FitHelper - Developer Guide

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1. Setting up

Refer to the guide here.

2. Design

2.1. Architecture

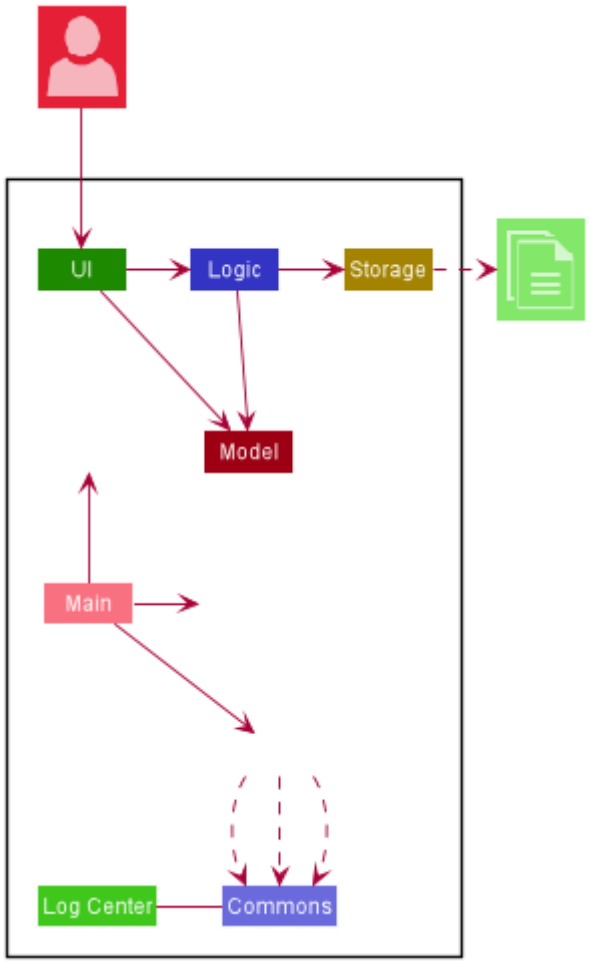


Figure 1. Architecture Diagram

The ***Architecture Diagram*** given above explains the high-level design of the App. Given below is a quick overview of each component.

TIP	The `.puml` files used to create diagrams in this document can be found in the diagrams folder.

`Main` has two classes called `Main` and `MainApp`. It is responsible for,

- At app launch: Initializes the components in the correct sequence, and connects them up with each other.
- At shut down: Shuts down the components and invokes cleanup method where necessary.

`Commons` represents a collection of classes used by multiple other components. The following class plays an important role at the architecture level:

- `LogsCenter` : Used by many classes to write log messages to the App's log file.

The rest of the App consists of four components.

- `UI`: The UI of the App.
- `Logic`: The command executor.
- `Model`: Holds the data of the App in-memory.
- `Storage`: Reads data from, and writes data to, the hard disk.

Each of the four components

- Defines its *API* in an `interface` with the same name as the Component.
- Exposes its functionality using a `{Component Name}Manager` class.

For example, the `Logic` component (see the class diagram given below) defines it's API in the `Logic.java` interface and exposes its functionality using the `LogicManager.java` class.

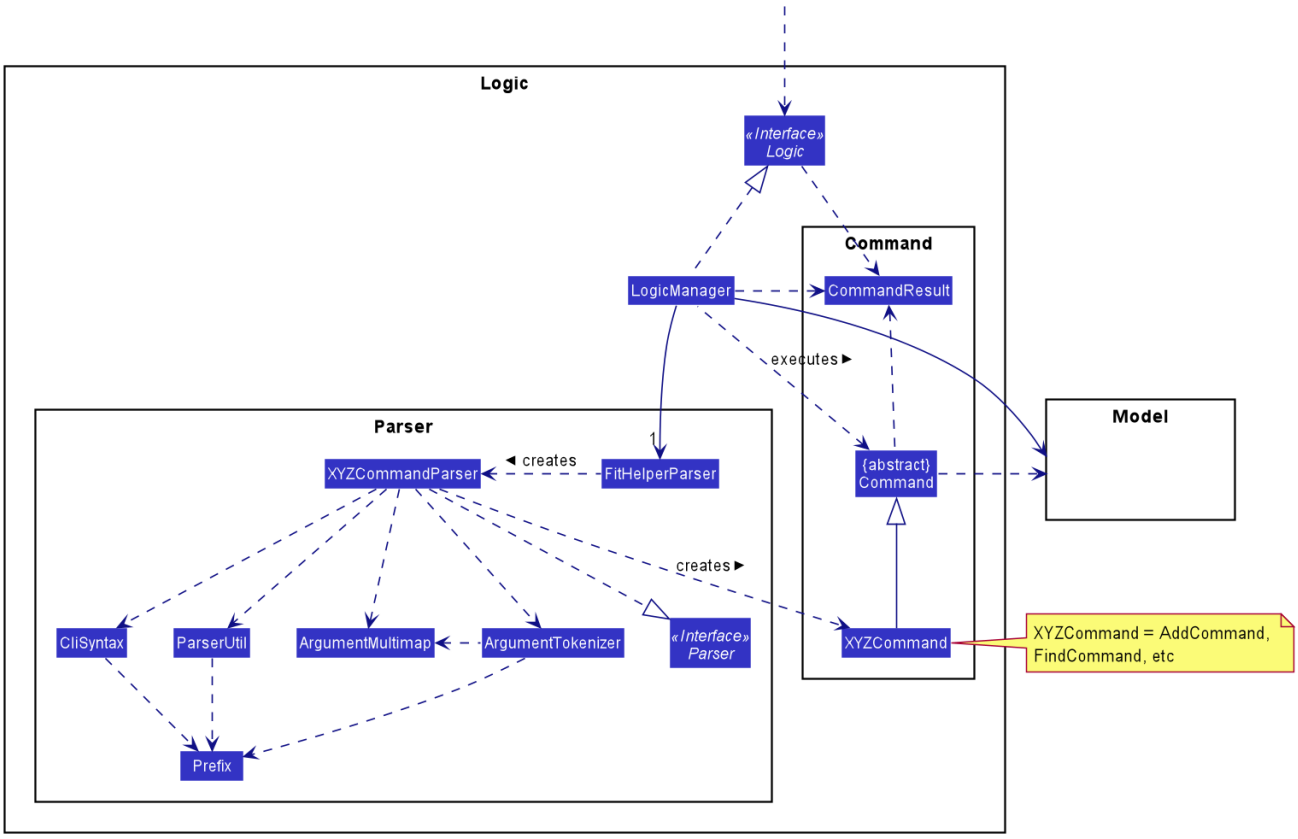


Figure 2. Class Diagram of the Logic Component

How the architecture components interact with each other

The *Sequence Diagram* below shows how the components interact with each other for the scenario where the user issues the command `delete x/f i/1`.

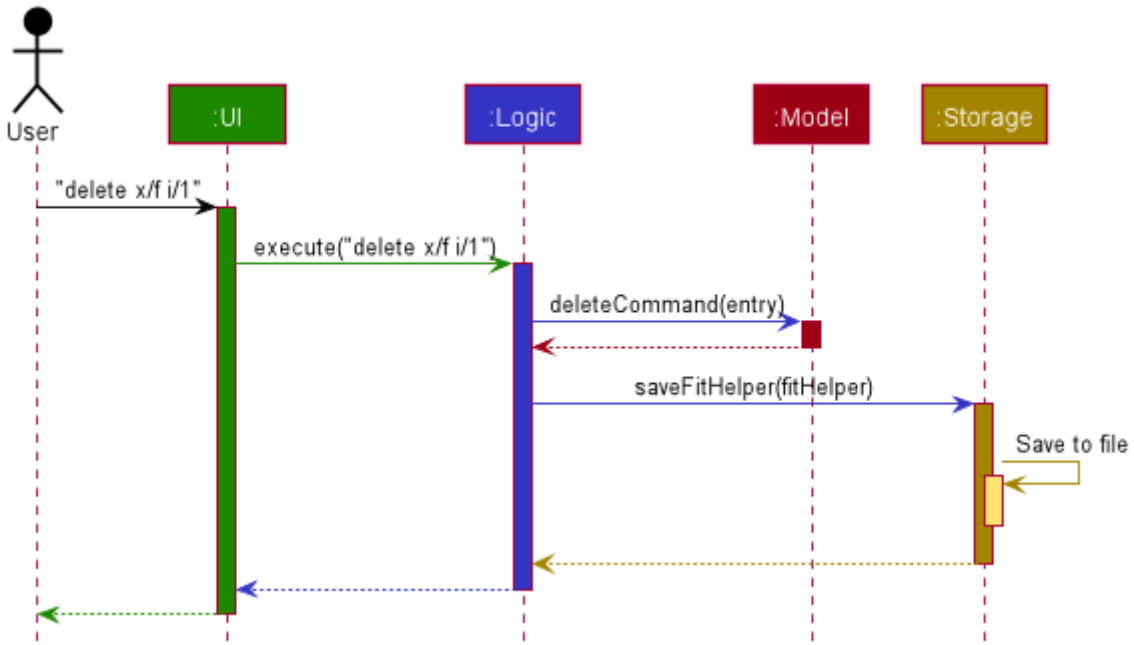


Figure 3. Component interactions for `delete x/f i/1` command

The sections below give more details of each component.

2.2. UI component

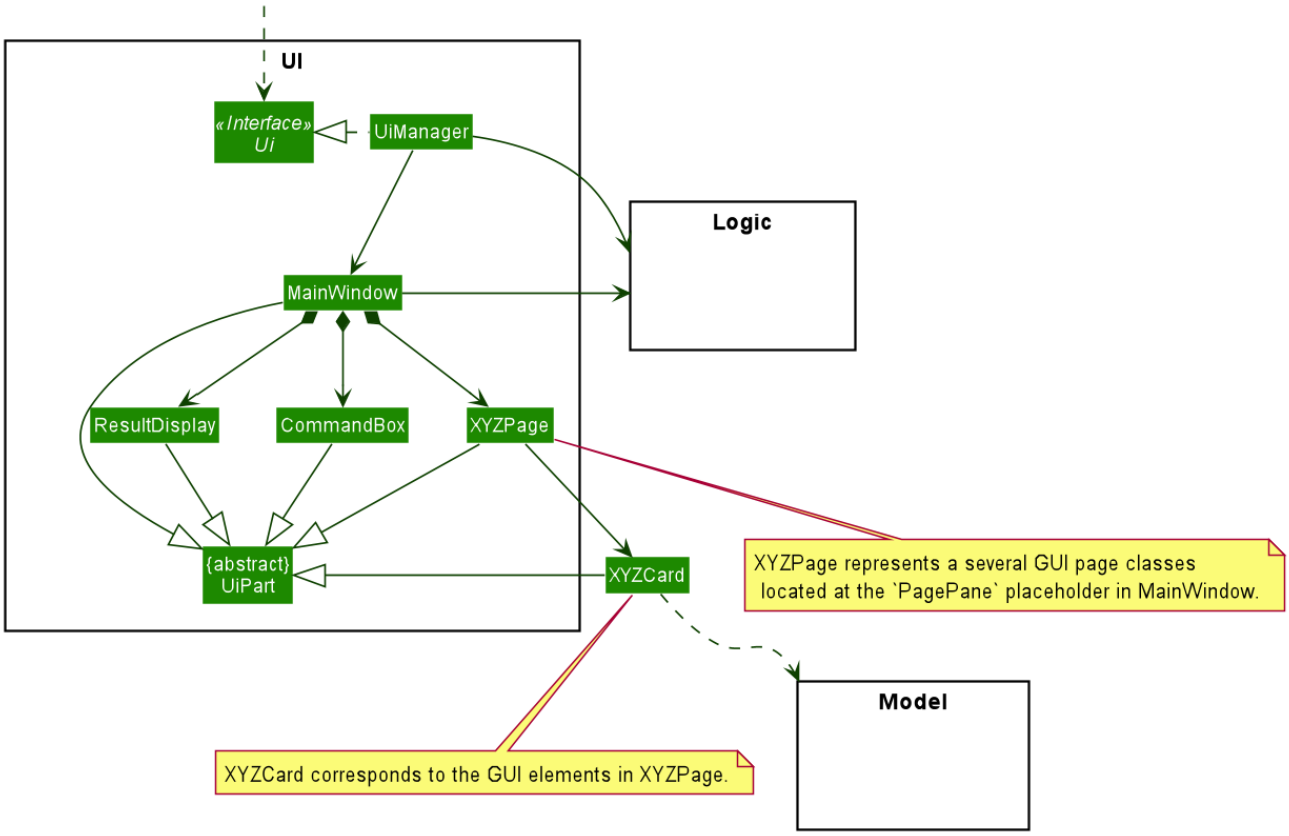


Figure 4. Structure of the UI Component

API : `Ui.java`

The UI consists of a `MainWindow` that is made up of parts e.g.`CommandBox`, `ResultDisplay`, `PagePane`,

`ButtonList`, `CurrentPageTitle` etc. Moreover, it reserves a place for different pages that can be filled and displayed. All these, including the `MainWindow`, inherit from the abstract `UiPart` class.

