WELLNESS MANAGER 2.0

Project Design Document

Team D

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Project Summary

Wellness manager is a program that allows for users to keep a collection of foods and exercises as well as a daily log of their food intake and exercises performed on a given day.

The program reads in basic foods from a csv file. The user also has the option to add their own basic foods to the collection. The foods added to the collection have basic nutritional information such as calories, fat, carbohydrates, and protein which can be used to keep track of nutritional intake each day. The user can also use basic foods from the collection to create their own recipes and create more complex recipes using other recipes as sub-recipes.

The program similarly reads in exercises from a csv file. The user also has the option to add their own exercise to the collection. The exercises added to the collection have the number of calories burned per hour which can be used to calculate the number of calories the user has burned on a given day.

There is also a daily log built into the program. The user can use the daily log to track their food and nutrient intake each day as well as log the exercises performed. This also allows the user to set daily goals for weight and calories. The program will be able to indicate to the user whether or not they have met their goals for the day. As well as this, the program will generate graphs for the user based on the nutrient distribution of the day.

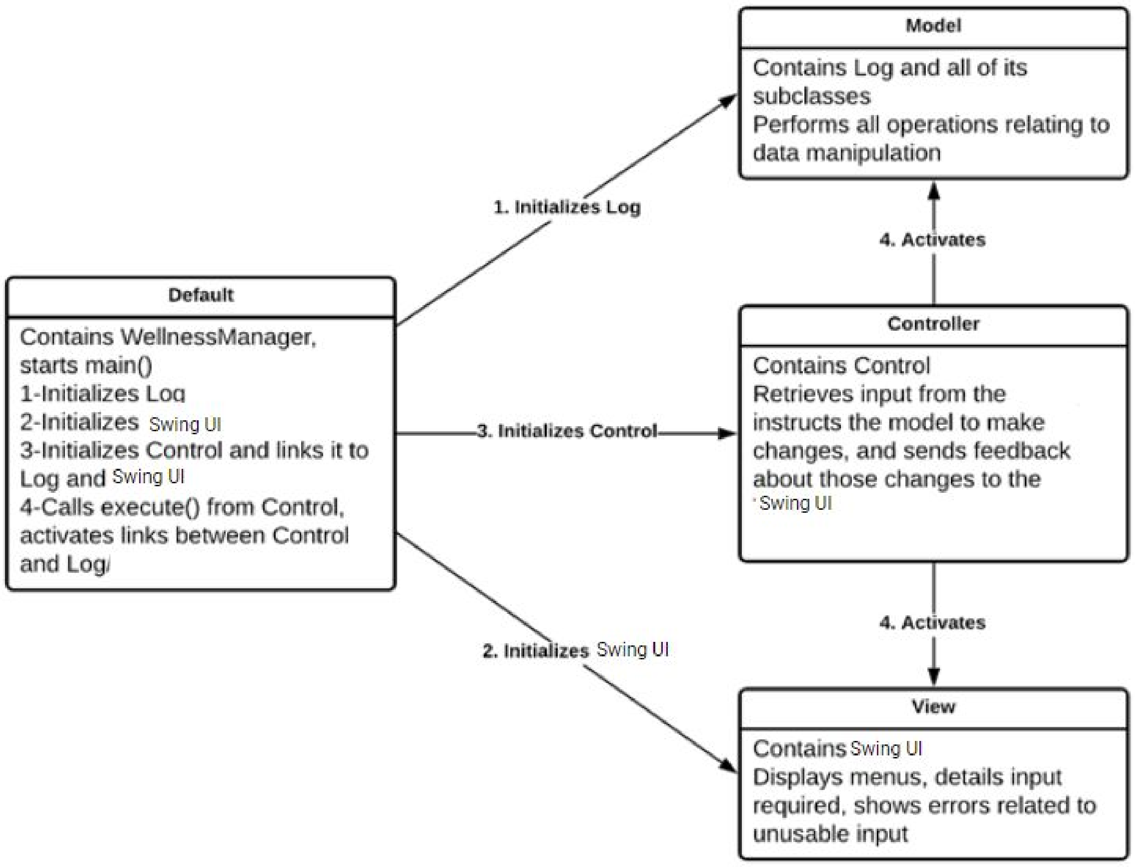
Design Overview

In first designing our system, we started building out the classes for patterns we will be implementing in our design. In doing this, it gave us a solid and organized foundation in which to build the rest of our infrastructure upon. The two patterns being implemented are the Model-View-Controller pattern and the Composite pattern. With “View” and “Controller” focused heavily on UI, and the model being the center in which information is obtained and stored to pass on to the controller. The composite pattern is utilized in creating the food and recipe objects. We also applied the Dependency Inversion Principle with the collection interface as our abstraction level, it separates the log - a high level class- from the three lower level classes: FoodCollection and DailyLog, and ExerciseCollection. The reading of a csv file is being handled in those two class as it helps decouple it from the log class.

