

# Joel Loong - Project Portfolio

## Project: PalPay

### Overview

This portfolio documents my contributions to PalPay, a software engineering project under the module, CS2103T Software Engineering. For this module, we were provided with a working software application which we could enhance or morph to suit our target audience.

PalPay is a student application that effectively tackles the problem of the lack of a centralised platform to manage their finances. PalPay provides the ability to easily track their expenses and manage their finances.

For the project, my main role was to develop the undo and redo feature for the application. Additionally, I was tasked to develop the view, sort and filter features.

### Summary of contributions

- **Code contributed:** [RepoSense](#)
- **Major enhancement:** Implemented the ability to undo and redo previous commands.
  - What it does: Undo command allows the user to undo all previous commands one at a time. Redo command reverses preceding undo command.
  - Justification: It gives users the ability to easily rectify their mistakes in commands. Hence, it improves the user experience and a more convenient way of self-correction.
  - Highlights: This requires a thorough understanding of the starting infrastructure of the application in order to make changes to it. This enhancement affects existing commands and commands to be added in future. In addition, I need to ensure the commands are undoable and redoable, and that there are no conflicts to the existing data in the application.
- **Minor enhancement:**
  - **View** command for users to switch tabs without the need of a mouse to click another tab. This meets the needs of the target audiences who prefer using the command line.
  - **Sort** command for users to sort their lists of transactions in PalPay.
  - **Filter** command for users to filter their lists of transactions to reduce the need of scrolling through their lists.
- **Other contributions:**
  - Project management:
    - Managed the biweekly project releases on GitHub.
    - Managed the issue tracker of the group repository.
    - Reviewed and merged pull requests.

- Enhancements to existing features:
  - Wrote comprehensive unit and integration test cases for the application's logic and model. (Pull requests: [#70](#), [#114](#), [#202](#), [#205](#))
- Documentation:
  - Reformatted the User Guide for a more sequential flow.
  - Wrote the details for the following commands in the User Guide.
    - View / Sort / Filter / Undo / Redo / Clear / List / Help / Exit
  - Wrote user stories in the Developer Guide.
  - Created UML diagrams to help in the explanation of view, sort and filter commands in the Developer Guide.
- Community:
  - Reported bugs and suggestions for other teams in the module. (Examples: [#219](#), [#220](#), [#222](#), [#229](#))
  - Provided tips and help to other students in the module. (Examples: [#70](#), [#79](#), [#110](#))
- Tools:
  - Managed the initial set up of the group repository on GitHub.
  - Integrated Travis CI, Coveralls, Netlify and RepoSense into the group repository.

## Contributions to the User Guide

*Given below are sections I contributed to the User Guide. They showcase my ability to write documentation targeting end-users.*

### Switching Tabs : **view**

Want to switch tabs without using your mouse? You can switch to another tab with the **view** command.

#### Command Syntax

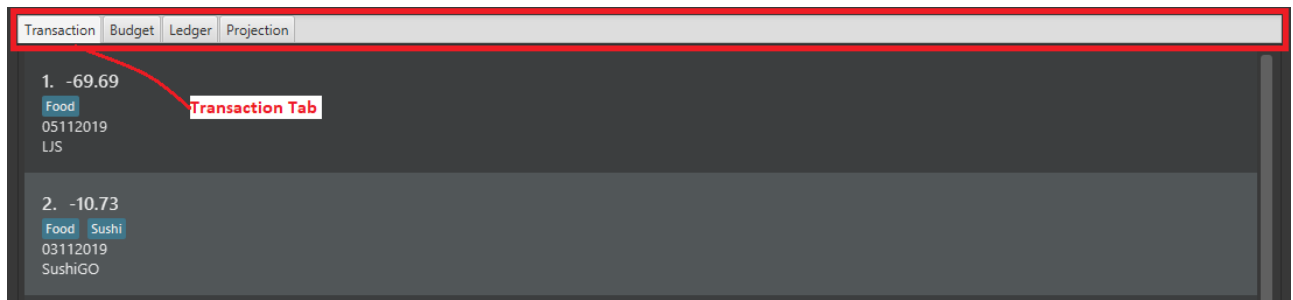
Format: **view** TAB

- TAB input only accepts **transaction**, **budget**, **ledger** and **projection** in v1.4. It is case-insensitive.

