**Lab Tasks**

Q.1

1. Let's consider a scenario involving an online booking system for a travel agency:

**Booking Terminal Component**:

* + Represents the interface used by travel agents to make bookings.
  + Connects to:
    - **Booking Server Component**:
      * Manages the booking process, including reservation storage and confirmation.
      * Communicates via:
        + **Booking Message Interface**:

Interface used for communication between the Booking Terminal Component and the Booking Server Component.

1. **Message Queue Component**:
   * Acts as an intermediary between the Booking Terminal and the Booking Server, especially when the server is experiencing high traffic or downtime.
   * Provides:
     + **Booking Message Interface**:
       - Interface used by the Booking Terminal Component to communicate with the Message Queue.
   * Requires:
     + **Booking Message Interface**:
       - Interface required by the Message Queue to communicate with the Booking Server.
2. **Booking Server Component**:
   * Comprises two major components:
     + **Booking Processor**:
       - Realizes the Booking Message Interface.
     + **Database Connector**:
       - Communicates with the Booking Database Component to store and retrieve booking information.
3. **Booking Database Component**:
   * Represents the database where booking information is stored.
4. **Accounting System Component**:
   * Manages financial transactions and billing information.
   * Connects to:
     + **Accounting Driver Component**:
       - Retrieves billing details and financial information for each booking.
       - Provides:
         * **Billing Information Interface**:

Interface used by the Accounting Driver Component to communicate with the Accounting System Component.

* + - **Booking Processor Component**:
      * Receives billing information from the Accounting Driver for each completed booking.

**Q.2**

In an online video streaming platform, the internal structure consists of three related subsystems - Content Delivery, User Accounts, and Billing.

1. **Content Delivery Subsystem**:
   * This subsystem manages the delivery of video content to users.
   * It contains three components related to content delivery:
     + **Video Search Engine**: Allows users to search or browse for videos by exposing the provided interface "Content Search". It utilizes the required interface "Content Catalog" provided by the Content Catalog component to retrieve information about available videos.
     + **Video Player**: Provides the functionality for users to watch videos. It uses the "Manage Playback" interface provided by the Playback Manager component to control video playback.
     + **Content Recommendation Engine**: Recommends personalized video suggestions to users based on their viewing history and preferences. It exposes the "Recommendations" interface for users to receive recommendations.
2. **User Accounts Subsystem**:
   * This subsystem manages user accounts, authentication, and authorization.
   * It contains the following components:
     + **User Authentication**: Allows users to create accounts, login, or logout. It binds users to their respective accounts and ensures secure access to the platform.
     + **User Profile Management**: Enables users to update their profiles, manage preferences, and view their watch history. It provides the "Manage Profile" interface for users to modify their account settings.
     + **User Subscription Management**: Handles user subscriptions, including upgrades, downgrades, and cancellations. It exposes the "Subscription Management" interface for users to manage their subscription plans.
3. **Billing Subsystem**:
   * This subsystem handles billing and payment processing for user subscriptions.
   * It provides two interfaces:
     + **Manage Subscription**: Manages user subscriptions, including billing cycles, payment methods, and invoice generation.
     + **Manage Payment**: Facilitates payment processing, including authorizing transactions, processing payments, and handling refunds.

**Q.3**

Scenario: Online Banking System

In an online banking system, the BankingApplication component provides the interface for users to perform banking operations, such as transferring funds and checking account balances. This BankingApplication component requires the interface of an AccountManager component for managing user accounts.

The BankingApplication component consists of three internal components: TransactionManager, UserAuthentication, and AccountSummary.

The TransactionManager component handles the processing of transactions initiated by users. It delegates the processing to the TransactionHandler component, which implements the TransactionManager's interface.

The UserAuthentication component is responsible for authenticating users before allowing them access to their accounts. It requires the interface of an AuthenticationServer component, which handles user authentication. The UserAuthentication component forwards user authentication requests to the AuthenticationServer component through its required AuthenticationInterface port.

The AccountSummary component provides users with a summary of their account information, such as transaction history and account balances. It relies on the AccountDatabase component to fetch account information. The AccountSummary component connects to the AccountDatabase component's required AccountDataInterface port to access account data.

By connecting to the AccountDataInterface port, the internals of the BankingApplication component, such as the AccountSummary component, can interact with the AccountDatabase component as if it were a local entity, even though it resides outside the BankingApplication component. The AccountDatabase component implements the required AccountDataInterface and manages the storage and retrieval of account data.