An advantage of our design is that it is easy for the food, recipes, and exercises in the csv to be read. It is also easy to make them into objects as the FoodCollection class is injected with the component interface (Food) for the composite design in which we have or basic food and recipes. The use of the SimpleCollection interface also made it easier to implement our ExerciseCollection for phase 2 of the project. By implementing the interface and following a similar pattern to FoodCollection, ExerciseCollection is easily able to read and create Exercise objects from the csv file. Another advantage is our low coupling of our system. A disadvantage at the moment is the control class. The control class has a lot of heavy implementation, both in order to validate inputs and do its regular “job” as the controller in the MVC pattern. This makes it the biggest file in the system and lowers cohesion.

Our initial design for our system did not include the layer of abstraction- our collection interface- and reading the csv file was handled by the log class. One of our original ideas to improve coupling was to create a class that would be associated with the log class in order to take some of the functionality load off of it. Another idea was to have a separate class to handle the reading of the csv file and send the information to the log class. This idea was also rejected and then refactored using the collection interface.

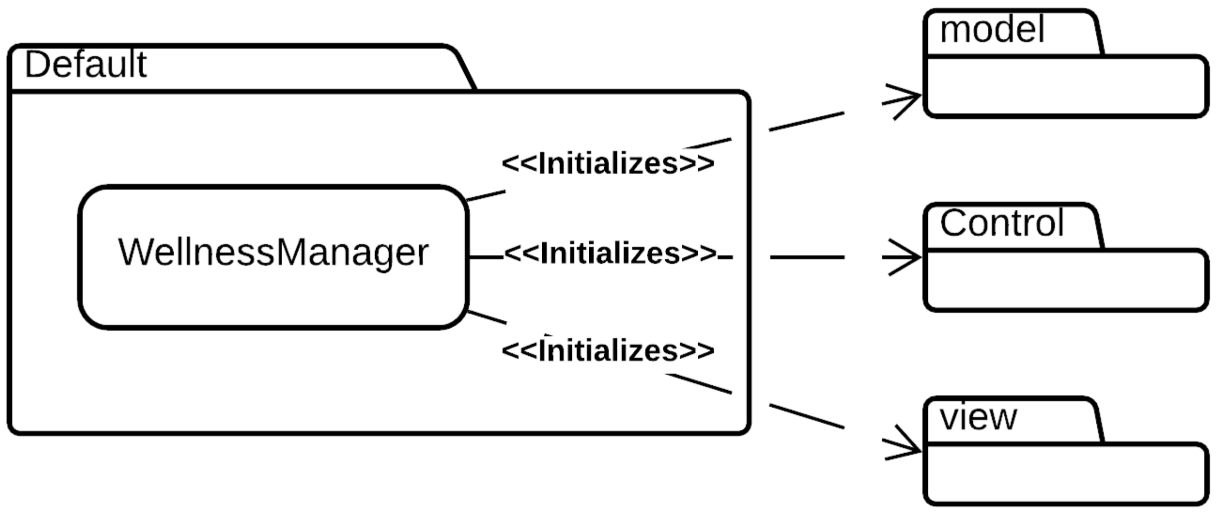
Subsystem Structure


Model
Contains Log and all of its subclasses
Performs all operations relating to data manipulation
1. Initializes Log
4. Activates
Default
Contains WellnessManager, starts main()
1-Initializes Log
2-Initializes Swing UI
3-Initializes Control and links it to Log and Swing UI
4-Calls execute() from Control, activates links between Control and Log
3. Initializes Control
Controller
Contains Control
Retrieves input from the instructs the model to make changes, and sends feedback about those changes to the Swing UI
4. Activates
2. Initializes Swing UI
View
Contains Swing UI
Displays menus, details input required, shows errors related to unusable input

