**2b. Software Architecture Representation**

This section illustrates the software architecture decomposition in terms of a package diagram.

**2b.i High Level Decomposition**

The following package diagram illustrates the high level decomposition of the software architecture:

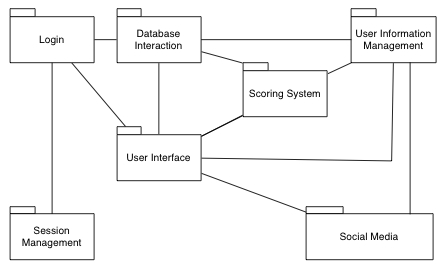


Figure 1: Package diagram for Healthy Eating Application

**Session Management Package**: a collection of classes associated with session management.

**Login Package:** a collection of classes related to gaining access to features available only to registered users.

**User Interface Package:** a collection of classes that enable visual interaction with the user.

**Social Media Management Package:** a collection of classes related to the interaction of the application with Facebook.

**User Information Management Package:** a collection of classes that handle user’s personal account data such as their food entries, status and friend list.

**Database Interaction:** this package is related to database interaction operations. The Healthy Eating Application uses a considerable amount of different types of queries to the database thus a separate package for this activity is warranted.

**Scoring System:** a collection of classes associated with evaluating user food logs and assigning appropriate scores. This package also contains operations linked to determining if the user needs prompts for healthier eating choices.

**2b.ii Second Level of Decomposition**

A second level of decomposition, identifying the main components within package, can be derived from Figure 1. This detailed decomposition highlights the major components present within the package. Note that components are units of computations and may be comprised of more than one class (marked as <<main component>> in diagrams). Other noteworthy packages are also shown.

The User Interface package contains the User Profile component; this is shown in Figure 2.

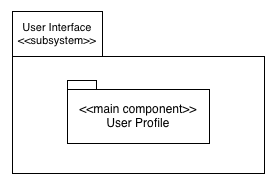


Figure 2: Decomposition of Data package

**User Profile component:** in accordance with the repository style there is one central data structure that represents the current state; for the Healthy Eating Application this is the user profile page. The user’s profile will contain a list of all the user’s food log entries for the current month (earlier entries can be seen by selecting a specific month and year). This component also has the option to display reports with graphical representation of user’s food related data for archiving. Furthermore, the user’s current score, and food optimization suggestions, friend’s feedback for logged entries and social media elements are to be displayed and accessed from the profile.

PROF SAYS NEED TO MENTION THE SPECIC TYPE OF DATA STRUCTURE USED

Moreover, there are several independent components that operate on this central data structure.

The Database Interaction package contains two essential sub packages; these are shown in Figure 3.

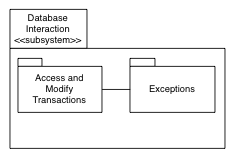


Figure 3: Decomposition of Database Interaction subsystem

**Access and Modify Transactions:** this sub-package is used by other main components in order to access and modify data in the database. It was not classified as a main component as it is better suited as a utility component.

**Exceptions:** this sub-package is to handle any erroneous modifications or accesses that the user might attempt. This does not provide any core functionality and thus was not classified as a main component.

The User Information Management package contains the several important components; these are shown in Figure 4.

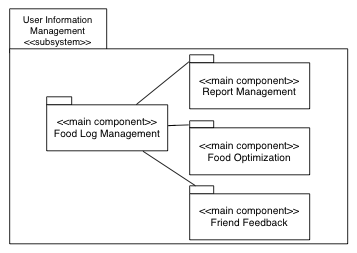


Figure 4: Decomposition of the User Information Management subsystem

**Food Log Management component:** the Food Log component process all food entry related data. It displays the first line of each entry on the user profile, with the option to view the entire entry if required. It is important to note that the user profile does not perform any action’s of its own, it simply acts as a central body of information.

**Report Management component:** this component is responsible for processing all the calorie information in the entries present in the profile for the current month. The data is converted into different graphs that offer the user insight into their eating habits and patterns.

**Food Optimization component:** this component analyzes the user’s food entries and statistics and suggests better food alternatives, if necessary.

**Friend Feedback component:** this component handles aspects related to feedback on the user’s food log entries. The classes within this component ensure that only friends can comment, prevent any abusive and negative comments and display the comments properly.

The Scoring System package contains the Scoring System Management component; this is shown in Figure 5.

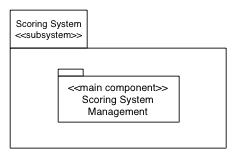


Figure 5: Decomposition of the Scoring System subsystem

**Scoring System Management component:** this component keeps track of the user’s score, which is determined mainly by their food log entries.

The Session Management package contains the Cookies and Related Security Management sub-package; this is shown in Figure 6.

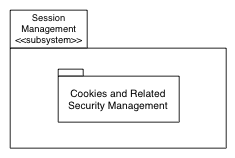


Figure 6: Decomposition of the Session Management subsystem

**Cookies and Related Security Management:** this package handles all cookie related operations such as saving certain session state information. It also contains any cookie confidentiality related code to preserve the cookie integrity.

