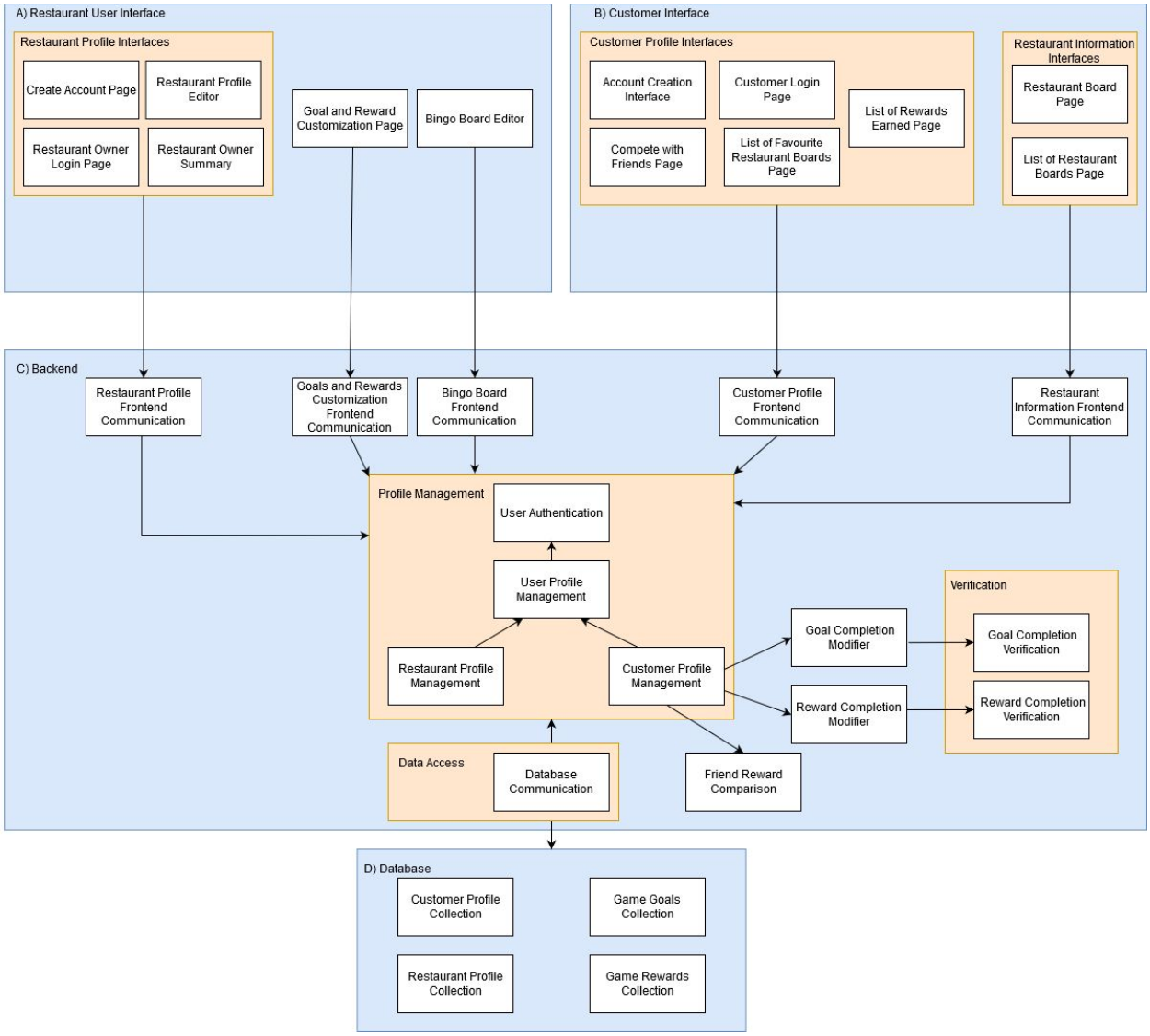

A) The Restaurant User Interface subsystem contains one subcomponent with multiple components and two independent components. All of these are dependent on the Backend. The subsystem components and dependencies are further explained as follows:

a) The Restaurant Profile Interfaces subcomponent contains all the interfaces pertaining to the restaurant user's profile. The entire subcomponent is dependent on the Profile Frontend Communication based in the Backend. The subcomponent's components are further explained as follows:

i) The Restaurant Owner Login Page prompts the user to enter their username and password. An error message will appear if the username or password are incorrect.

ii) The Restaurant Owner Summary displays the information as well as provides links to their bingo board and a link to edit their public profile page.

iii) The Create Account Page provides a form in which the new user can add their full name, desired username and password in order to create a new restaurant profile.
iv) The Restaurant Profile Editor provides a form in which the restaurant owner can update their restaurant information.

b) The Goals and Rewards Customization Page allows for a restaurant user to create customized goals and/or rewards that are unique to them. This component is dependent on the Goals and Rewards Customization Frontend Communication component in the Backend.
c) The Bingo Board Editor allows for a restaurant user to edit the setup of their bingo board, including the rewards earned when a customer gets a bingo. This component is dependent on the Bingo Board Frontend Communication component in the Backend.