The `UI` component uses JavaFx UI framework. The layout of these UI parts are defined in matching `.fxml` files that are in the `src/main/resources/view` folder. For example, the layout of the `MainWindow` is specified in `MainWindow.fxml`

The `UI` component,

- Executes user commands using the `Logic` component.
- Listens for changes to `Model` data so that the UI can be updated with the modified data.

2.3. Logic component

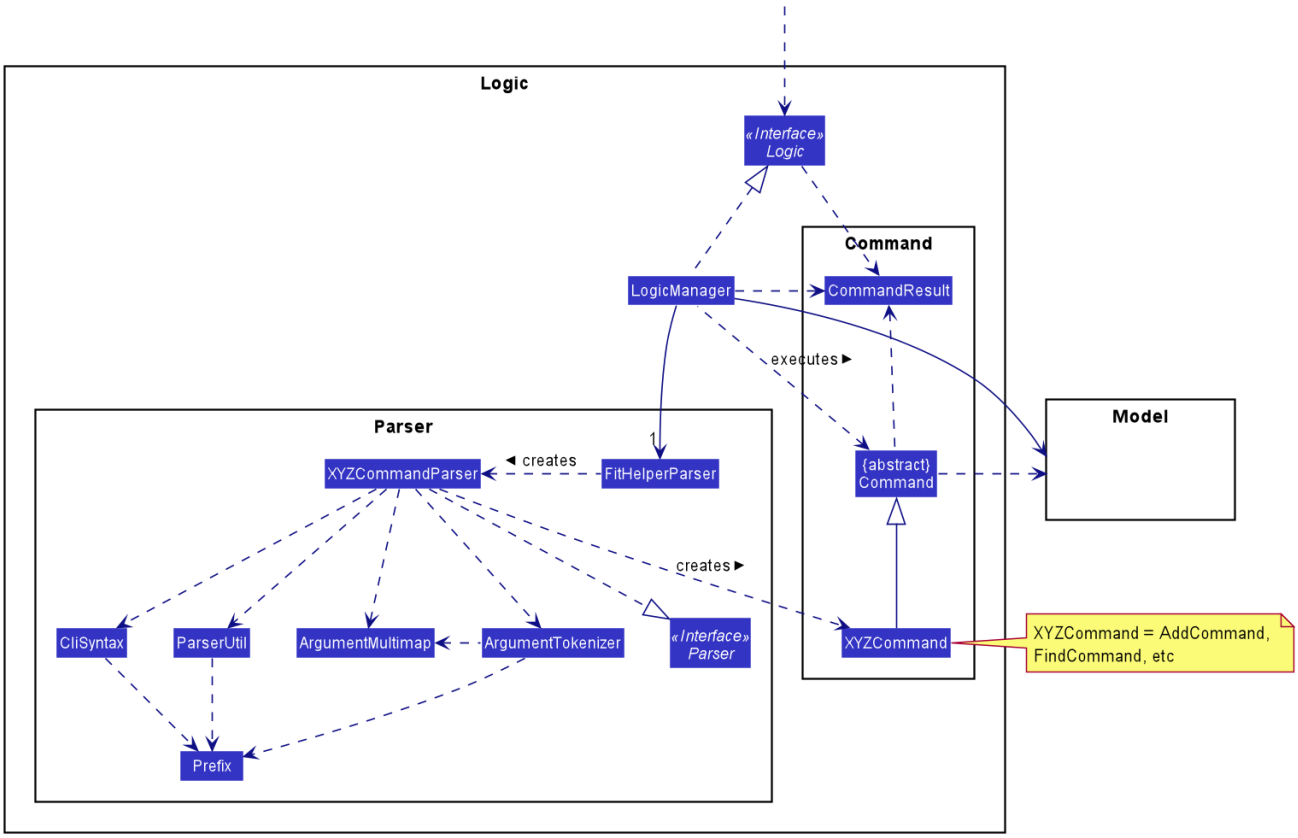


Figure 5. Structure of the Logic Component

API : `Logic.java`

1. `Logic` uses the `FitHelperParser` class to parse the user command.
2. This results in a `Command` object which is executed by the `LogicManager`.
3. The command execution can affect the `Model` (e.g. adding an entry).
4. The result of the command execution is encapsulated as a `CommandResult` object which is passed back to the `Ui`.
5. In addition, the `CommandResult` object can also instruct the `Ui` to perform certain actions, such as displaying help to the user.

Given below is the Sequence Diagram for interactions within the `Logic` component for the `execute("delete x/f i/1")` API call.

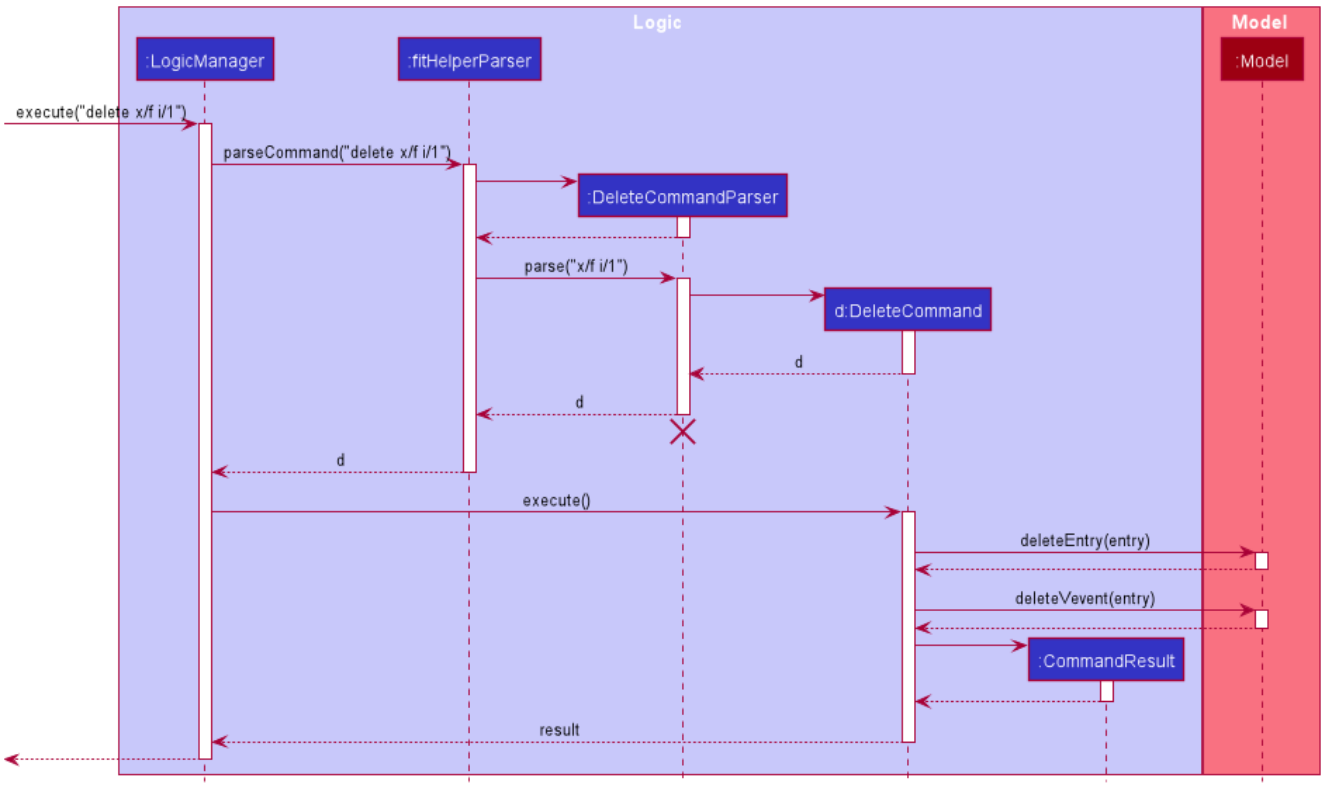


Figure 6. Interactions Inside the Logic Component for the `delete x/f i/1` Command

NOTE	The lifeline for `DeleteCommandParser` should end at the destroy marker (X) but due to a limitation of PlantUML, the lifeline reaches the end of diagram.

2.4. Model component

The `Model`,

- stores a `UserPref` object that represents the user's preferences.
- stores `UserProfile` and `WeightRecords` objects for user's personal information.
- stores the FitHelper data.
- stores `FitHelperCommit` and `VersionedFitHelper` objects for execution of `redo` and `undo` instructions.
- exposes multiple unmodifiable `ObservableList<Entry>` and one unmodifiable `ObservableList<Diary>` that can be 'observed' e.g. the UI can be bound to this list so that the UI automatically updates when the data in the list change.
- does not depend on any of the other three components.