Subsystems

Default Subsystem

Class WellnessManager	
Responsibilities	Create the model objects. Create the text user interface. Display the text user interface so the application can be used.
Collaborators (uses)	**model.Log** – The primary model class. **view.SwingUI** – The application window. **controller.ControlGUI** – Go between for SwingUI and Log



Model Subsystem

Class Log	
Responsibilities	Instantiate a food collection and a daily log collection. Support access to the food collection and daily log collection.
Collaborators (uses)	**model.FoodCollection** – Collection containing all foods usable in the daily log. **model.DailyLog** – Collection containing all days recorded in the wellness manager. **model.day** – Object pulled from the daily log containing data for a given day. **model.Food** – Object pulled from the food collection containing data about a specific food. **java.time.LocalDate** – Used for comparing the date variable of Day. **java.observable** - Makes the log an observable object

Class SimpleCollection (interface)	
Responsibilities	Provide a generic interface for collections. Defines a means to add, remove, and access objects in the collection. Defines a means to read and write for file access. Defines a mean to show the contents of the collection.

Class DailyLog	
Responsibilities	Support access to the days in the daily log collection. Add, find, modify an existing day in the collection. Reads in a csv log file.
Collaborators (inheritance)	**model.SimpleCollection** – Generic interface that collections adhere to.
Collaborators (uses)	**model.FoodCollection** – The collection of foods that can be added to the foods consumed on a day of the daily log. **model.FoodCollection** The collection of exercises that can be added to the specified day **model.Day** - The basic type for days in the collection. **java.util.ArrayList** – Used internally to store the days in the collection **java.util.Comparator** – Used to sort the array list and keep the daily organized by date. **java.util.Scanner, java.io.File, java.io.FileWriter, java.io.BufferedWriter** – Used to implement the file read and write functionality of the simple collection interface

Class Day	
Responsibilities	Represents a day in the daily log collection. Provides access to the date. Provides access to the weight, calorie limit, and list of foods consumed for the given date.
Collaborators (uses)	**model.Food** – One of the objects being stored in the array list of foods consumed on a given day. **java.time.LocalDate** – Used as a variable of day. Identifies a specific date. **java.util.ArrayList** – The internal structure to store foods consumed on a given day. **java.util.Map** – Used to store map entries of foods and their corresponding servings in the array list. **java.util.AbstractMap** – Used to create a new entry for the array list.

Class Food (abstract)	
Responsibilities	Provide a generic interface to all food types in the food collection. Includes the food name as a unique ID. Can retrieve nutrition information regardless of underlying food type.

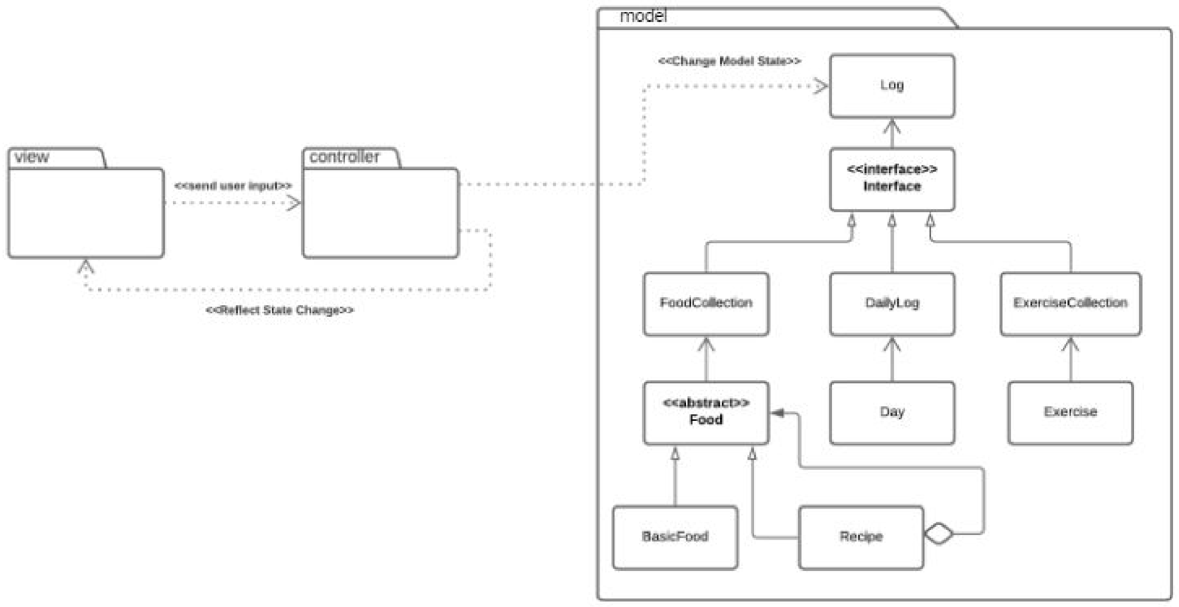
Class FoodCollection	
Responsibilities	Support access to the foods in the food collection. Add, find, delete an existing food in the collection. Reads in a csv food file.
Collaborators (inheritance)	**model.Collection** – Generic interface that collections adhere to.
Collaborators (uses)	**model.BasicFood** – One of the food types. Used during file reading to build the collection. **model.Recipe** - One of the food types. Used during file reading to build the collection. **model.Food** - The basic type for all different foods in the collection. **java.util.LinkedHashMap** – Internal storage structure for food collection **java.util.Scanner, java.io.File, java.io.FileWriter, java.io.BufferedWriter** – Used to implement the file read and write functionality of the simple collection interface