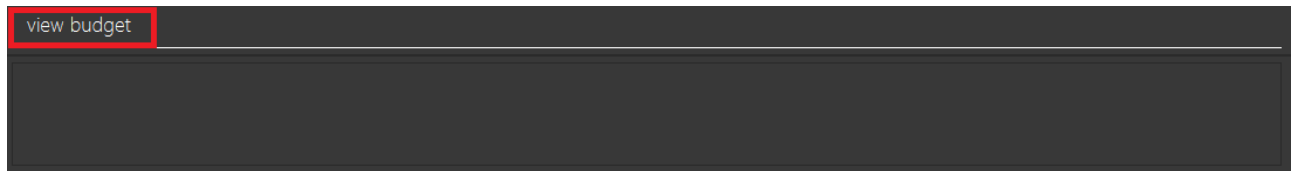
#### Example Usage:

You do not have to use your mouse in PalPay to switch tabs anymore.

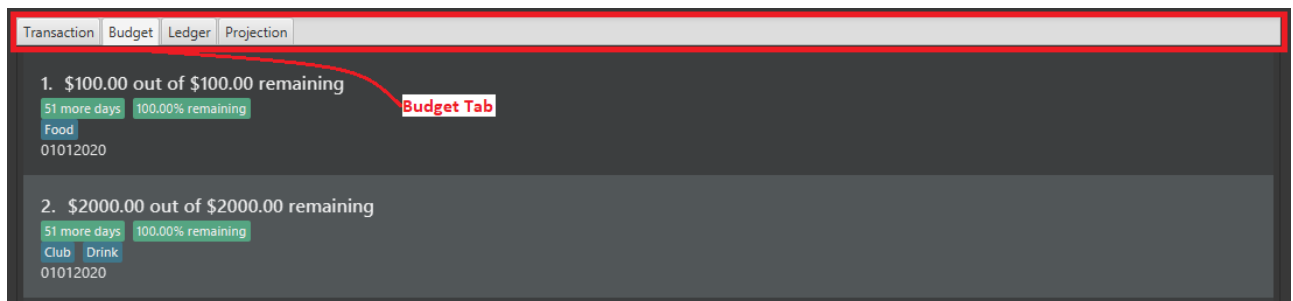
1. By default, you are in the **transaction** tab.



2. Simply type **view budget** in the command box and press **Enter**.



3. You can now view your budgets. Easy!



## Undoing the Last Command : **undo**

Did you accidentally delete a transaction? Do not panic! PalPay lets you undo your previous commands with just one word, **undo**.

### Command Syntax

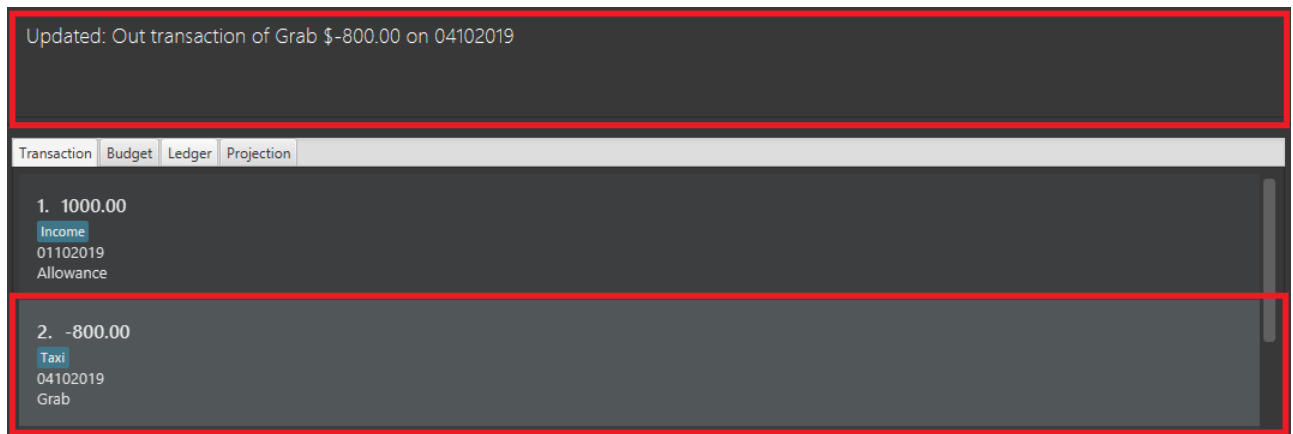
Format: **undo**

- Once you exit PalPay, you cannot undo the previous commands.
- Below are the commands that are undoable:
  - **in / out / set / split / receive / project / sort / filter / update / delete / clear / list**