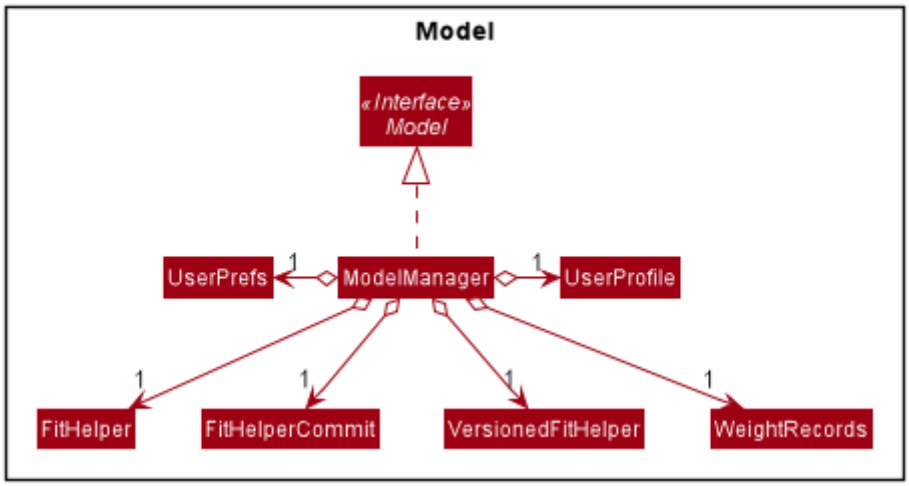


Figure 7. Structure of the Model Component

API : `Model.java`

Below are the class diagrams for different components of model

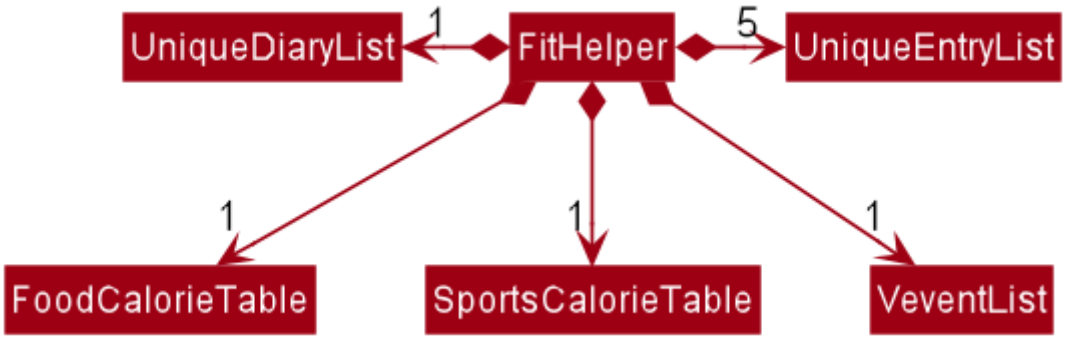


Figure 8. Class Diagram for FitHelper

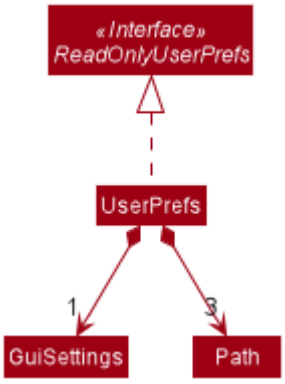


Figure 9. Class Diagram for UserPrefs

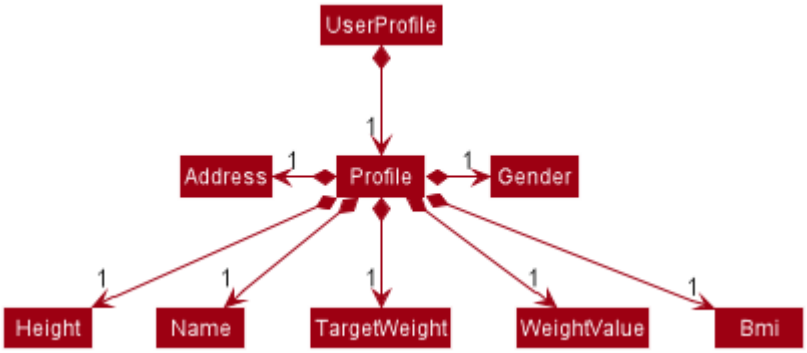


Figure 10. Class Diagram for UserProfile

Figure 11. Structure of VersionedFitHelper and FitHelperCommit

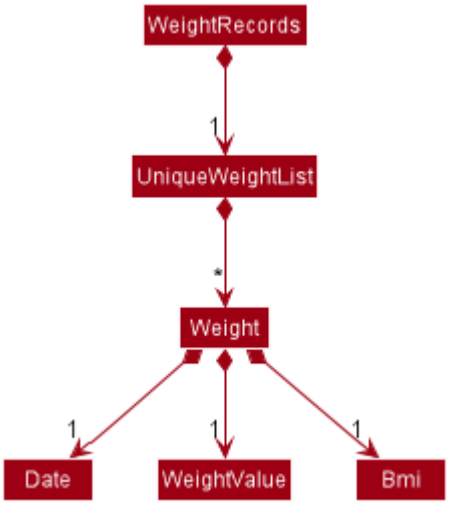


Figure 12. Class Diagram for WeightRecords

2.5. Storage component

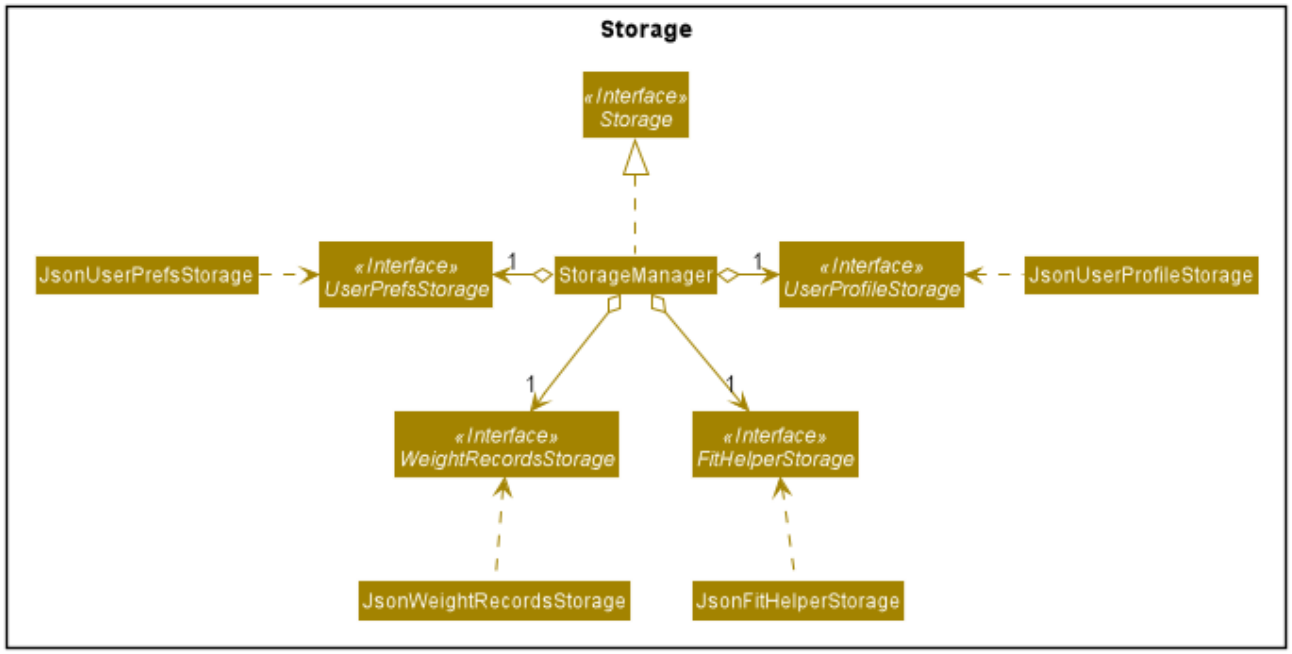


Figure 13. Structure of the Storage Component

API : `Storage.java`

The `Storage` component,

- saves a `UserPrefsStorage` object in json format and can read it back.
- saves a `FitHelperStorage` object in json format (***fithelper.json***) and can read it back. This database includes all data related to entries and diaries.
  - `FitHelperStorage` consists of lists of `Entry` and `Diary`, and thus these two types of objects can be saved in json format and read back too.
- saves a `UserProfileStorage` object in json format (***userprofile.json***) and can read it back. This database includes all data related to user profile attributes.
  - `UserProfileStorage` consists of a list of `Profile`, and objects in type of `Profile` can be saved in json format and read back.
- saves a `WeightRecordsStorage` object in json format (***weightrecords.json***) and can read it back. This database includes all data related to weight records.
  - `WeightRecordsStorage` consists of a list of `Weight`, and objects in type of `Weight` can be saved in json format and read back.

2.6. Common classes

Classes used by multiple components are in the `fithelper.commons` package.

3. Implementation

This section describes some noteworthy details on how certain features are implemented.

3.1. Entry Feature

The Entry consists of the following:

- Each `Entry` consists of a unique combination of `Name`, `Calorie`, `Location`, `Duration`, `Type`, `Remark`, `Status` and `Time`
- Each `Entry` consists of a `Duration` in hours, default set to 1, smallest accuracy is 0.02 (1 min).
- Each `Entry` consists of a `Type`, either food or sports
- Each `Entry` consists of a `Remark`, default set to be empty
- Each `Entry` consists of a `Status`, either `Done` or `Undone`
- Each class has their respective getter methods

The class diagram below is an overview of the `Entry` class.

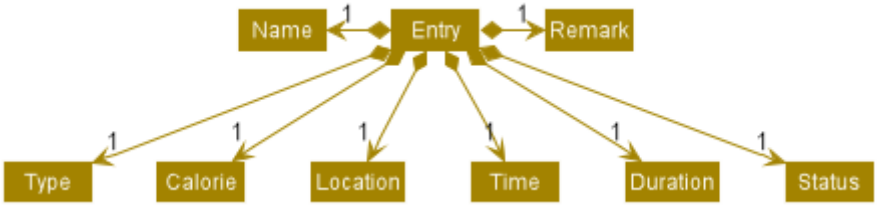


Figure 14. Entry Class Diagram

3.1.1. Implementation of Entry Commands

`Entry` class supports multiple commands. It includes:

- `AddCommand` - Adds a `Entry` into `FitHelper`
- `DeleteCommand` - Deletes a `Entry` from `FitHelper`
- `EditCommand` - Edits a `Entry` from `FitHelper`
- `FindCommand` - Finds all `Entry` whose `name` contains the keywords user entered
- `ListCommand` - Lists all `Entry`

All the above entry commands will be parsed in `FitHelperParser` and based on their types (i.e Add, Delete, Edit etc), the corresponding parsers will be invoked (i.e `AddCommandParser`, `EditCommandParser` etc). After which, the corresponding command will be executed (i.e `AddCommand`, `EditCommand` etc).

The figure below shows the execution of an `EditCommand`.

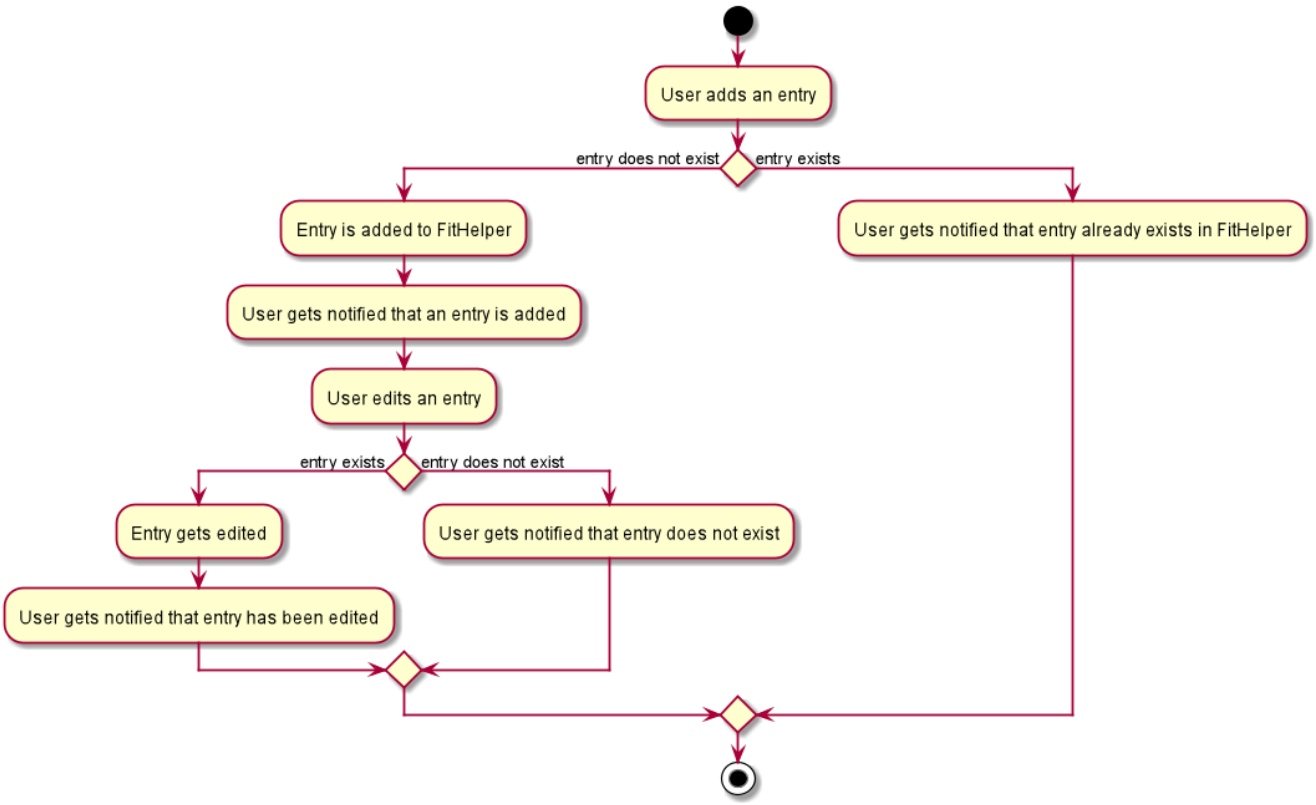


Figure 15. EditCommand Activity Diagram

After a successful execution, the entry with the given index will be edited from FitHelper.