Class BasicFood	
Responsibilities	Represents a basic food in the food collection. Provides access to the name of the food. Provides access to the number of calories, grams of fat, grams of carbs, and grams of protein per serving.
Collaborators (inheritance)	**model.Food** – Abstract class that all food items adhere to.

Class Recipe	
Responsibilities	Represents a recipe in the food collection. Provides access to the name of the recipe. Provides access to a list with *n* entries containing name/count pairs where name is the name of the basic food or sub-recipe and count is the number of servings.
Collaborators (inheritance)	**model.Food** – Abstract class that all food items adhere to.
Collaborators (uses)	**java.util.HashMap** – Internal storage structure for foods that make up this recipe. **java.util.Set** – Used to grab the keys of the internal storage structure

Class exerciseCollection	
Responsibilities	Support access to the exercises in the exercise collection. Add, find, delete an existing exercise in the collection. Reads in a csv exercise file.
Collaborators (inheritance)	**model.Collection** – Generic interface that collections adhere to.
Collaborators (uses)	**model.Exercise** – An exercise. Used during file reading to build the collection **java.util.Scanner, java.io.File, java.io.FileWriter, java.io.BufferedWriter** – Used to implement the file read and write functionality of the simple collection interface

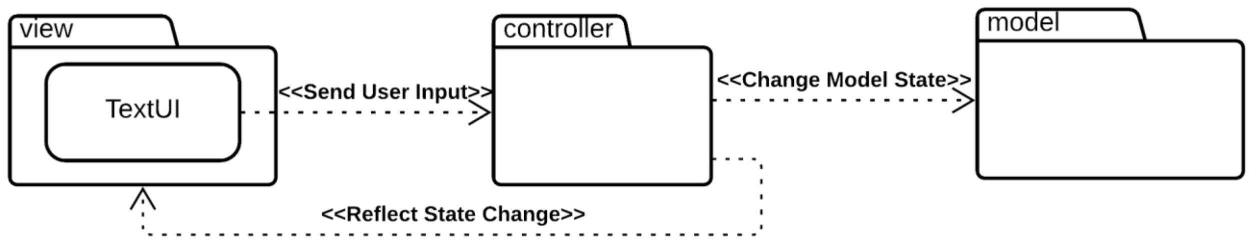
Class Exercise	
Responsibilities	Represents an exercise in the exerciseCollection Provides access to the name of the exercise. Provides access to the number of calories rate of calories burned
Collaborators (inheritance)	**model.dailyLog** – Retrieves weight of person for that day to calculate calories burned



View Subsystem

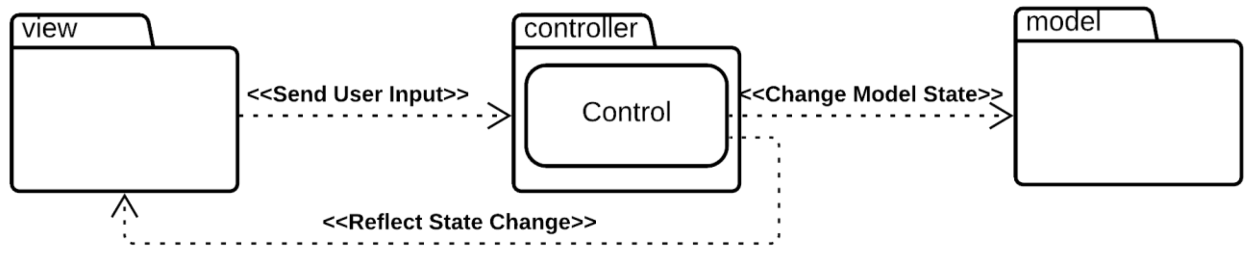
Class SwingUI	
Responsibilities	Display the menu. Display information requested from the model.
Collaborators (uses)	**model.Log** – The model the TextUI refers to

