Birla Institute of Technology & Science, Pilani
Work Integrated Learning Programmes Division
First Semester 2021-2022

Mid-Semester Test
(EC-2 Makeup)

Course No.	:
Course Title	: Software Architectures
Nature of Exam	: Open Book
Weightage	: 35%
Duration	: 2 Hours
Date of Exam	: 24/09/2021 or 08/10/2021 (FN/AN)

No. of Pages = 1
No. of Questions = 5

Note to Students:
1. Please follow all the *Instructions to Candidates* given on the cover page of the answer book.
2. All parts of a question should be answered consecutively. Each answer should start from a fresh page.
3. Assumptions made if any, should be stated clearly at the beginning of your answer.

Q.1 Set. (A) Marks **8**

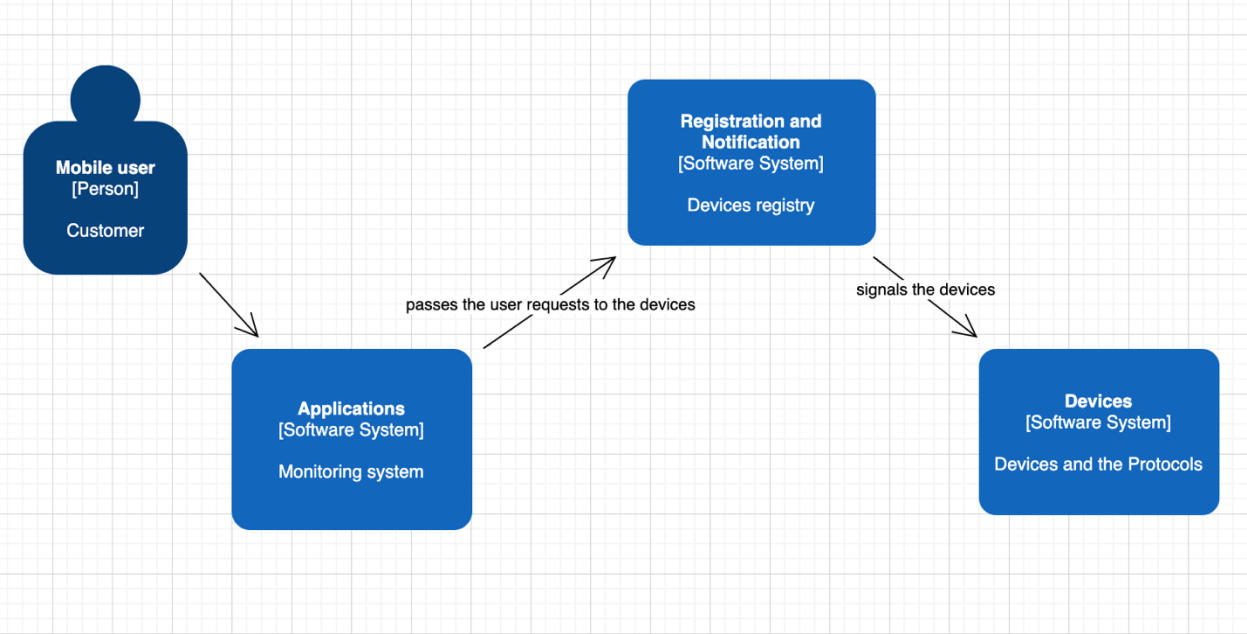
A home electronics giant wants to build a system for home automation: turning lights on and off, locking and unlocking doors, remote camera observation, and future unspecified behaviour. It's an mobile-app based system where the users can manage their homes remotely.

Requirements:

- The system must be as turnkey as possible, but be sold in modular units (camera, lock, thermostat, etc.) for easy purchase
- The units must be accessible over the Internet (for remote monitoring and access), and it is assumed the user will have an existing WiFi setup (router and connection) to tap into
- Customers can program the system to control the various modules according to their own needs.

The electrical engineering for the units will be taken care of by other groups, and the software protocols for controlling the modules is flexible, according to the needs/designs of your architecture. They will handle implementing the module side of the protocol, once you have specified it to them.

Draw a C4 context diagram for the above problem. List the assumptions you make. Show the different systems, if any.

