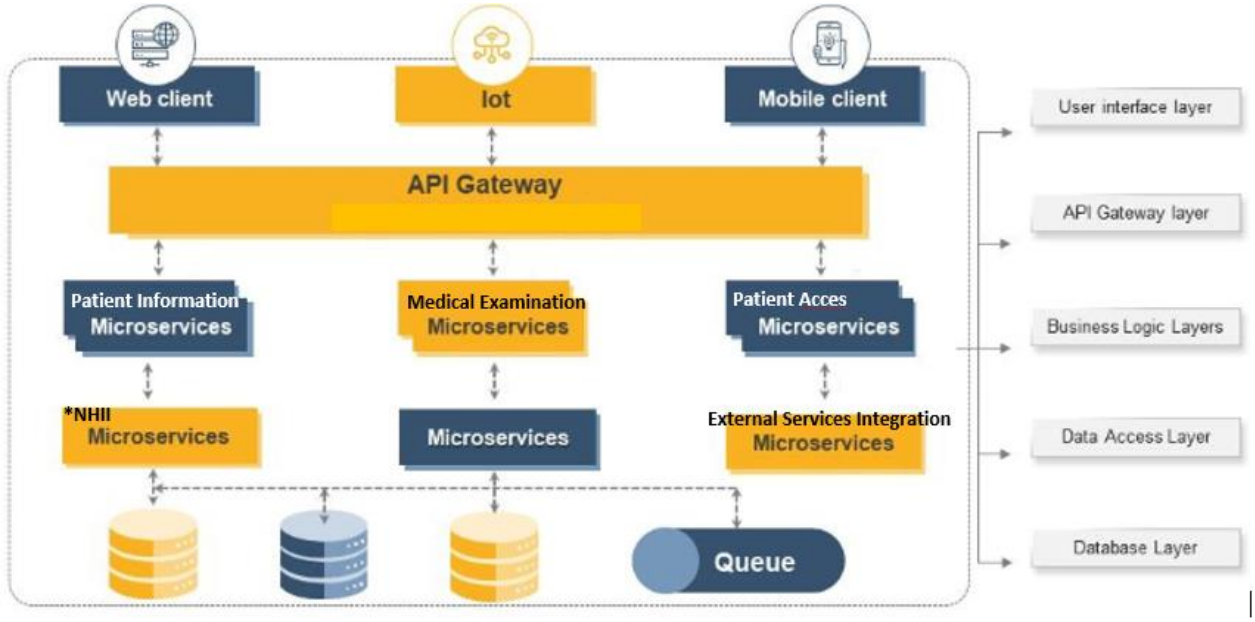
Q3: Suppose you are the software architect working on a software engineering project to develop a medical information processing system. Assume that the stated goal of this system is to manage the health records of patients for a large health maintenance organization. Among the identified functions of the system are the capabilities for doctors to access patient history online, especially in emergency situations, to add new information based on examinations and laboratory tests, and to allow patients access to their own medical information. Patients and doctors shall use this application on their computers but it is expected that a mobile interface will be required very soon. It is also recognized that this system will potentially need to upload and download information from a National Health Information Management System in the future. Regarding nonfunctional requirements little

information is currently available such as the system shall respond quickly in emergency situations and the system shall be user friendly for all types of users.

To do: Keeping in mind the above statement, **provide** an architecture diagram using the most suitable architecture styles. Clearly **mention/label** the architecture styles used. The diagram should be detailed enough to indicate the placement of system's modules. The diagram should not be a high level (and generic) diagram only. [10+5=15 marks]