Class BarGraph	
Responsibilities	Display the bar graph. Gets the information from the model.
Collaborators (uses)	**model.Log** – Where the data for the graph comes from. Connected via the observer pattern. **Java.Observable -** Observer object



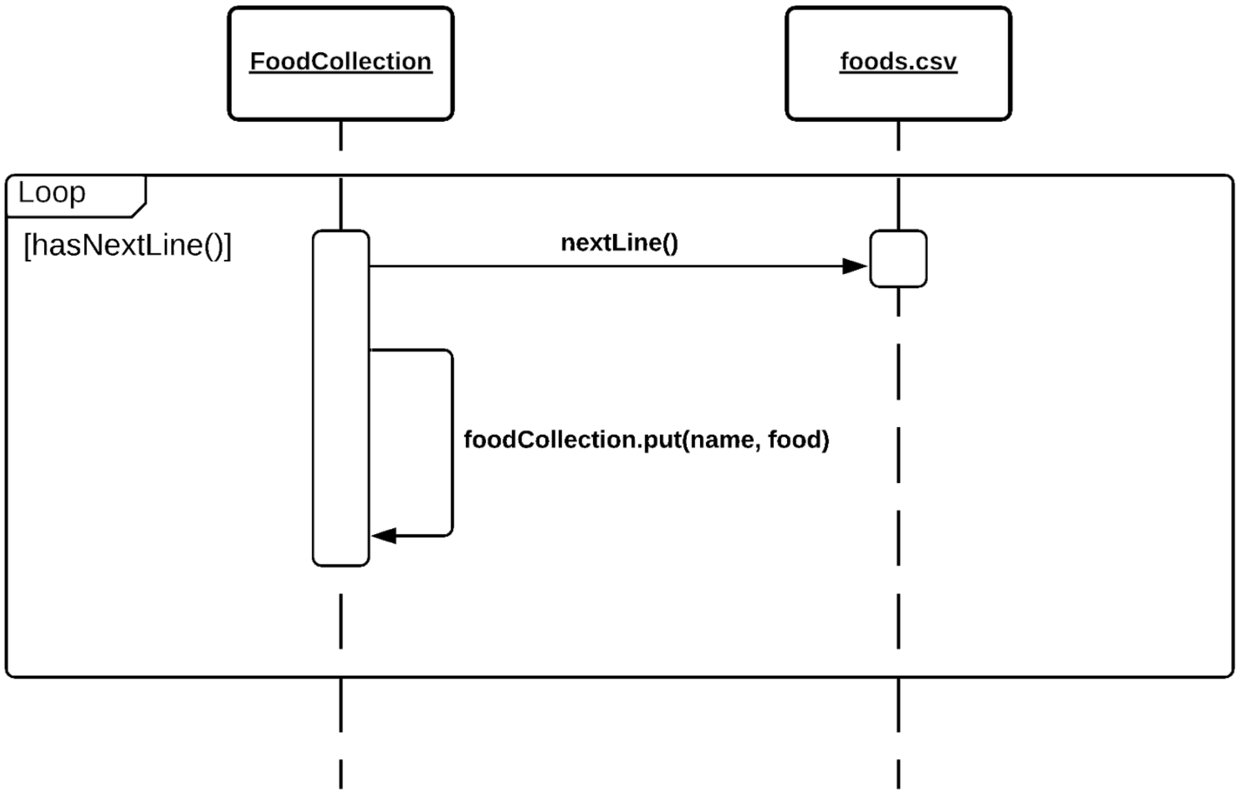
Controller Subsystem

Class Control	
Responsibilities	Retrieve user input. Update the model and view.
Collaborators (uses)	**view.SwingUI** – Displays changes processed by the controller **model.Log** – Manipulated by the controller **model.Food, model.Recipe, model.BasicFood, java.time.LocalDate** – Used for data comparison/verification. **java.awt.event** – Adds listeners to UI buttons to retrieve user input. **java.util.regex.Pattern** – Used for input verification.