3.1.2. Design Considerations

Aspect: `Type` for the entry

- **Option 1:** As a string attribute in `Entry`
  - Pros: Easy to implement, less code required
  - Cons: Provides a lower level of abstraction
- **Option 2:** Use two different classes to represent types, such as `FoodEntry` and `SportsEntry`
  - Pros: Higher level of abstraction
  - Cons: More code, generic types are required for implementation of common functionality

In the end, we chose Option 1 as it reduces the amount of duplicated code required, given that all parameters of food entries and sports entries are the same. However, Option 2 is still an viable option.

Aspect: `Time` for the entry

- **Option 1:** Fix the format of `Time` to be `yyyy-MM-dd-hh:mm`
  - Pros: Easy to implement, less bug prone
  - Cons: Adds inconvenience to the user
- **Option 2:** Use natty, the natural language date parser
  - Pros: Brings more convenience for CLI users

    - Cons: More bug prone due to the inaccuracy of the date parser. Moreover, only date can be parsed, not time.

Consequently, we chose Option 1 as it standardized the format of date and time across this application.

Aspect: `Duration` **for the entry**

- **Option 1:** As an optional attribute
    - Pros: More user friendly, since duration for food entry is less meaningful
    - Cons: Calendar display will not able to display food entries
- **Option 2:** As an optional attribute, with default set to 1
    - Pros: Calendar display will not able to display food entries with no duration provided
    - Cons: The duration does not reflect the true value when user chooses not to enter

We chose Option 2 for better display of entries on the calendar

3.2. Today Feature

3.2.1. Implementation

FitHelper's entries have a `Time` attribute including a `Date` and a specific `Time` in the format of `yyyy-mm-dd HH:mm`. Today feature allows the user to view entries with the `Date` of today, i.e. shows only entries in today. It fetches the `todayFoodEntries` and `todaySportsEntries` stored in FitHelper storage. Because the display of these two lists have the same logic, they are illustrated as `todayEntries` in this section, as a whole.

- In `FitHelper`, the `UniqueEntryList<Entry> todayEntries` contains all entries on today. The list is updated whenever changes are made to the general UniqueEntryList<Entry> entries which contains entries of all dates.
- A `FilteredList<Entry> filteredTodayEntries` is stored in the `ModelManager`. `filteredTodayEntries` in the ModelManager is initialized with this `UniqueEntryList<Entry>` by converting it to an `ObservableList<Entry>`.
- `Today Page` takes in `todayEntries` as a parameter when it is initialized. The list is always displayed on the GUI page as a ListView.
- When the `today` command is executed, FitHelper switches to `Today Page` where the entries on today can be seen.
- Other features implemented in `Today Page`, like `daily calorie calculation`, `daily task completion`, and `dialy performance assessment`, all depend on the data carried by the passed in list.

An example usage scenario and how the `today` mechanism behaves at each step is shown below.

Step 1. The user launches the application for the first time. `UniqueEntryList` will be initialized with a list of default entries in FitHelper, which contains a few entries with various dates.

`UniqueTodayEntryList` will be initialized concurrently by filtering out entries on today.

Step 2. `MainWindow` fetches `ObservableList<Entry> todayEntries`. `Today Page` is initialized in `MainWindow` with the `ObservableList<Entry> todayEntries` passed from the model.

Step 3. The user inputs `today` to view all today entries. `UI` passes the input to `Logic`.

Step 4. Logic passes the user input to `FitHelperParser`. `FitHelperParser` identifies that this is a `TodayCommand` through the word "today". It then creates a `TodayCommandParser` to parse the it into a `TodayCommand` and return.

Step 5. `Logic` gets the `TodayCommand` and execute it. This execution then returns a `CommandResult` to `UI`, containing the success message and a specified displayed page of `Today Page`.

Step 5. `UI` displays the response in the `CommandResult`. `UI` also switches FitHelper to `Today Page`, where the continuously updated `todayEntryList` is displayed, since `UI` is constantly listening for the change in `Model`.

The Sequence Diagram below shows how the components interact with each other for the above mentioned scenario.

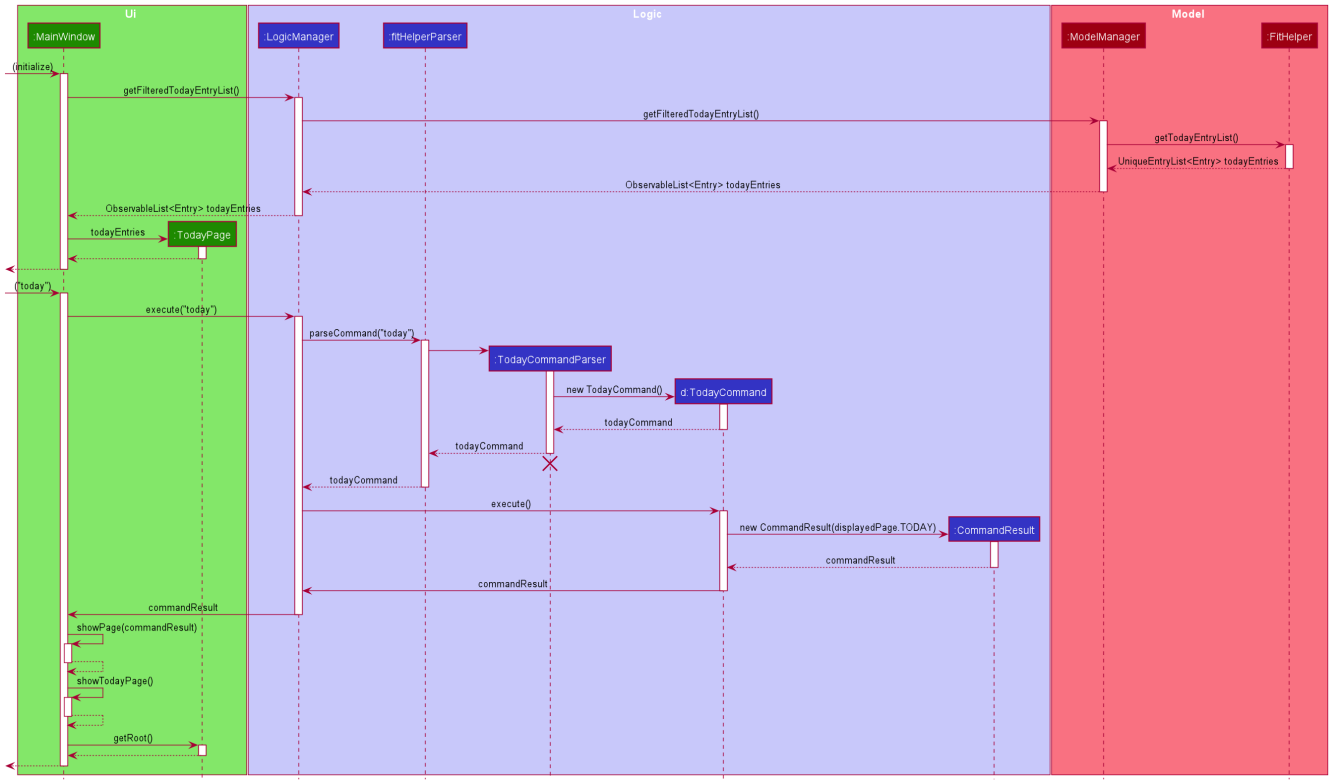


Figure 16. Sequence Diagram for Today Feature

3.3. Diary Feature

3.3.1. Implementation

FitHelper also allows the user to keep a diary with a `Date` in the format of `yyyy-mm-dd` and the `content` with no more than 200 characters. The diaries are represented as model `Diary` with the attributes of `DiaryId`, `DiaryDate`, and `Content`. This feature allows the user to view their diaries. It

fetches the `filteredDiaryList` stored in FitHelper storage.

The diary feature is facilitated by FilteredList which wraps a ObservableList and filters using the provided Predicate. A `FilteredList<Diary> filteredDiaries` is stored in the `ModelManager`. In `FitHelper`, there is an `ObservableList<Diary> diaries` which contains all diaries, regardless of its `DiaryDate`. `filteredDiaries` in the ModelManager is initialized with this ObservableList.

Since a FilteredList needs a Predicate, which matches the elements in the source list that should be visible, the filter mechanism implements the following operation to support filtering:

- `Model#updateFilteredDiaryList(Predicate<Diary> predicate)` — Sets the value of the property Predicate in the `filteredDiaries`.
    - The predicate is declared statically in the `Model` interface, namely `PREDICATE_SHOW_ALL_DIARIES`. In particular `PREDICATE_SHOW_ALL_DIARIES` is as follows

```
Predicate<Diary> PREDICATE_SHOW_ALL_DIARIES = unused -> true;
```

- The `DiaryCommand` will call this method to change the visibility of diaries with different status by passing in the corresponding predicate.

An example usage scenario and how the diary mechanism behaves at each step is shown below.

Step 1. The user launches the application for the first time. `UniqueDiaryList` contains no default diaries before the user adds any.

Step 2. The user inputs `diary` to list all diaries. `UI` passes the input to `Logic`. Logic then uses a few `Parser` classes to extract layers of information out as seen from steps 3 to 5.

Step 3. Logic passes the user input to `FitHelperParser`. `FitHelperParser` identifies that this is a `DiaryCommand` through the word "diary". It then creates a `DiaryCommandParser` to parse the it into a `DiaryCommand` and return.

Step 4. `Logic` finally gets the `DiaryCommand` and execute it. The execution firstly calls `Model#updateFilteredDiaryList(Predicate<Diary> predicate)` to update the Predicate in `filteredDiaries` in `Model`. This execution then returns a `CommandResult` to `UI`, containing the response to the user.

Step 5. `UI` displays the response in the `CommandResult`. In addition, UI will change to display diaries after model updates `filteredDiaries`, since `UI` is constantly listening for the change in `Model`.

The Sequence Diagram below shows how the components interact with each other for the above mentioned scenario.