The Login package contains the Login Management component; this is shown in Figure 7.

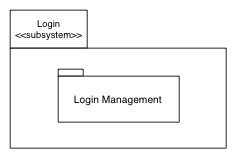


Figure 7: Decomposition of the Login subsystem

**Login Management:**  This sub-package involves operation related to user login and providing critical features to improve the login security.

The Social Media package contains the Facebook Interaction Management component; this is shown in Figure 8.

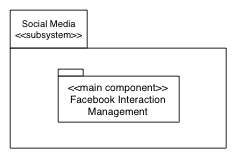


Figure 8: Decomposition of the Social Media subsystem

**The Social Media Management component:** this component is responsible for taking information reachable via the profile and displaying it on a relevant Facebook page as well as allowing the user to import certain application related data from Facebook.

Description of Major Connectors

The connectors for the repository style architecture proposed are mainly procedure calls. For instance the Food Log component might issue a AddNewEntrySynopsis() procedure call to the User Profile. Similarly the User Profile can issue a GetFullEntry() procedure call to the Food Log component.

TODO: NEED TO GIVE EXAMPLES OF POSSIBLE PROCEDURE CALL FOR ALL COMPONENTS

**3. Architectural Goals and Constraints**

Different styles may seem more applicable depending on if one views the application solely from a software developer’s perspective, user perspective or hardware implementation perspective. In general, the Healthy Eating Application is a three-layer software architecture since it consists of a user interface, middleware and a database system. However, it is important to note that in sections 3a and 3b, the style chosen was based on how the data would be presented to the user.

**3a. Architectural Rational and Justification of Style Chosen**

The architectural style used is the repository style. Figure 3 illustrates how some of the major components and connectors present fit in to the architectural style chosen.

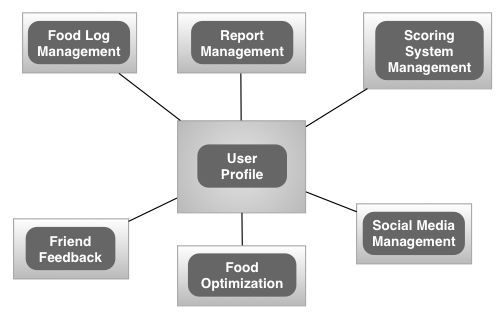


Figure 9: Components and connectors diagram for Healthy Eating Application

Justification of Style Selection

The repository architectural style is a justified selection for the Healthy Eating Application. This is because the user’s profile is the central data structure. This is the case seeing as almost all major actions and activities affecting the application are displayed and accessed from there. What’s more, any updates or modifications are displayed in some form on the profile. Additionally, the application lent itself to having a collection of independent components that operate on the central data structure. This was so, since most computations that occur in the application result in some form of change or update to the user’s profile.

Architectural Rationale for Components and Connectors

It is important to mention the architectural rational for creating the different components. Each component encapsulates processing and data associated with a particular functionality within the application. For instance, the Food Log component encapsulates data related to a log entry and any processing associated with it. The Report component encapsulates data associated with generated reports and the accompanying computations. The same can be said for the Scoring System, Social Media, Food Optimization and Friend Feedback components. The rational behind choosing user profile as the central data structure was that it houses snippets of all types of information provided by the application. Thus any changes made to certain type of data are reflected in some form in the user’s profile.

Moreover, the architectural rational for creating different connectors was... NOT SURE WHAT TO PUT HERE, CAN’T HAVE ANYTHING ELSE BUT PROCEDURE CALLS AS CONNECTORS... IF NOT THEN THERE IS NO RATIONAL TO MENTION.

**3b. Analysis of Architectural Elements Affecting Quality Aspects**

Since there is a central data structure in the application, this gives the opportunity to have centralized management. In consequence, one can easily perform backups of essential data and focus mainly on the security of one central component. All of the aforementioned points increase the ease of maintaining the software.

In addition, the repository architecture is very efficient for sharing large amount of data. This is because all components have access to a common known data structure, which represents the central body of information.

However, a downside to the chosen architecture is that data evolution (defined in this report as integration of new type of information) might prove to be expensive. This is because the profile has limited space to show different types of data and displays. Therefore, the amount and type of data stored in the central data structure should be decided in the beginning, modifying this substantially in later stages could prove to be difficult.

**4. Use Case View**

The relevant use cases for the application are shown in Figure 10 and 11. The use cases have been divided according to if the user is logged in or not. Each figure is followed by the corresponding use case descriptions in tabular form.