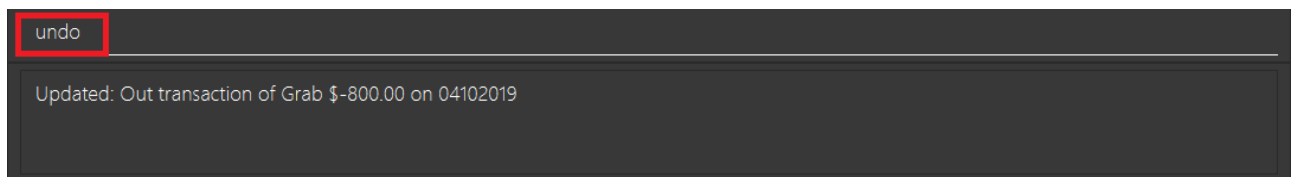
### Example Usage:

Suppose you want to update your allowance you received in October 2019 to \$800 but you accidentally update the GrabTaxi ride instead. Without going through the trouble of updating the same transaction again, you can simply perform the **undo** command. Just follow these three simple steps.

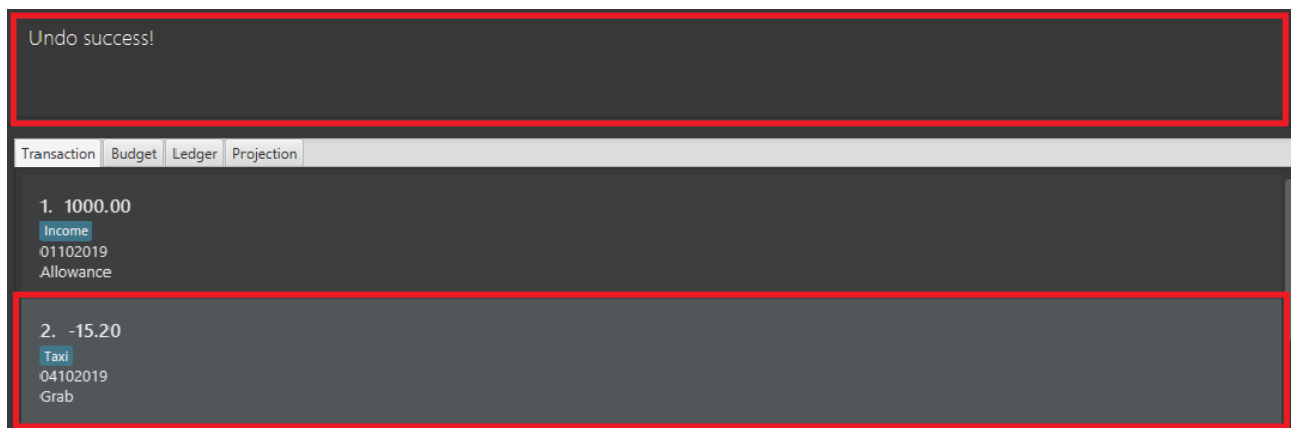
1. Here, you can see the wrong update you just made.



- Simply type **undo** in the command box and press **Enter**.



- As you wish, your command has been undone.



## Contributions to the Developer Guide

*Given below are sections I contributed to the Developer Guide. They showcase my ability to write technical documentation and the technical depth of my contributions to the project.*

### Sort Feature: **sort**

This feature allows the user to sort their transactions by amount or date, in ascending and descending order.

#### Current Implementation

The **sort** command is facilitated by the Logic and Model components of the application.

The following sequence diagram shows how the sorting of transactions work when the user enters **sort date/d**.