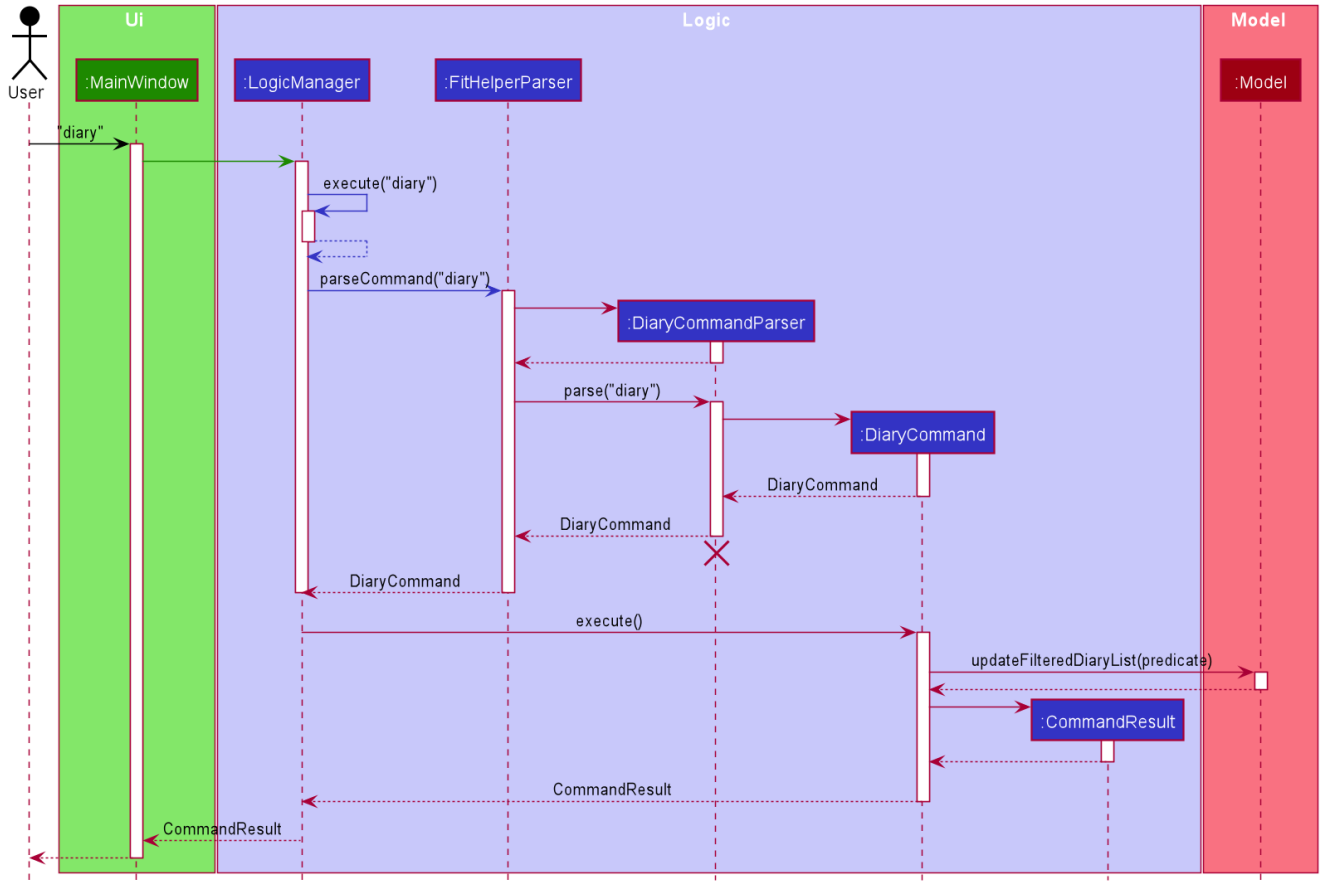


Figure 17. Sequence Diagram for Diary Feature

3.4. Undo/Redo feature

3.4.1. Implementation

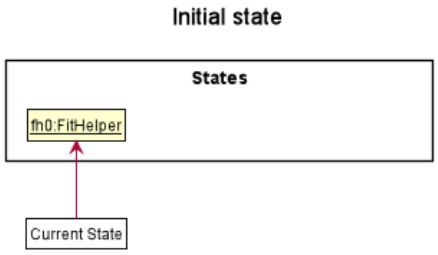
The undo/redo mechanism is facilitated by `VersionedFitHelper`. It extends `FitHelper` with an undo/redo history, stored internally as an `fitHelperStateList` and `currentStatePointer`. Additionally, it implements the following operations:

- `VersionedFitHelper#commit()` — Saves the current FitHelper state in its history.
- `VersionedFitHelper#undo()` — Restores the previous FitHelper state from its history.
- `VersionedFitHelper#redo()` — Restores a previously undone FitHelper state from its history.

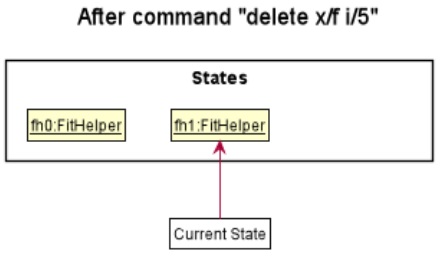
These operations are exposed in the `Model` interface as `Model#commit()`, `Model#undo()` and `Model#redo()` respectively.

Given below is an example usage scenario and how the undo/redo mechanism behaves at each step.

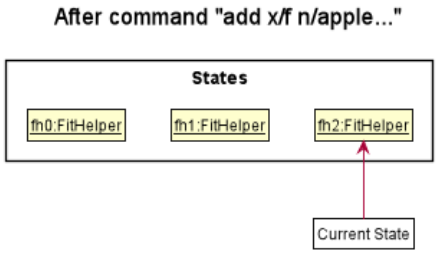
Step 1. The user launches the application for the first time. The `VersionedFitHelper` will be initialized with the initial FitHelper state, and the `currentStatePointer` pointing to that single FitHelper state.



Step 2. The user executes `delete x/f i/5` command to delete the 5th food entry in the FitHelper. The `delete` command calls `Model#commit()`, causing the modified state of the FitHelper after the `delete x/f i/5` command executes to be saved in the `fitHelperStateList`, and the `currentStatePointer` is shifted to the newly inserted FitHelper state.

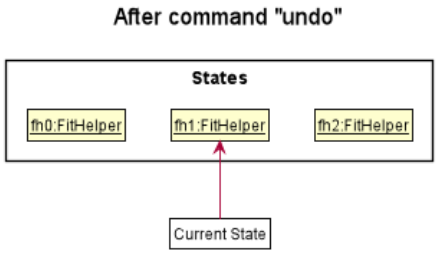


Step 3. The user executes `add x/f n/apple …` to add a new food entry. The `add` command also calls `Model#commit()`, causing another modified FitHelper state to be saved into the `fitHelperStateList`.



NOTE If a command fails its execution, it will not call `Model#commit()`, so the FitHelper state will not be saved into the `fitHelperStateList`.

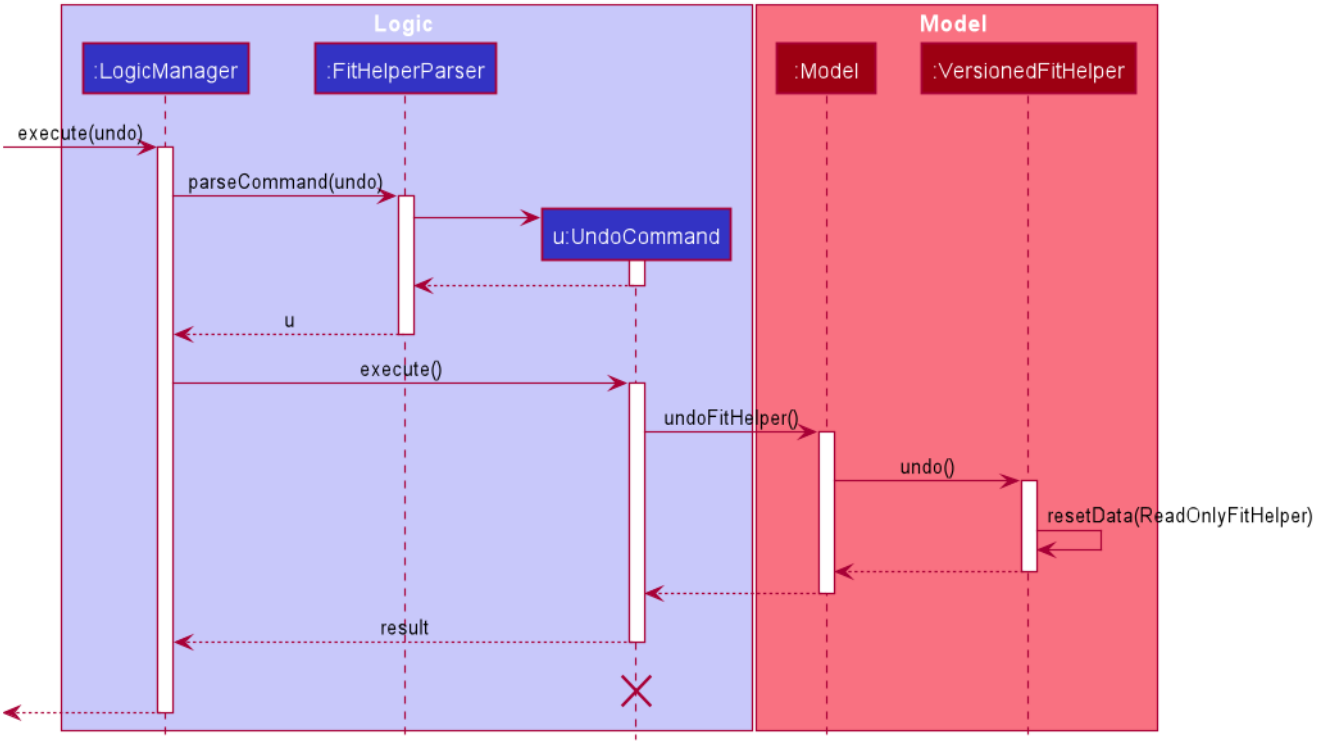
Step 4. The user now decides that adding the food entry was a mistake, and decides to undo that action by executing the `undo` command. The `undo` command will call `Model#undo()`, which will shift the `currentStatePointer` once to the left, pointing it to the previous FitHelper state, and restores the FitHelper to that state.



NOTE

If the `currentStatePointer` is at index 0, pointing to the initial FitHelper state, then there are no previous FitHelper states to restore. The `undo` command uses `Model#canundo()` to check if this is the case. If so, it will return an error to the user rather than attempting to perform the undo.

The following sequence diagram shows how the undo operation works:



NOTE

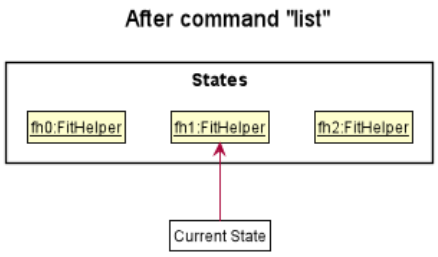
The lifeline for `UndoCommand` should end at the destroy marker (X) but due to a limitation of PlantUML, the lifeline reaches the end of diagram.

The `redo` command does the opposite — it calls `Model#redo()`, which shifts the `currentStatePointer` once to the right, pointing to the previously undone state, and restores the FitHelper to that state.

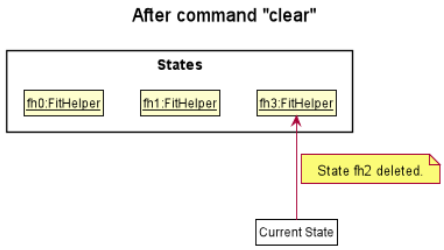
NOTE

If the `currentStatePointer` is at index `fitHelperStateList.size() - 1`, pointing to the latest FitHelper state, then there are no undone FitHelper states to restore. The `redo` command uses `Model#canRedo()` to check if this is the case. If so, it will return an error to the user rather than attempting to perform the redo.

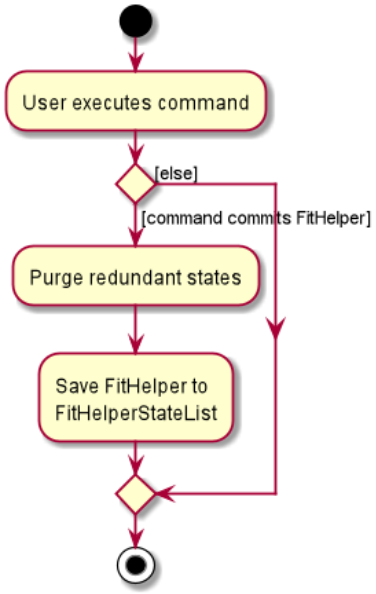
Step 5. The user then decides to execute the command `list`. Commands that do not modify the FitHelper, such as `list`, will usually not call `Model#commit()`, `Model#undo()` or `Model#redo()`. Thus, the `fitHelperStateList` remains unchanged.



Step 6. The user executes `clear`, which calls `Model#commit()`. Since the `currentStatePointer` is not pointing at the end of the `fitHelperStateList`, all FitHelper states after the `currentStatePointer` will be purged. We designed it this way because it no longer makes sense to redo the `add n/David …` command. This is the behavior that most modern desktop applications follow.