B) The Customer Interface subsystem contains two subcomponents, each with multiple components. These subsystems are dependent on the Backend. The subsystem components and dependencies are further explained as follows:
a) The Customer Profile Interfaces subcomponent contains all the interfaces pertaining to the customer's profile. The entire subcomponent is dependent on the Customer Profile Frontend Communication based in the Backend. The subcomponent's components are further explained as follows:
i) The Account Creation Page provides a form in which the new user can add their First Name, desired username and password in order to create a new restaurant profile.
ii) The Customer Login Page prompts the customers to enter their username and password. An error message will appear if the username or password are incorrect.
iii) The List of Rewards Earned Page shows the user a list of all the rewards that they redeemed.
iv) The Compete with Friends Page shows the user their ranking in comparison with their friends who use the application.
v) The List of Favourite Restaurant Boards Page displays the boards that the customer has saved in order for them to access easily.
b) The Restaurant Information Interfaces subcomponent contains all the interfaces pertaining to the information of the restaurants using the application. The entire subcomponent is dependent on the Restaurant Information Frontend Communication based in the Backend. The subcomponent's components are further explained as follows:
i) The List of Restaurant Boards Page shows the user a list of all the restaurant boards that are in progress. A restaurant board that is "in progress" has one or more goals completed.
ii) The Restaurant Board Page shows the user an individual restaurant game board.

C) The Backend subsystem contains multiple components and two subcomponents. The subsystem components and dependencies are further explained as follows:
    a) The Profile Frontend Communication allows the Restaurant Profile Interfaces in the Restaurant User Interface subsystem to interact with the Backend.
    b) The Goals and Rewards Frontend Communication allows the Goals and Reward Customization Page in the Restaurant User Interface subsystem to interact with the Backend.
    c) The Bingo Board Frontend Communication allows the Bingo Board Editor in the Restaurant User Interface subsystem to interact with the Backend.
    d) The Customer Profile Frontend Communication allows the Customer Profile Interfaces in the Customer Interface subsystem to interact with the Backend.
    e) The Restaurant Information Frontend Communication allows the Restaurant Information Interfaces in the Customer Interface subsystem to interact with the Backend.
    f) The Profile Management subcomponent contains all the interfaces pertaining to the profiles stored in the database. The entire subcomponent is dependent on the Profile Frontend Communication, Goals and Rewards Frontend Communication, Bingo Board Frontend Communication, Customer Profile Frontend Communication, Restaurant Information Frontend Communication, and Database Communication components in order to update and maintain the profiles of the application users. The subcomponent's components are further explained as follows:
        i) The User Authentication component allows for the verification of inputted usernames and passwords.
        ii) The User Profile Management component allows for users in general to modify their account information.
        iii) The Restaurant Profile Management component allows for restaurant owner users to modify their restaurant profiles; these modifications include changes to the goals and rewards they want to offer. This component inherits from the User Profile Management.
        iv) The Customer Profile Management component allows for customers to modify their friend lists as well as access goals and rewards. This component inherits from the User Profile Management. This component is dependent on Friend Reward Comparison and Verification.
    g) The Friend Reward Comparison ranks customer users based on the number of rewards earned compared to their friends.
    h) The Verification subcomponent contains all the interfaces pertaining to verifying that a customer has achieved goals and obtained rewards. The subcomponent's components are further explained as follows:
        i) The Goal Completion Verification component allows for restaurant owners to verify if a goal is completed by a customer.

        ii) The Reward Completion Verification component allows for restaurant owners to verify if a reward is valid and redeemed by a customer.
    i) The Goal Completion Modifier component allows for the goals field of the Customer Profile Database to be updated when a goal is completed. This component is dependent on the Goal Completion Verification so that restaurant users can verify that the goal is completed.
    j) The Reward Completion Modifier component allows for the rewards field of the Customer Profile Database to be updated when a reward is redeemed. This component is dependent on the Reward Completion Verification so that restaurant users can verify that the reward is valid and redeemed.
    k) The Data Access subcomponent contains the component related to accessing data from the database. This subcomponent is dependent on the Database subsystem so that it can communicate with the database components as well as the Profile Management so that it can update the information in the database.
        i) Database Communication allows for the Backend to communicate with the Databases.
D) The Database subsystem contains multiple components. The Database is dependent on the Database Communication in the Backend subsystem. The components are as follows:
    a) The User Account Database stores user account information such as password and username.
    b) The Restaurant Profile Database stores restaurant information such as name of the restaurant, the username associated with the restaurant, the restaurant goals, and the restaurant rewards.
    c) The Game Goals Database stores the premade goals used for the bingo loyalty game.
    d) The Games Rewards Database is used for storing rewards for the bingo loyalty game.
    e) The Customer Profile Database is used for storing customer user information such as username, active game boards, goals completed, rewards earned, and friends' usernames.

Changes to System Components

For this deliverable, we introduced a new subcomponent called Data Access to contain the Database Communication component. This new subcomponent decouples the Database Communication from Profile Management and allows for it to be related indirectly. In addition, it allows for future components related to data access to be introduced without affecting the other components directly. However, this subcomponent is still a part of C)Backend as it resides in the backend of our system. Also, we changed the names of the Login Interface in A)Restaurant User Interface and Login Page in B) Customer User Interface to Restaurant Owner Login Page and Customer Login Page to help distinguish the two interfaces. We changed the names and kept them separate because even though they are very similar they function differently and belong to different subsystems.

Minimizing Coupling & Maximizing Cohesion

In Deliverable 3, the frontend components all shared the same backend communication, both on the A) Restaurant User Interface and the B) Customer Interface. In Deliverable 4, we decoupled these features by creating more specific backend communication components. That is, each feature has its own backend communication. Thus, we minimized coupling in our current system diagram.

We introduced the subcomponents to group together similar components. For example, we introduced the Profile Management subcomponent in the C) Backend which contains the components User Authentication, User Profile Management, Restaurant Profile Management, and Customer Profile Management. These components are all grouped together since they relate to the management of profiles in the system. In addition, User Profile Management serves as a parent component, while Restaurant Profile Management and Customer Profile Management inherit from it. Thus, with the introduction of subcomponents with some inheritance, we maximized cohesion in our current system diagram.