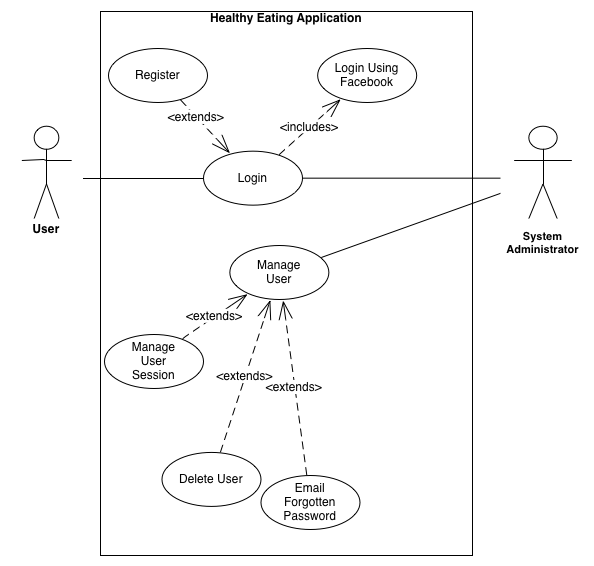
****

Figure 10: Use Cases concerned with logging into the application

Use Case Description

|  |  |
| --- | --- |
| Login | |
| Participating Actor | User |
| Entry Condition | User has correct credentials |
| Exit Condition | User is authenticated via database match |
| Flow of Events | User types ID/password and clicks on Login button. Credentials are passed to database to find a match. If hit, user exits this use case and is redirected to main page |
| Exceptional Cases | User’s ID does not exist  User’s password is incorrect |

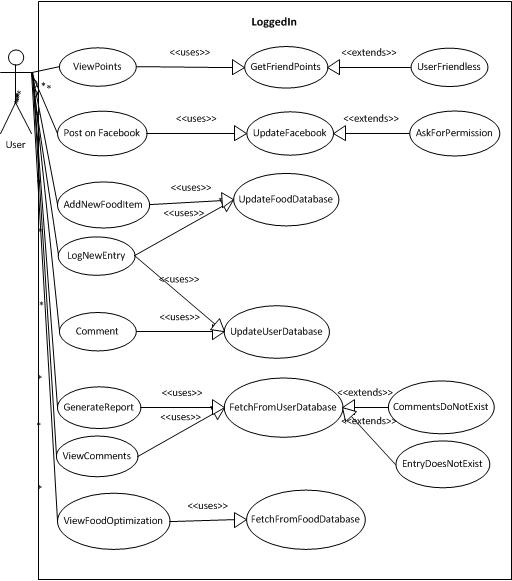
****

Figure 11: Use Cases concerned with when user is logged in to the application

Use Case Description

|  |  |
| --- | --- |
| View Points | |
| Participating Actor | User |
| Entry Condition | User was authenticated via Login |
| Exit Condition | Points information is displayed |
| Flow of Events | User clicks on ViewPointBtn  Database is queried with User’s information  Points information returned is displayed |
| Exceptional Cases | User does not have any past scores / friends |

|  |  |
| --- | --- |
| Post On Facebook | |
| Participating Actor | User |
| Entry Condition | User was authenticated via Login |
| Exit Condition | Facebook status is updated |
| Flow of Events | User clicks on UpdateFBStatusBtn  Database is queried with User’s FB Credentials  Facebook status is updated (changes coming to content of the update) |
| Exceptional Cases | User lacks content (to come later) |

|  |  |
| --- | --- |
| Add New Food Item | |
| Participating Actor | User |
| Entry Condition | User was authenticated via Login |
| Exit Condition | New food item is added to the database |
| Flow of Events | User clicks on “AddNewFoodItem” button  User fills out necessary fields(name, category, calories, etc) and clicks OK  New entry is added to database accordingly |
| Exceptional Cases | Food item duplicate |

|  |  |
| --- | --- |
| Log New Entry | |
| Participating Actor | User |
| Entry Condition | User was authenticated via Login |
| Exit Condition | New entry logged in UserDatabase |
| Flow of Events | User selects an item from the dropdown of food items from database  User clicks Log New Entry button  New entry is added to user database  accordingly |
| Exceptional Cases | Intended food item does not exist in the database and hence does not show up in the dropdown |

|  |  |
| --- | --- |
| View Food Optimization | |
| Participating Actor | User |
| Entry Condition | User was authenticated via Login |
| Exit Condition | Recommended food item is displayed |
| Flow of Events | User clicks on “Recommend food item” button  User selects a category of food from dropdown  Database is queried for most “healthy” choice for that food category  Queried information is relayed back to the webpage and displayed |
| Exceptional Cases | User is too fat for any recommendations |

|  |  |
| --- | --- |
| Comment | |
| Participating Actor | User |
| Entry Condition | User navigates to a friend’s page |
| Exit Condition | New comment added |
| Flow of Events | User clicks on a friend’s name from the list of friends  User comments on an entry  New entry is added to user database |
| Exceptional Cases | User does not have any friends |
| Generate Report | |
| Participating Actor | User |
| Entry Condition | User was authenticated via Login |
| Exit Condition | Report is generated |
| Flow of Events | User specifies period and clicks on GenerateReport button  Database is queried for points information for the period specified  Points information is displayed via table or chart |
| Exceptional Cases | No data exists |

|  |  |
| --- | --- |
| View Comments | |
| Participating Actor | User |
| Entry Condition | User was authenticated via Login |
| Exit Condition | Comments are displayed |
| Flow of Events | User clicks on any past entry from front page  Database is queried for comments associated with that entry  Front page repainted with the comment information underneath the entry |
| Exceptional Cases | No comments exist for the entry |