The following activity diagram summarizes what happens when a user executes a new command:



3.5. Calendar Feature

3.5.1. Implementation

1. The user enters a view command in the `calendar d/2020-04-13`.
2. `LogicManager` parses the user input, constructs and executes the `CalendarCommand`.
3. The `CalendarCommand` reaches `setCalendarDate`, `setCalendarMode`, `setCalendarShow` in the `Model` and returns the `CommandResult` to the `LogicManager`.
    - `Model#setCalendarDate()` — Set the referenced date for calendar, default set to current date.
    - `Model#setCalendarMode()` — Set the calendar display mode, can be either `list` or `calendar` mode.
    - `Model#setCalendarShow()` — Set the display of entries of a particular date, default set to `null`.
4. The `LogicManager` returns the `CommandResult` to the `Ui`.
5. The `Ui` gets the `CommandResult` from `LogicManager` and updates the Ui to display the module. The following sequence diagram shows how the update operation works to change calendar page:

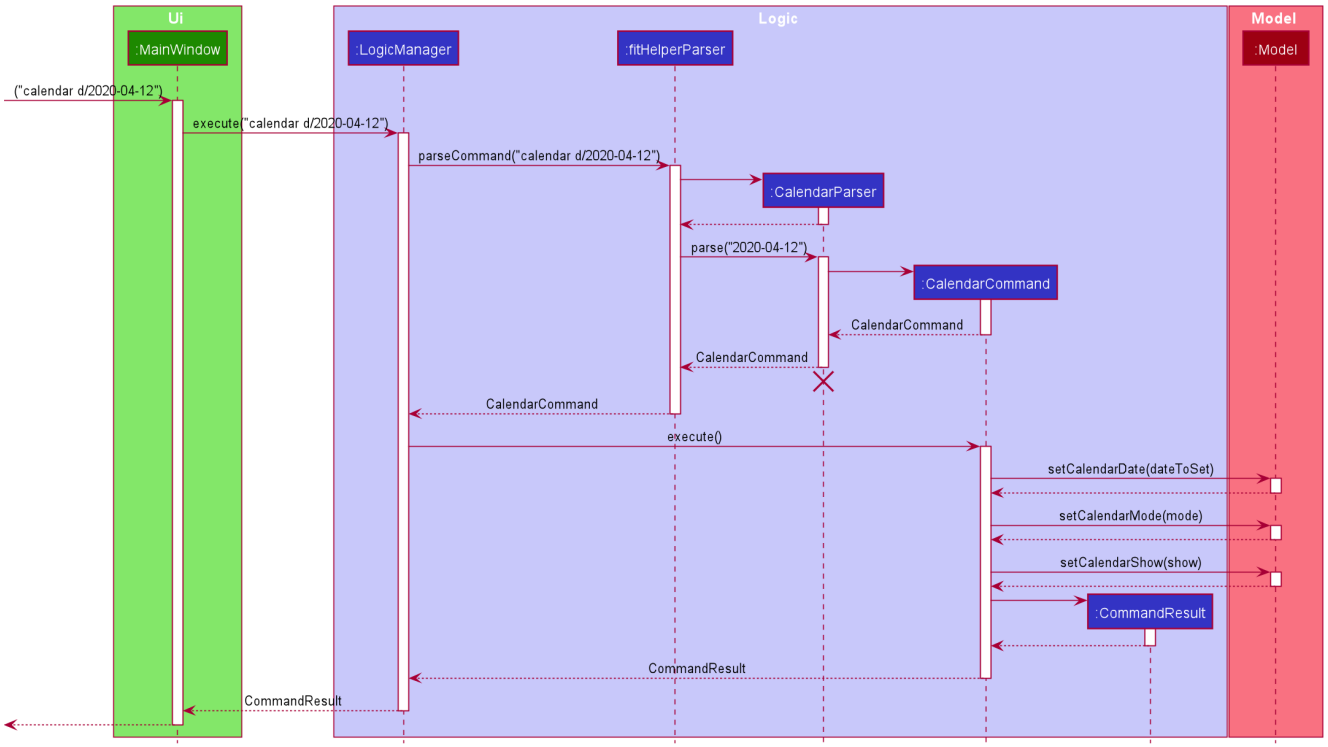


Figure 18. CalendarCommand Sequence Diagram

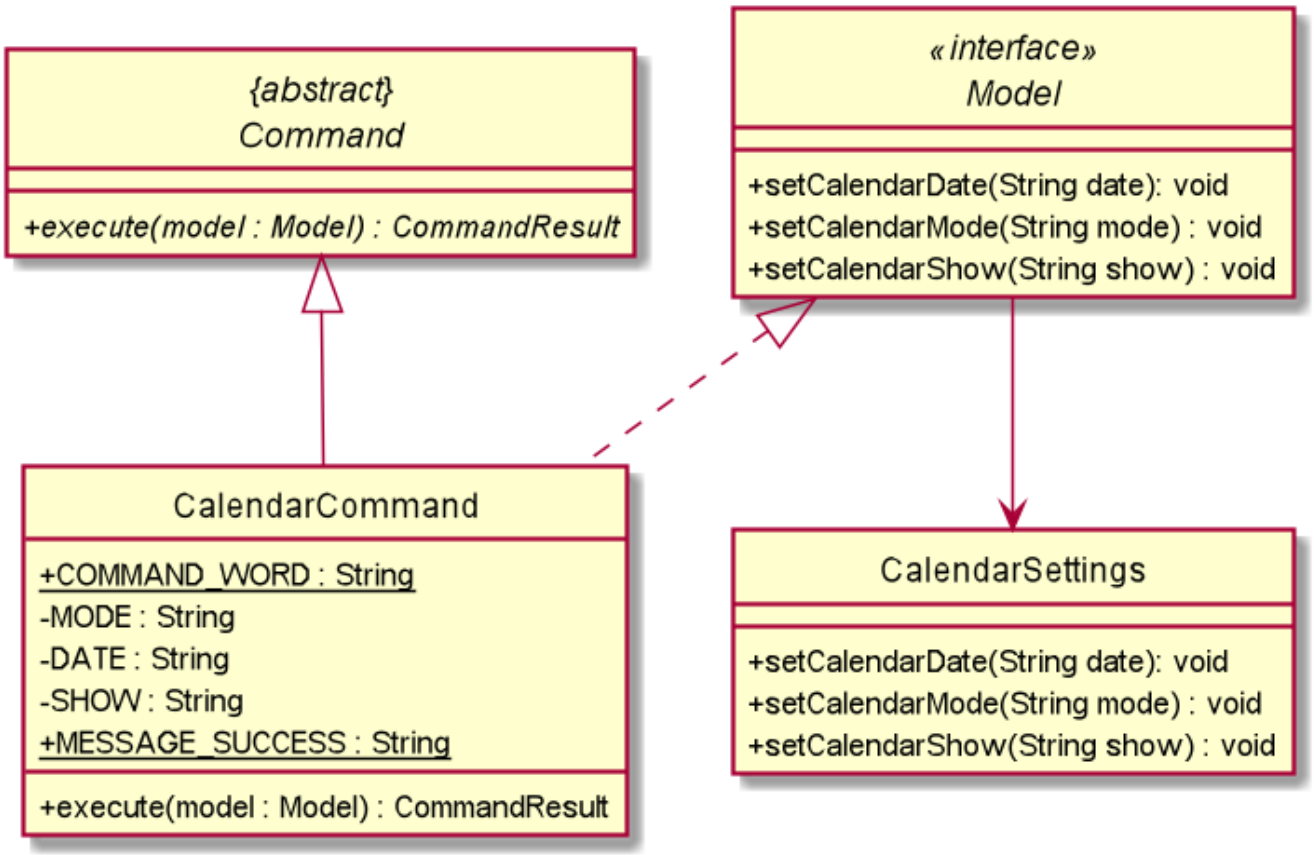


Figure 19. CalendarCommand Class Diagram

3.5.2. Design consideration

Aspect: Allowing no time clashes for all entries

- **Option 1:** Allow multiple entries to exist over the same time period

    - Pros: More user friendly, since users might be doing multiple things for a given time period
    - Cons: Calendar display will not able to display food entries
- **Option 2:** No time clashes allowed
    - Pros: Calendar display becomes clearer
    - Cons: Users are not given the freedom to add multiple entries with the same time period

We chose Option 1 for better display of entries on the calendar

3.6. Logging

We are using `java.util.logging` package for logging. The `LogsCenter` class is used to manage the logging levels and logging destinations.

- The logging level can be controlled using the `logLevel` setting in the configuration file (See Section 3.7, "Add Weight Records")
- The `Logger` for a class can be obtained using `LogsCenter.getLogger(Class)` which will log messages according to the specified logging level
- Currently log messages are output through: `Console` and to a `.log` file.

Logging Levels

- `INFO` : Information showing the noteworthy actions by the App

3.7. Add Weight Records

FitHelper allows the user to track with their weight change easily by allowing user to add their current weight and previous weight.

3.7.1. Sample

An example usage scenario and how the `addWeight` command behaves at each step is shown below.

Step 1.

- The user launches the application for the first time.
- `UniqueWeightList` in Model contains no default weights before the user adds any.
- `weightrecords.json` in local Storage contains no weight records as well.

Step 2.

- The user inputs `addWeight` command word, followed by `v/WEIGHT_VALUE` and an optional `d/DATE`.
- `UI` passes the input to `Logic`.
- `Logic` then uses a few `Parser` classes to extract layers of information out as seen from steps 3 to 5.

Step 3.

- `Logic` passes the user input to `FitHelperParser`.
- `FitHelperParser` identifies that this is a `AddWeightCommand` through the command word "addWeight".
- It then creates a `AddWeightCommandParser` to parse the input into a `AddWeightCommand` and return back.

Step 4.

- `Logic` gets the `AddWeightCommand` and execute it.
- The execution firstly check is the new weight date is after today's date and if there is already a existing weight in the UniqueList.
- Both of these two cases will throw corresponding `CommandException`.
- Then the execution add the new `Weight` into model.
- Finally, it returns a `CommandResult` to `UI`, containing the response to the user and the displayPage, which equals to `WEIGHT` page.

Step 5.

- `UI` displays the response in the `CommandResult`.
- In addition, UI will change to display Weight Page after updating Profile Page and Weight Page.

3.7.2. Implementation

Storage

A weight is stored with three attributes in the `weightrecords.json` database:

- `date` : the date of the weight record in format of `yyyy-MM-dd`, if no date is provided by the user, the **default value** is the date of today
- `weightValue` : a double value with two decimal places.
- `bmi` : the BMI value is also a double value with two decimal places. It is auto-computed and stored, using the formula : `BMI = Weight Value(kg) / Height(m)^2`. The Height value gets from user profile in `userprofile.json` database.

Model

- A single weight is represented as model `Weight` with the attributes of `Date`, `WeightValue`, and `Bmi`.
- In `ModelManager`, all weights are represented by `WeightRecords weightRecords`.
  - The `WeightRecords` class implements `ReadOnlyWeightRecords` interface, and therefore can return an **unmodifiable** version of a **unique** list of weights.
  - The `WeightRecords` wraps a `UniqueWeightList` which allows adding and iterating. **Unique** here refers to the constraint that no two weight with the same date can exist in the list/database.
- In `ModelManager`, a `FilteredList<Weight> filteredWeight` object is used to store and update a

filtered version of all weights.

- The FilteredList wraps a `ObservableList` and filters using a provided `Predicate`.

UI

When user input `addWeight` command to `UI`, the input is passed to `Logic` part as a `String`.

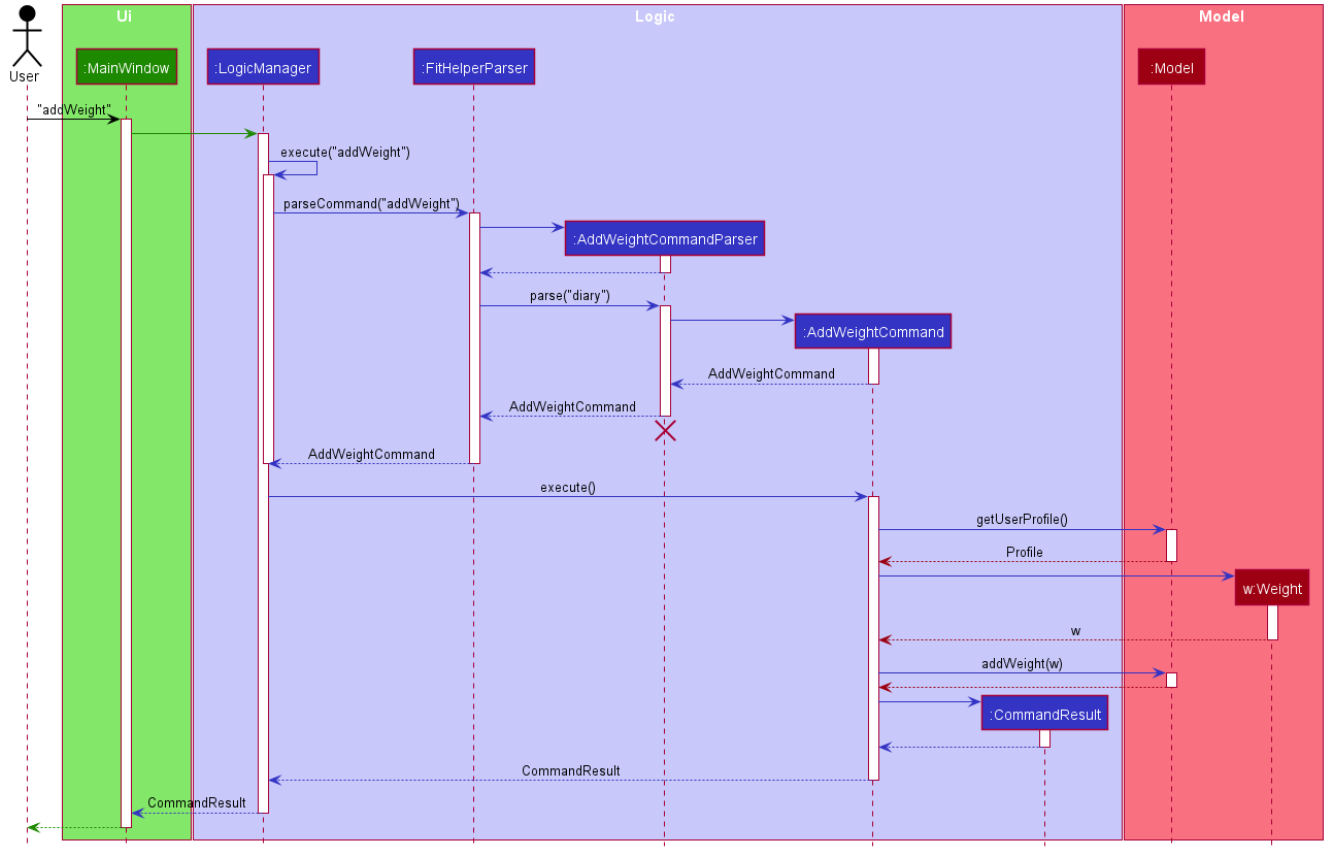
After `addWeight` command is executed, a `CommandResult` with `DisplayPage` equals `WEIGHT` will be passed back to `MainWindow` in `UI` part. Then:

- Firstly, it will call `updateProfilePage()`, since if the newly added weight has the lasted date, Current Weight and Current BMI in uer profile will need to be updated.
- Secondly, it will call `updateWeightPage()`, since if a new weight is added successfully, new points should be added on to Weight Line Chart and BMI Line Chart. The text content of top notification will also be updated if the gap between Current Weight and Target Weight is changed.
- Lastly, it will call `showWeightPage()`. This allows the Main Window auto-switch to Weight Page after each `addWeight` command by user.

Logic

The Sequence Diagram below shows how the components interact with each other for the mentioned scenario in sample.

Sequence Diagram for Add Weight Feature



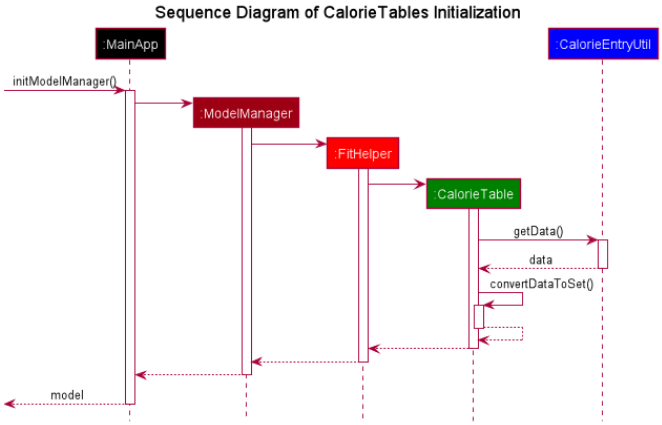
3.8. Check calorie intake/consumption of some common food/sports

3.8.1. Implementation

The check function is achieved by calling the `FitHelper` inside the `ModelManager` to search through either `FoodCalorieTable` or `SportsCalorieTable` for `CalorieDatum` that contain the keywords specified by the user.

Given below are example usage scenario:

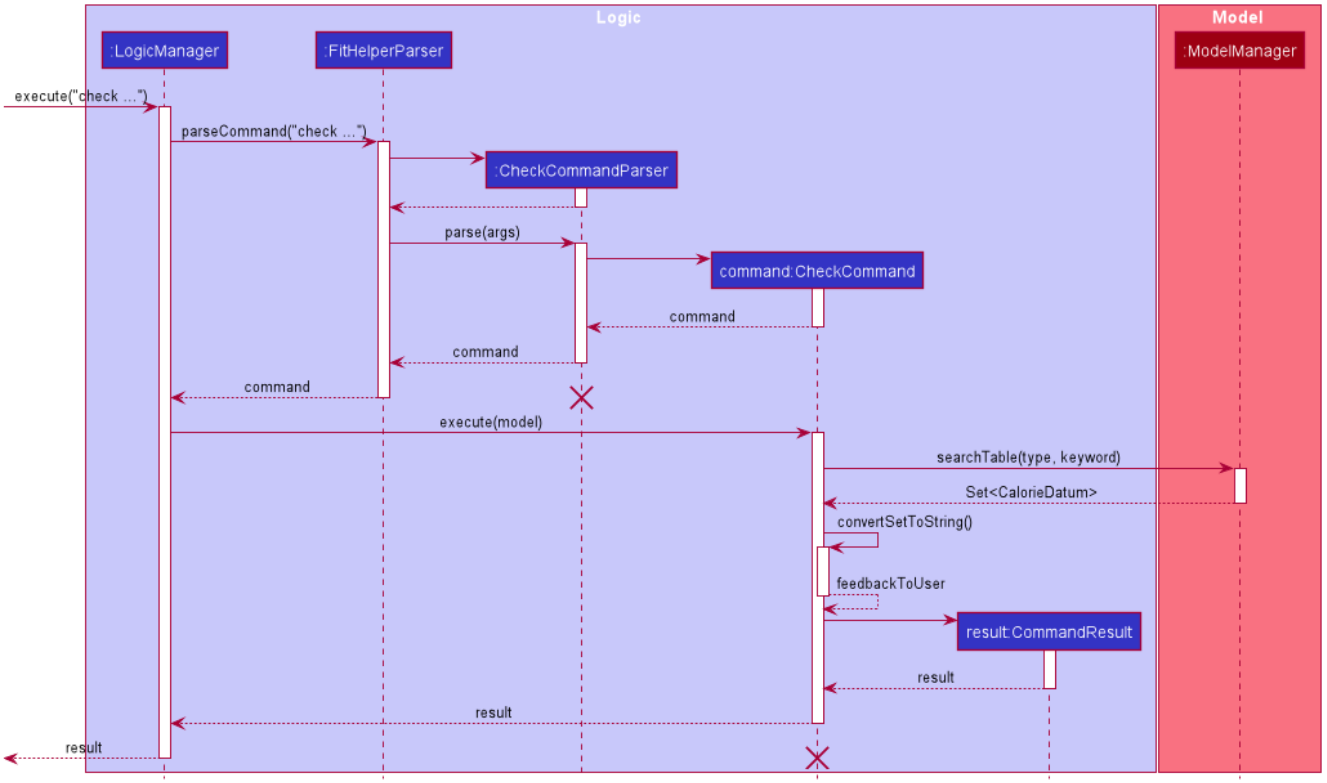
Initialization: when the application is launched, `ModelManager` will initialize a `FitHelper`, which will in turn initialize both `FoodCalorieTable` and `SportsCalorieTable` to contain pre-set data which is a LinkedHashSet of one type of `CalorieDatum` (either `FoodCalorieDatum` or `SportsCalorieDatum`).



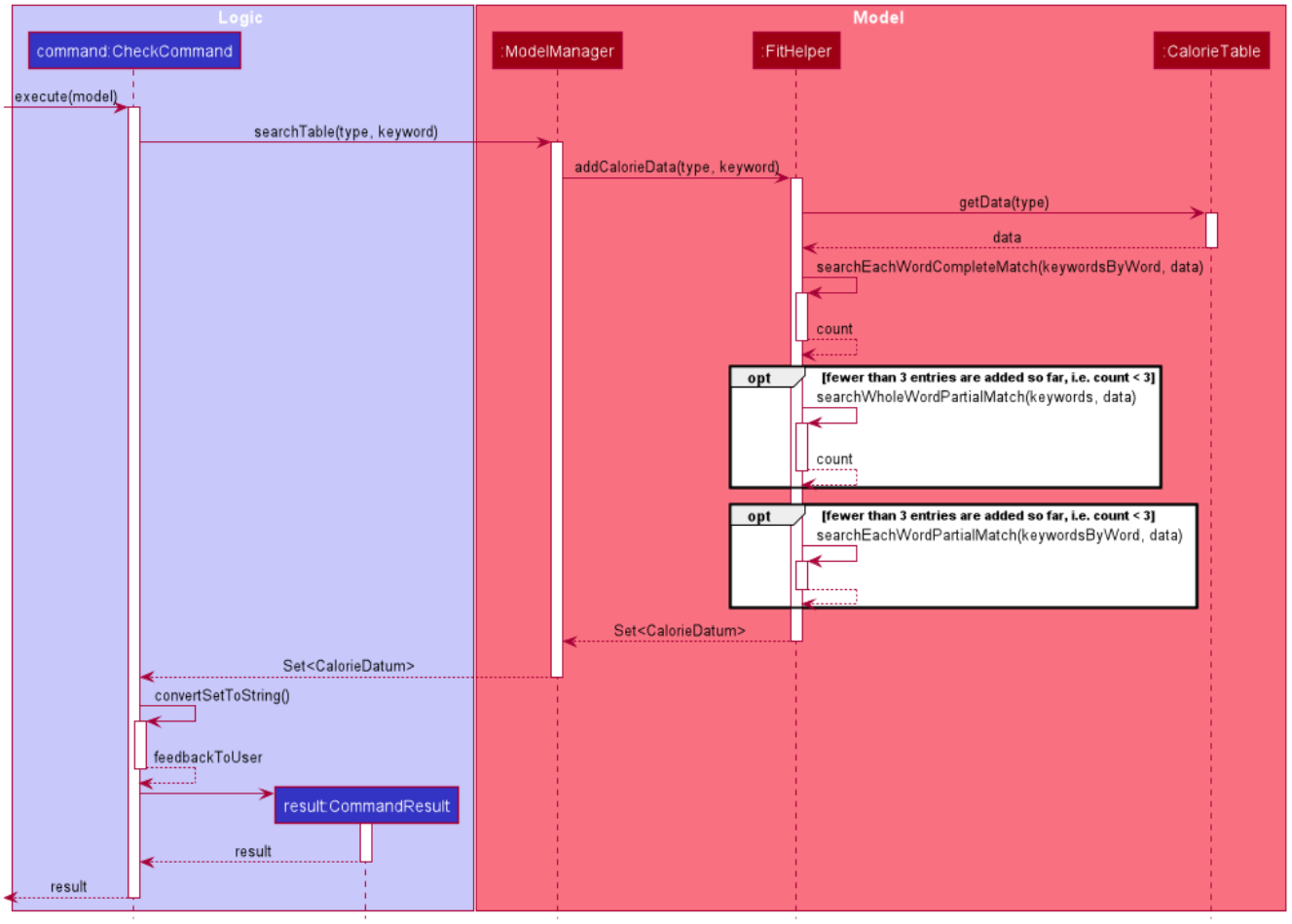
Case 1: when the user enter the command `check x/sports k/swim`, the `LogicManager` will create a `CheckCommand`, which asks `ModelManager` to let `FitHelper` to search through `SportsCalorieTable` to add first 3 `CalorieDatum` whose name matches the keyword `swim` into a set, and return the set to `CheckCommand`. Since the set contains at least one `CalorieDatum` (meaning there is some matching data), the `CheckCommand` returns a `CommandResult` whose `feedbackToUser` contains a success message followed by the string representation of each matching datum.

Case 2: when the user enter the command `check x/f k/swim`, the `LogicManager` will create a `CheckCommand`, which asks `ModelManager` to let ` FitHelper` to search through `FoodCalorieTable` to add first 3 `CalorieDatum`s whose name contains the keyword `swim` into a set, and return the set to `CheckCommand`. Since the set contains no `CalorieDatum` (meaning there is no matching data), the `CheckCommand` returns a `CommandResult` whose `feedbackToUser` contains a failure message followed by the string representation of the keyword.