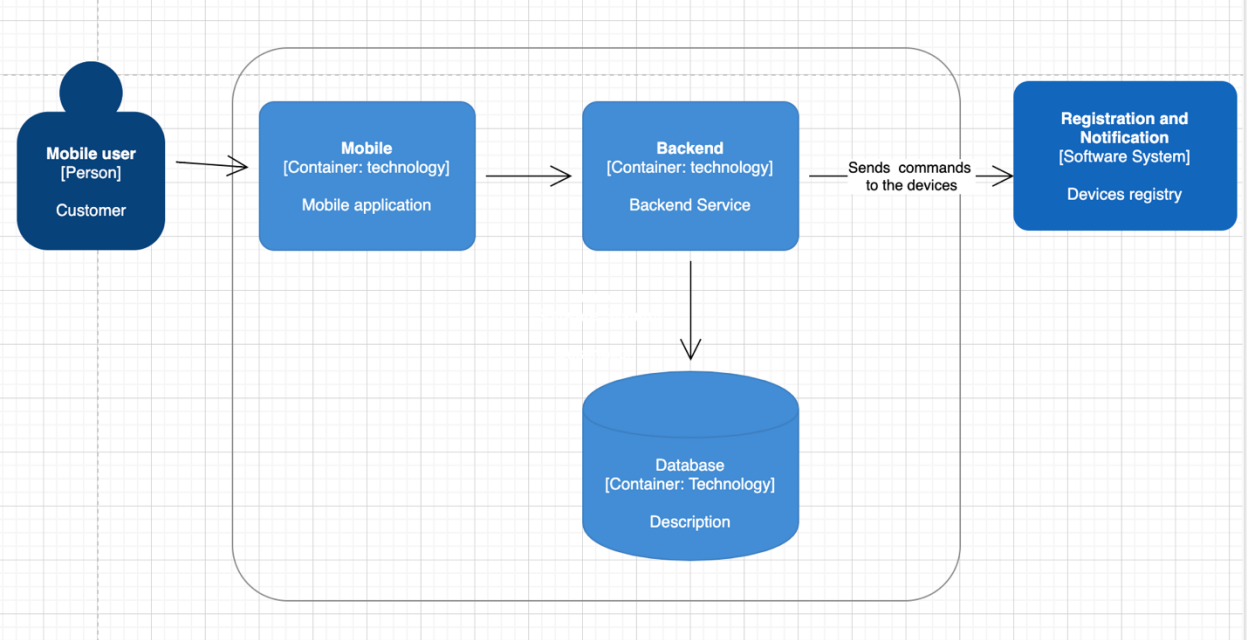


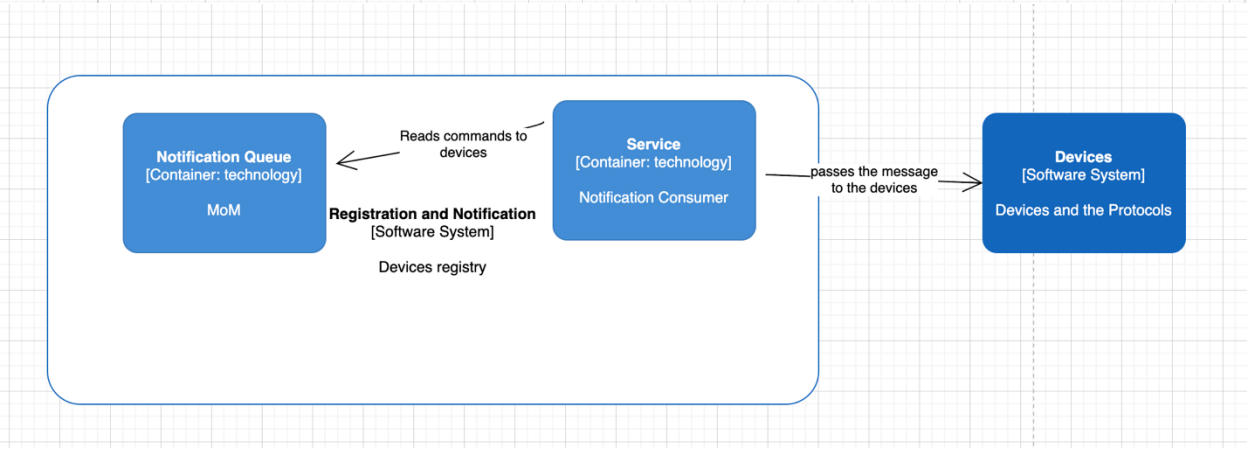
Q.2 Set. (A) Marks **15**

For the problem statement in (1) draw a C4 container diagram showing all the containers in the "software" system.

The rough flow is this. There will definitely be deviations to this flow

1. If the user wants to turn on her room light, she uses the mobile application and presses say a button(ON).
2. The command is send to the backend service.
3. The service passes the message to a MoM
4. The message is picked up by the Notifier service
5. The notifier service sends the message to the Light device





Q.3 Set. (A) Marks **6**

In the problem statement in (1) show the layers with their responsibilities for the core mobile application.

Presentation Layer: Displays the devices list/registration options/ Passes the devices command to the back end
Business layer: Not really applicable(But if the student has listed something, don't penalize)
Service layer: Connect to the backend service
Persistence layer: Devices information can be stored in the mobile itself
Database/Data source layer: Core data store present in the mobile

Q.4 Set. (A) Marks **6**

In the problem statement in (1) show the layers with their responsibilities for any backend one container application

Layers and responsibilities for Mobile backend service

Presentation Layer: Display the devices list/registration options
Business layer: Not really applicable(But if the student has listed something, don't penalize)

Service layer: Pass the message to the Notifier service
Persistence layer: Reads the user information, devices information from the database
Database/Data source layer: An RDBMS/NoSQL database containing the user information/device list