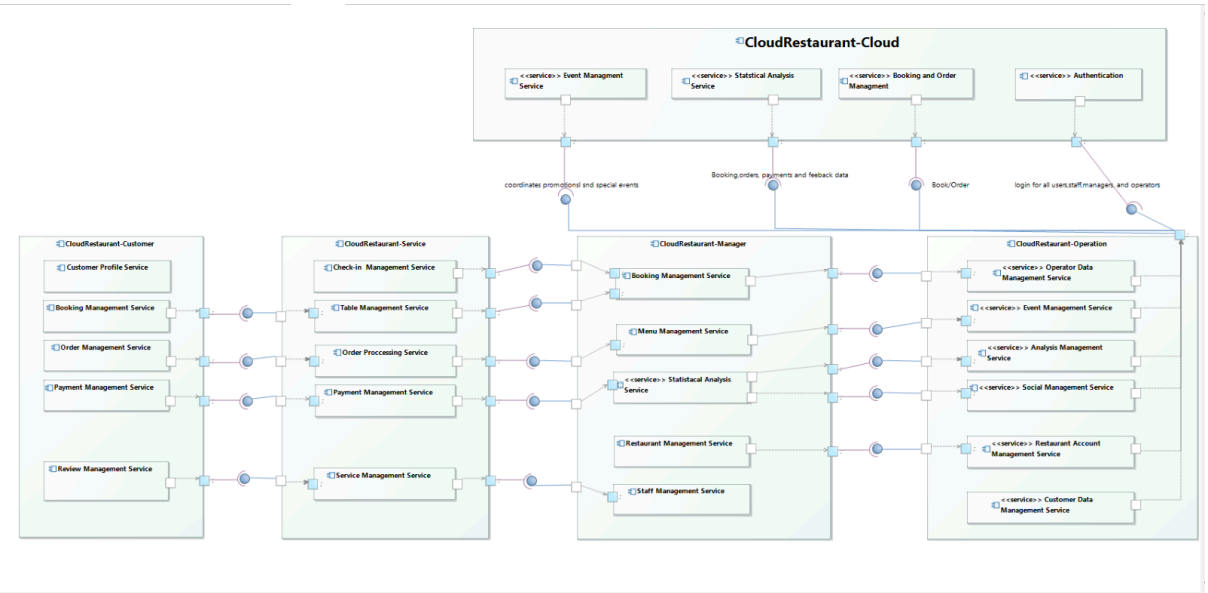
Task 4(b) *Architecture of the whole system* (10 Marks, Team effort): The team should produce an architectural design of the whole system through integrating the subsystems together.

***Note**:*

1. *You should specify the architectural designs in the UML component diagrams with a set of component nodes to represent microservices and a set of interfaces to represent the connectors between them.*
2. *The components and connectors, including their methods and parameters, should be specified in a*



textual documentation to define their functionalities and meanings:

1.The Customer Subsystem

This handles features that directly interact with the customers; it allows customers to create profiles, book tables, make orders, perform payments, and leave feedback or reviews. This subsystem is highly integrated with cloud services in order to perform user authentication, booking management, order management, payment transactions, and event notifications. Through this portal, customers can access events happening in restaurants and personalized services; the data is constantly updated in other subsystems to maintain consistency.

The Customer Subsystem is integrated with the Service Subsystem via the Order Management Service and the Booking Management Service. When customers make a booking or place an order, the system sends this information to the Service Subsystem so that service staff can effectively respond to customer needs. It also integrates with the Manager Subsystem so that managers can view customer bookings and feedback, and with the Operation Subsystem to analyze customer trends for multiple restaurants.

2. CloudTables-Service Subsystem

The Service Subsystem provides restaurant staff with the tools they need to serve guests effectively. The system enables service personnel to check the status of bookings, manage table reservations, take orders, and receive payments. Moreover, the subsystem integrates with cloud services to obtain real-time booking information and to sync customer orders along with tracking table availability.

The goal is to empower service staff with the ability to efficiently meet customer requests based on data that is always up to date, enabled through cloud backing.

The Service Subsystem interfaces with the Customer Subsystem to obtain details concerning reservations and orders. It also publishes information received from the Manager Subsystem, concerning real-time situations of the services being operated, such as table allocation and order status. The Service Subsystem interacts with the Operation Subsystem for consistency in service levels among the restaurants and service quality.

3. CloudTables-Manager Subsystem

The Manager Subsystem enables the restaurant managers to take control of all operational aspects of the restaurant. It provides capabilities to edit details of the restaurant, menu items, view and update reservations, staff assignment, and performance analysis of the restaurant. This subsystem uses cloud technologies in order to support booking management, analyze customer's ratings and comments, refresh configurations of the restaurants, and manage promotional activities.

Managers use the statistical analysis services in the cloud to gain insights into restaurant performance, helping them make informed business decisions.

The manager subsystem cooperates with customer service to get information about booking details and customer feedback. In a broader sense, it interacts with service subsystems to help staff service arrangements so that services can be well coordinated. In addition, it strengthens the integration with the Operation Subsystem, coordinating restaurant-level management according to the overall operational objectives, which can be further expanded to event planning, including overall system-wide performance monitoring and analysis.

4. CloudTables-Operation Subsystem

System operators will use the Operation Subsystem in managing broad activities across multiple restaurants. It allows them to activate or deactivate any restaurant account, monitor system-wide data, plan events, manage customer relationships, and generate cross-restaurant reports. This subsystem interacts closely with the cloud, mainly for accessing centralized data, providing system-wide analysis, and managing events that span multiple restaurants. This maintains standardization in consistency of operations.

The Operation Subsystem is connected to all other subsystems in the system. It interacts with the Customer Subsystem to obtain information about customer preferences and feedback. In addition, it interacts with the Service Subsystem to ensure that service quality is consistent across the restaurants and coordinates with the Manager Subsystem to ensure that management processes at the restaurant level are in line with overall operational strategies. The Operation Subsystem will also manage promotional functions and ensure that all other subsystems are kept aware of system-wide activities.

Cloud Integration and Centralized Services

The cloud infrastructure is a central component of the CloudTables system, hosting services such as authentication, data management, ordering, booking management, handling payments, and statistical reporting. It keeps all of the data synchronized throughout the different subsystems while providing access control; it also acts as the entry point and service registry for communication purposes. These are the main components:

Authentication Service: Provides secure login functionality and handles all types of users' sessions, including customers, employees, managers, and operators. Booking and Order Management Services: Facilitate the centralized administration of customer bookings and orders, ensuring accessibility to all subsystems for consistent updates. Statistical Analysis Service: Consolidates data from reservations, orders, payments, and feedback to generate insights for managers and operators. Event Management Service: Coordinates promotional and special events along with all relevant subsystems to create visibility. This cloud-based infrastructure supports strong integration across all four subsystems, bringing about a coherent experience for customers, efficient operations for service personnel, extensive management features for managers, and proficient system monitoring for operators. Each of these elements collaborates effectively to offer a holistic, adaptable, and secure solution for restaurant management.