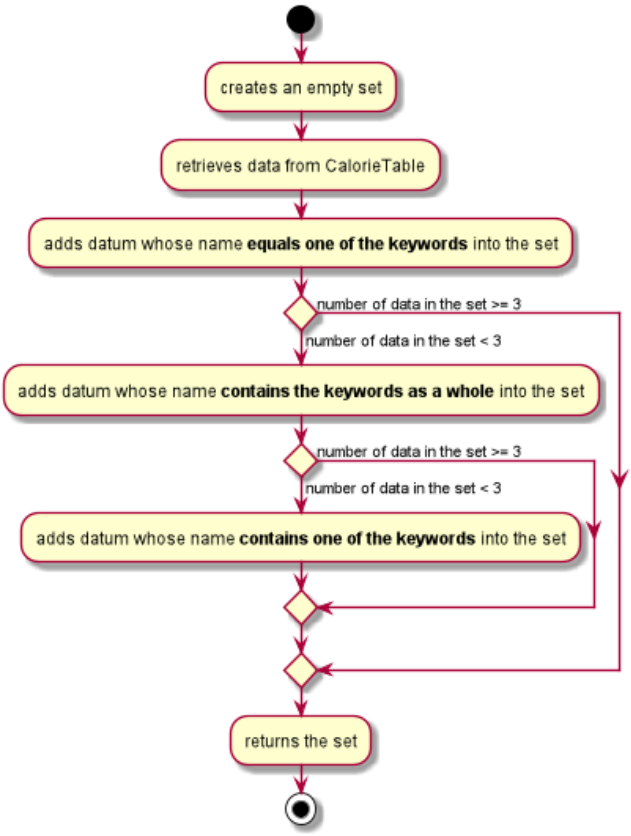
Sequence Diagram of Check Command (Logic part)



Sequence Diagram of Check Command (Model part)



The detailed searching mechanism is illustrated in the following activity diagram:



3.8.2. Design Considerations

Aspect: Data structure to store entries

- **Alternative 1 (current choice):** Use an `LinkedHashSet` as a field in CalorieTable to store the entries.
  - Pros: Easy to implement partial-key search (compare the keyword with the name of each entry in the set). Ensure that the database contains no duplicate data since a Set does allow duplicate elements.
  - Cons: O(n) complexity for finding matching entries, where n is the number of entries in the set.
- **Alternative 2:** Use a `HashMap` as a field in CalorieTable to store the entries. The key is the name of the entry and the value is the entry.
  - Pros: (theoretically) O(1) time complexity for finding an entry given a complete keyword, regardless of how many entries are in the HashMap.
  - Cons: hard to implement partial-key search (i.e. the keyword is only part of the name of the entry).

4. Documentation

Refer to the guide here.

5. Testing

Refer to the guide here.

6. Dev Ops

Refer to the guide here.

Appendix A: Product Scope

Target user profile:

- has a need to control weight, therefore need to record daily food intake and sports
- prefer desktop apps over other types
- can type fast
- prefers typing over mouse input
- is reasonably comfortable using CLI apps

Value proposition: achieve fitness control faster than a typical mouse/GUI driven app

Appendix B: User Stories

Priorities: High (must have) - * * *, Medium (nice to have) - * *, Low (unlikely to have) - *

Priority	As a …	I want to …	So that I can…
* * *	new user	record my basic information such as name and gender	have a more complete profile
* * *	user who is concerned about body shape	record and update my current height and weight	have a clear view of my current body condition
* * *	user who wants to lose weight	set my target weight	have a clear target to work towards
* * *	user who wants to set diet plans	add a food entry	can plan my diet
* * *	user who wants to control calorie intake	view the calorie in each food entry	can keep track of my calorie intake
* * *	user who wants to set sports plans	add a sport entry	can plan for my sport exercises
* * *	user who wants to increase calorie consumption	view the calorie consumption for each sport entry	can keep track of my calorie consumption

Priority	As a …	I want to …	So that I can…
* * *	user who wants to adjust my diet/sports plans	edit a food/sports entry	can have my plans and records updated
* * *	user who wants to remove my diet/sports plans	delete a food/sports entry	
* * *	user who wants to search for an entry	search by keywords in the entry name	can find related entries without having to scan through all the entries
* * *	user who wants see today’s plans	switch to Today Page and view the daily food/sports plans	can have a general idea of the daily diet/sports arrangements
* * *	user who needs some suggestions for my daily plan	switch to Today Page and view FitHelper feedback	I know whether my daily food/sports plan is suitable
* * *	user who wants to know my daily performance	switch to Today Page and view my performance report	I know my food calorie intake distribution and my task completion
* * *	user who types wrongly sometimes	undo my previous command	I do not need to delete explicitly using a long command
* * *	user who types wrongly sometimes	redo my previous undo command	I can re-executed a undone command
* * *	user who wants to keep a diary	add a diary log for a specific day	note down my schedules, feelings, goals and so on as a self-encouragement
* * *	user who wants to append more content to a previous diary	append new content to existing diaries	enrich my previous diaries' content
* * *	user who wants to replace the content of a previous diary with new content	edit existing diaries	modify the content to an updated version
* * *	user who wants to remove some diary logs	delete existing diaries	keep abandon some diary logs that I do not want to keep
* * *	user who wants to clear my diary	clear all existing diaries	I can re-start my diary from a white paper
* *	user who wants keep fit	acknowledge my weight change trend according to time	keep track of my weight change easily

Priority	As a …	I want to …	So that I can…
* *	user who wants to lose weight	compare between my current weight and target weight	know the gap clearly
* *	user	update my basic information such as address and name if necessary	have an updated profile at any time
* *	user	view pending tasks and status of daily calories goals in a calendar	have cleaner display of data
* *	user who wants to have a clean user interface	clear entries regularly	do not need to see irrelevant information
* *	user	leave the application when I need	It does not occupy additional space in my computer
* *	user	list all entries by certain criteria	I can filter the tasks by what I am looking for
* *	user	get reminders for tasks not done	I can focused on these tasks and complete them
* *	user who do not know very well about dieting and exercising	check calorie intake/consumption of common food and sports	I can input calorie intake/consumption without having to search about these information online.
* *	first-time user	view help page	I can know the functions of the application quickly

Appendix C: Use Cases

(For all use cases below, the **System** is the `FitHelper` and the **Actor** is the `user`, unless specified otherwise)

Use case: UC01 - Add an Entry

MSS

1. User adds an entry specifying a meal or a sport with name, time, location, and calorie.
2. FitHelper stores the entry to the specific date file.
3. FitHelper display successful record and the entry status.

   Use case ends.

Extensions

1a. User input incomplete values.

1a1. FitHelper shows an error message.

Use case ends.

1b. The input time has clashes with previous entries.

1b1. FitHelper shows an error message.

Use case ends.

Use case: UC02 - Edits an Entry

MSS

1. User edits an entry specifying a meal or a sport with name, time, location, and calorie.
2. FitHelper modifies the entry to the specific date file.
3. FitHelper display successful record and the entry status.

Use case ends.

Extensions

1a. User input repeated values that are already stored in the entry.

1a1. FitHelper ignores the edit command.

Use case ends.

Use case: UC03 - Deletes an Entry

MSS

1. User deletes an entry by using the `delete` command.
2. FitHelper deletes the corresponding entry in the list and in the file.
3. FitHelper display the entry status and the successfully-delete message.

Use case ends.

Extensions

1a. The `INDEX` specified by the user does not exist.

1a1. FitHelper shows an error message.

Use case ends.

{More to be added}

Appendix D: Non Functional Requirements

1. Should work on any mainstream OS as long as it has Java 11 or above installed.
2. Should be able to hold up to 1000 entries without a noticeable sluggishness in performance for typical usage
3. Should be able to function normally without internet access.
4. A user with above average typing speed for regular English text (i.e. not code, not system admin commands) should be able to accomplish most of the tasks faster using commands than using the mouse.
5. A user can get response from the system within 5 seconds after command input.
6. A user can be familiar with the system commands and interface within half an hour usage.

{More to be added}

Appendix E: Glossary

Mainstream OS

Windows, Linux, Unix, OS-X

Table 1. Command Prefix

Prefix	**Meaning**	**Used in the following Command(s)**
x/	Type of entry	add, check, delete, edit, find
i/	Index of entry	edit, delete, edit
n/	Name	add, edit
t/	Time in format of "date hour minute"	add, edit
l/	Location	add, edit
c/	Calorie	add, edit
s/	Status	add, edit
r/	Remark	edit
d/	Date in format of **yyyy-MM-dd**	calendar, addWeight
dr/	Duration in format of **yyyy-MM-dd yyyy-MM-dd**	add, edit
dc/	Dairy contents	dairy
k/	Keyword	check, find
attr/	Attribute in user profile	update
v/	Attribute Value in user profile	update, addWeight

Table 2. Possible Command Flags

Command	Flag	Meaning
Sort	-a	Sort in **ascending** order
Sort	-d	Sort in **descending** order
Sort	-t	Sort according to **time**
Sort	-c	Sort according to **calorie intake**
Update	-f	**Force update** even with existing value

Appendix F: Product Survey

Product Name : FitHelper

Author: …

Pros:

- …
- …

Cons:

- …
- …

Appendix G: Instructions for Manual Testing

Given below are instructions to test the app manually.

NOTE	These instructions only provide a starting point for testers to work on; testers are expected to do more *exploratory* testing.

G.1. Launch and Shutdown

1. Initial launch
   a. Download the jar file and copy into an empty folder
   b. Double-click the jar file
      Expected: Shows the welcome page of FitHelper. On the left hand side, the user can see a list of page name. Users are able to click on the button or using corresponding command to direct to that page.
   c. The window size is fixed.
2. Shutdown

a. Users are able to shutdown the application using CLI with following commands:
   - `exit`
   - `quit`
   - `bye`

b. Users can also choose to shutdown the application by clicking on X button on the right top side if the window.

c. User data will be auto-saved if user choose to shutdown the application. Three local data file in json format can be find:
   - `fithelper.json` : containg data related to entries and diaries.
   - `userprofile.json` : containing data related to user profile.
   - `weightrecords.json` : containing data related to all weight records.

G.2. Adding A New Weight Record

1. Add **first weight record** while there is no previous weight record in the database.

   a. Prerequisites: None. Users are able to use `addWeight` command at any page.

   b. Test case: `addWeight v/50.0`
   Expected:
      - A new `Weight` is added into `weightrecords` database, with `WeightValue` equals 50.0, `Date` with default value(today's date) and `BMI` calculated by `Height`.
      - The window is automatically directed to weight page. A new point is shown on both Weight Line Graph and BMI Line Graph. The top notification is also updated.
      - In profile page, Current Weight and Current BMI change from "Not Available Now" to the newest value.

   c. Test case: `addWeight v/49.0 d/2050-01-01`
   Expected: No new weight record is added since the date is after current date. An error message is shown in the command result box.

2. Add new weight record when there is already **some previous weight records existing** in the database.

   a. Prerequisites: None. Users are able to use `addWeight` command at any page.

   b. Test case: `addWeight v/48.0`
   Expected: No new weight record is added since there is existing weight record with the same date (by default is today's date) in the data base. An error message is shown in the command result box.

   c. Test case : `addWeight v/47.0 d/2020-03-01`
   Expected:
      - A new `Weight` is added into `weightrecords` database, with `WeightValue` equals 47.0, `Date` with 2020-03-01 and `BMI` calculated by `Height`.
      - The window is automatically directed to weight page. A new point is shown on both Weight Line Graph and BMI Line Graph, and form a new trend line with previous data

points. The top notification is also updated.

- In profile page, Current Weight and Current BMI remain the same, since the newly added weight record is not the most recent record in the database.

G.3. Saving data

1. Dealing with missing/corrupted data files
    a. If the application is launched and shut down at least once, there will be three local database in json format.
    b. Delete `fithelper.json`, and launch FitHelper again. All user manipulation on entries and diaries will be cleared. `Dashboard`, `Today`, `Calendar` and `Diary` Page will restart with sample data.
    c. Delete `userprofile.json`, and launch FitHelper again. All user manipulation on user profile will be clear. `Profile` page will restart with sample user data.
    d. Delete `weightrecords.json`, and launch FitHelper again. All user manipulation on weight records will be clear. `Profile` page will show Current Weight and Current BMI as "Not Available Now", and `Weight` Page will have no data point on the trend line graph.