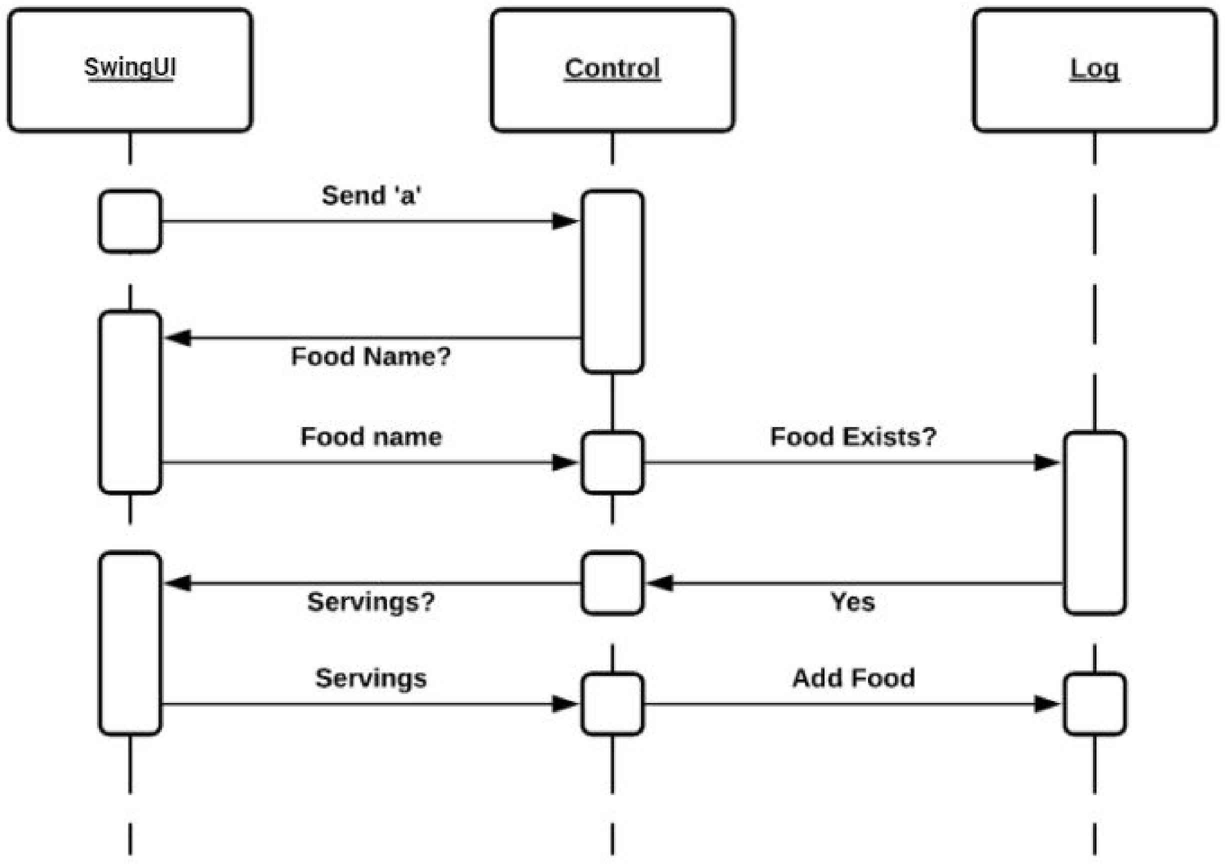


Sequence Diagrams

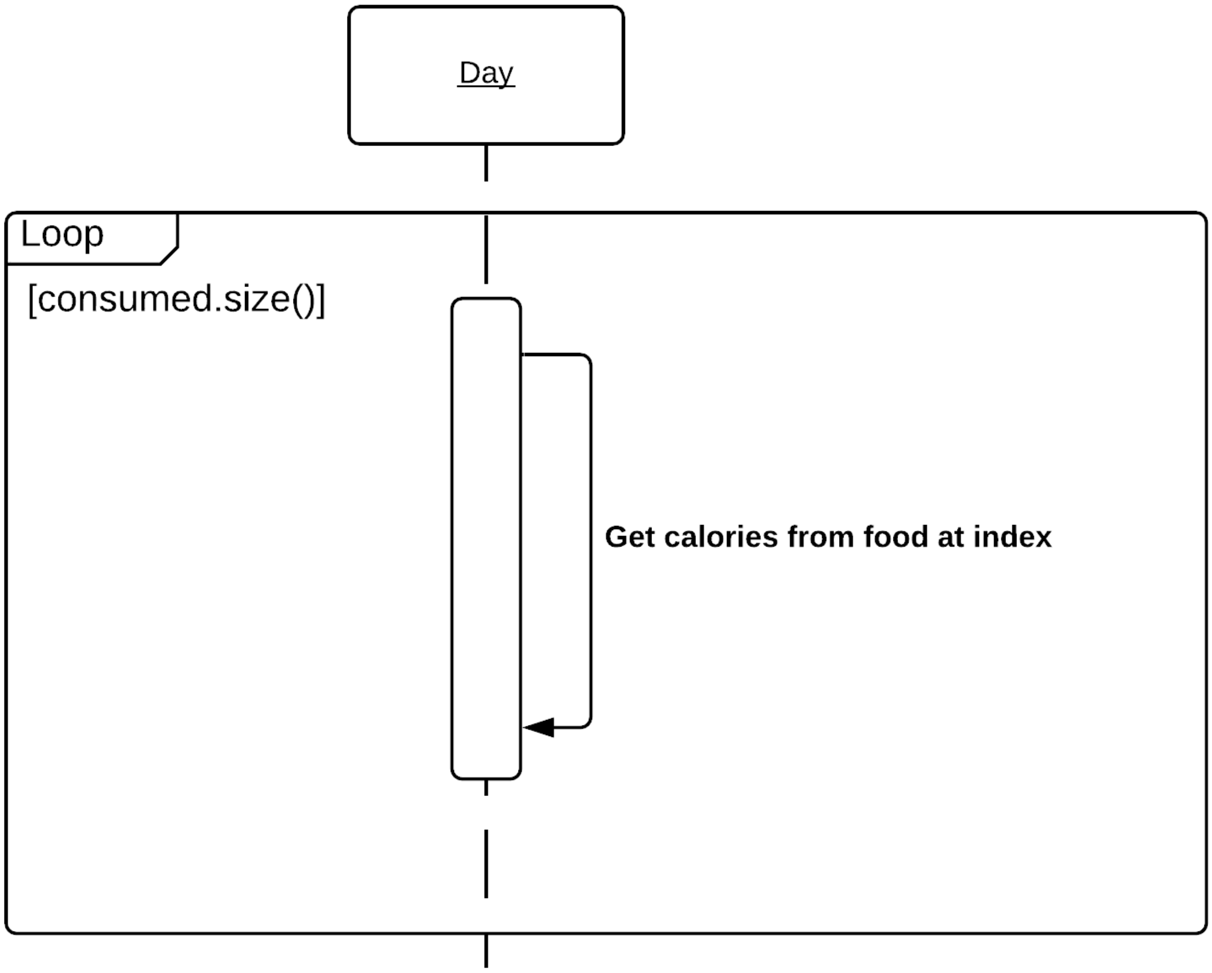
Sequence Diagram #1: Reads in a food database of three basic foods, a recipe that contains two of the basic foods, and a recipe that contains the first recipe and the remaining food.



Sequence Diagram #2: Add two servings of a food to the log entry for the current date.



Sequence Diagram #3: Compute the total number of calories for the current date assuming the log consists of a basic food and a recipe consisting of two basic foods.



Pattern Usage

Pattern #1 Composite

Basic foods and recipes inherit from the abstract food object so that they can be stored in one collection for use by higher level logic in the application.

Composite Pattern	
Component	Food
Leaf	BasicFood
Composite	Recipe

Pattern #2 MVC

The application is organized using the model view controller pattern to recognize commands to the controllers, manipulate the thermometer as the model, and reflect changes via the views.

MVC Pattern	
Model	Log SimpleCollection DailyLog FoodCollection Day Food BasicFood Recipe Exercise Exercise Collection
View	SwingUI
Controller	ControlGUI

Pattern #3 Observer

The Observer is the BarGraph and the Observable is extended by the Log Class. More specifically by any function dealing with that day's nutrition as it must be reflected on the graph.

Observer Pattern	
Observer	BarGraph
Observable	Log