1. When describing a system, explain why you may have to design the system architecture before the requirements specification is complete.

   An architecture design is concerned with understanding how a system should be organized and designing the overall structure of that system. In the model of software development process, architecture design is the first stage of the system. It describes how the system is organized as a set of communicating components.
   Writing specification for the whole system might bring great complexity and it is difficult to formulate it. So, it is easier to divide the system into simpler subsystems and define their specification and it will define specification and put it into respective subsystem.
   Hence, we can concurrently develop subsystems and the specification to be readily into the implementation stage.

   The architecture has to be designed before specification are written, because
   1. To provide a means of structuring.
   2. The specification and developing different sub-system specifications concurrently.
   3. To allow manufacture of hardware by sub-contractors and to provide a model for system costing.

2. Explain why design conflicts might arise when designing an architecture for which both availability and security requirements are the most important non-functional requirements.

   Conflicts of Availability and Security Requirements.

   Generally, the most non-functional requirements for design system architecture as follows:
   - Performance
   - Safety
   - Security
   - Availability
   - Maintainability

   While design an architecture, it may arise conflicts in security and availability requirements in above non-functional requirements.

   The Reasons as follows:
   - The system architecture disturbs the robustness, maintainability and performance of a system. The particular style and structure preferred for an application may consequently depend on these requirements.
   - In security requirement, the architecture must be used layered structure in a security requirement. It is an extraordinary level of security validation applied to these layers.

- In availability requirement, the architecture must be considered to terminate components and so that it is probable to change and edit components without preventing the system.
- The security and availability are critical requirements. But the major architectural conflict occurred between replication and several copies in availability requirement and security requirement conflict occurred between specialization and minimal copies. So, design conflicts might arise whether a layered structure of redundant components are used when designing an architecture.

3. An information system is to be developed to maintain information about assets owned by a utility company such as buildings, vehicles, equipment, etc. It is intended that this will be updatable by staff working in the field using mobile devices as new asset information becomes available. The company has several existing asset databases that should be integrated through this system. Design a layered architecture for this asset management system based on the generic information system architecture shown in Figure 1.

Asset management system

An asset management system has many layers which are related to security, set of rules, etc. the diagram to show the layered architecture of asset management system is as given below:

<table>
<tr><td>User interface layer</td><td>Access web server using Browser</td></tr>
<tr><td>Business logic layer</td><td><table><tr><td>Business service class</td><td>Security class</td><td>Custom logic class</td></tr><tr><td colspan="3">Business logic layer</td></tr><tr><td colspan="3">Data access layer</td></tr></table></td></tr>
<tr><td>Database Layer</td><td><table><tr><td colspan="2">Stored Procedures</td></tr><tr><td>Views</td><td>Tables</td></tr><tr><td colspan="2">SQL server</td></tr></table></td></tr>
</table>

Explanation:

- There are three types of layer for architecture of asset management system.

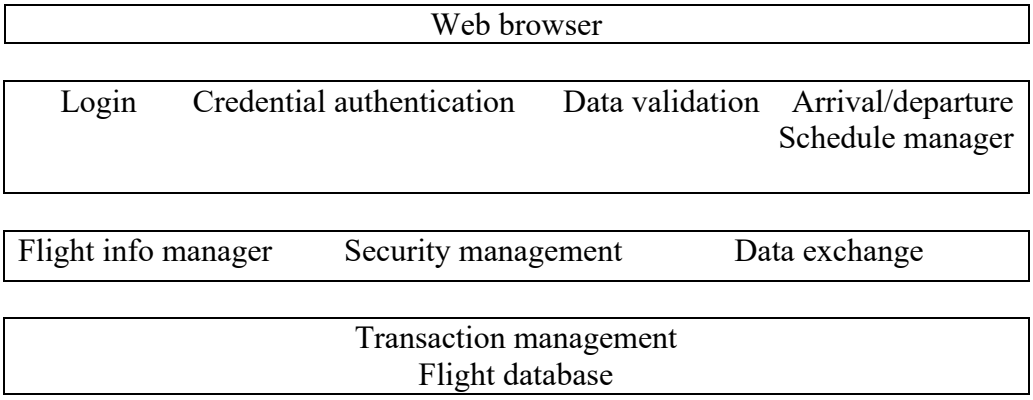
1. User interface layer.
2. Business logic layer.
3. Database layer.

- In User interface layer, user can access web serving using the browser.
- In Business layer, user has some options, business service class, security class, custom logic class. After seen these option user goes to the business logic layer and access the data-on-data access layer.

- In Database layer, user sees the stored procedures, different views, tables and SQL server.

4. Using the basic model of an information system as presented in Figure 1, suggest the components that might be part of an app for a mobile device that displays information about flights (arriving and departing from an airport).

   The components of an information system that allows users to view information about flights are as shown in the layered information system architecture.



1. The top layer implements the user interface. The component responsible for this implementation is the web browser.
2. The second layer includes the components to allow users to log in to system, verify their credentials and data entered and obtain arrival and departure schedules of a flight.
3. The third layer contains component that implement system security, maintain flights information, and exchange information between databases and provide to users.
4. Fourth layer contains database and transaction management component

Figure 1:
Layered information system architecture.