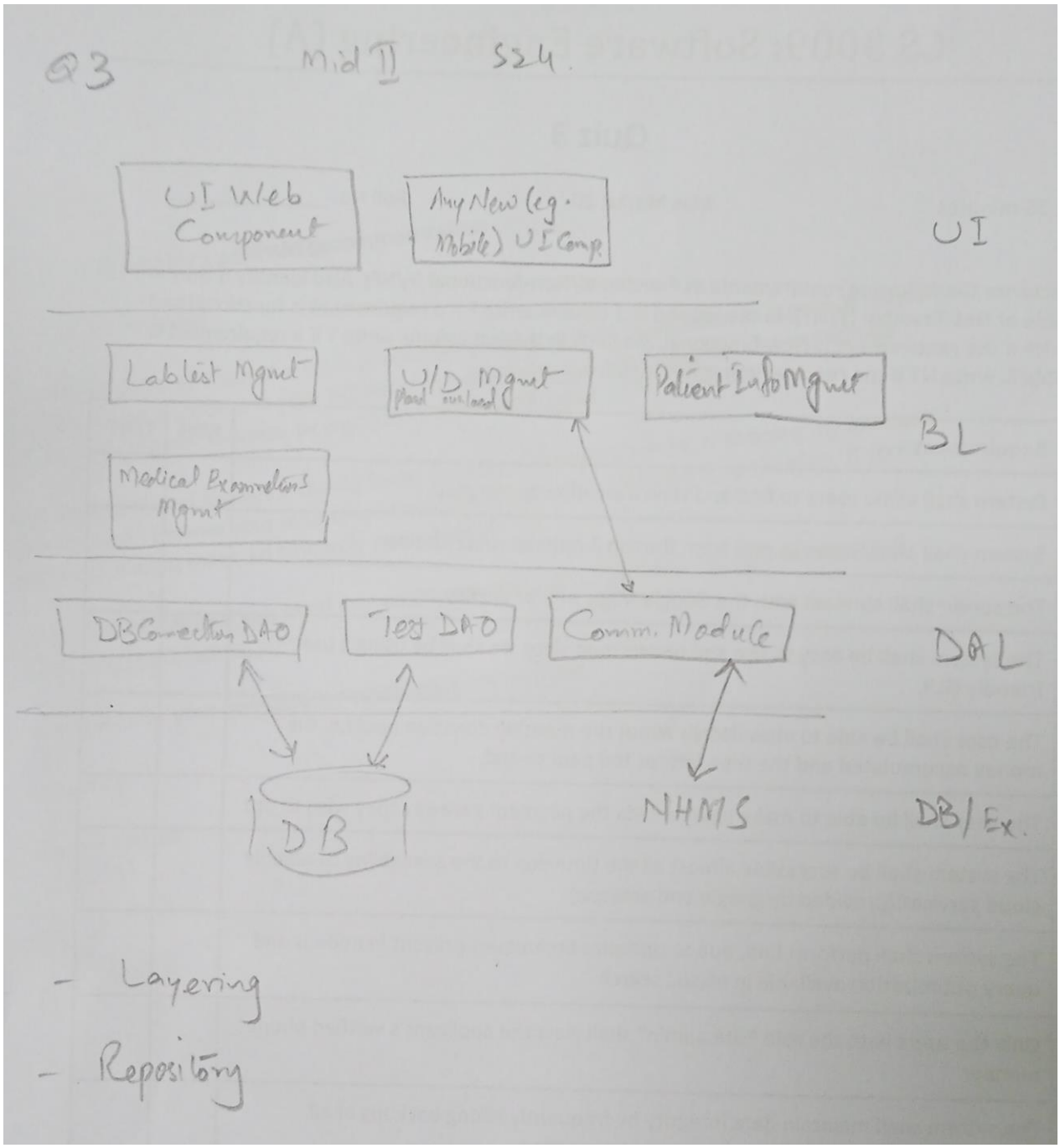
Note: State your assumption(s) clearly.

One possible solution is as follows**:



*NHII= National Health Information Integration

**This diagram gives a good idea of the solution, however, an alternate model solution is as follows:



One common thing in both diagrams is the decomposition of the system, the diagrams show the parts of the system and their organization.