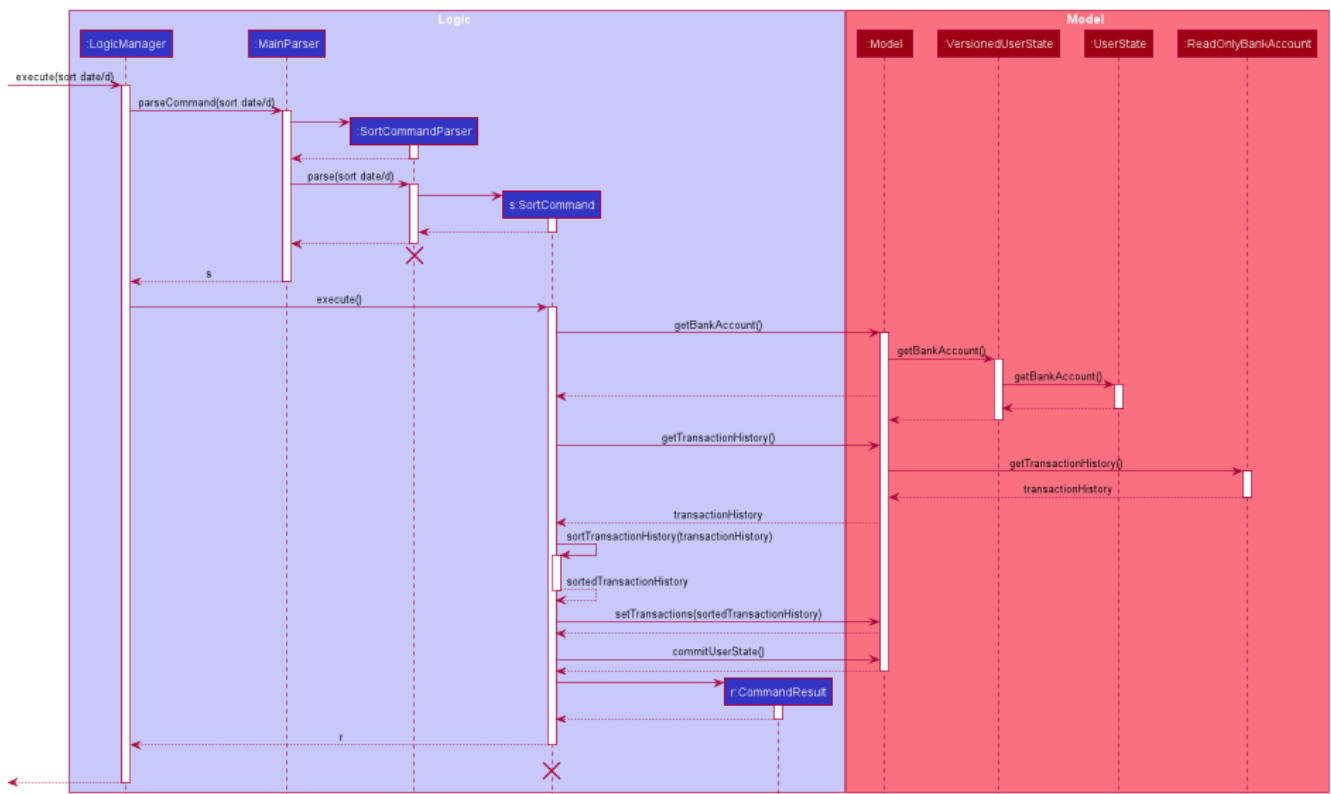


Figure 1. Sequence Diagram for `sort date/d`

## Example of Usage

Given below is an example usage of how `sort` behaves at each step.

**Step 1.** The user launches the application and views an unsorted list of transactions.

Transaction	Budget	Ledger	Projection
1. 1000.00 Income 01102019 Allowance			
2. -23.00 Shopping 04102019 RedMi Airdots			
3. -15.20 Taxi 04102019 Grab			
4. -13.37 Insurance 10102019 Aviva			
5. -773.80 Travel 19102019 Airplane Tickets			

Figure 2. Initial State of PalPay

**Step 2.** The user now executes `sort date/d` to sort the transactions in the order of descending date.

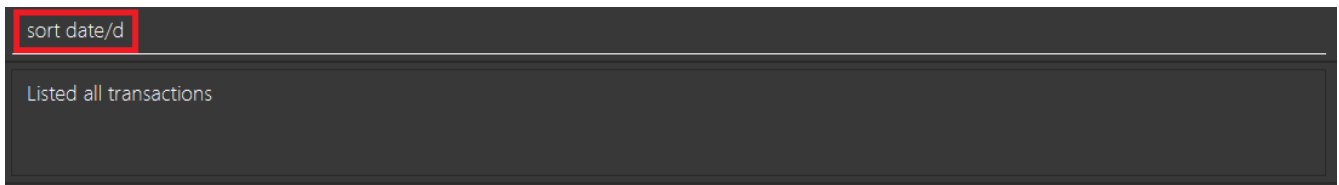


Figure 3. User Inputs `sort date/d`

**Step 3.** Upon executing the command, `LogicManager` uses `MainParser#parse()` to parse the input from the user.

**Step 4.** `MainParser` determines which command is being used and creates `SortCommandParser` to further parse the input from the user.

**Step 5.** `SortCommandParser` parses the argument and checks if it is valid. If it is invalid, `SortCommandParser` throws an exception and terminates. Else, it returns a `SortCommand`.

**Step 6.** `LogicManager` uses `SortCommand#execute()` to sort the transactions in the order of descending date.

**Step 7.** `SortCommand` uses `ModelManager#getBankAccount()` to get the current bank account and uses `BankAccount#getTransactionHistory()` to get the list of transactions of the user.

**Step 8.** `SortCommand` uses `SortCommand#sortTransactionHistory()` to sort the transactions.

**Step 9.** `SortCommand` uses `Model#setTransactions()` to store the sorted transactions and `Model#commitUserState()` to save the latest state of the application.

**Step 10.** `SortCommand` returns a `CommandResult` to the `LogicManager` and the result will be displayed to the user at the end.

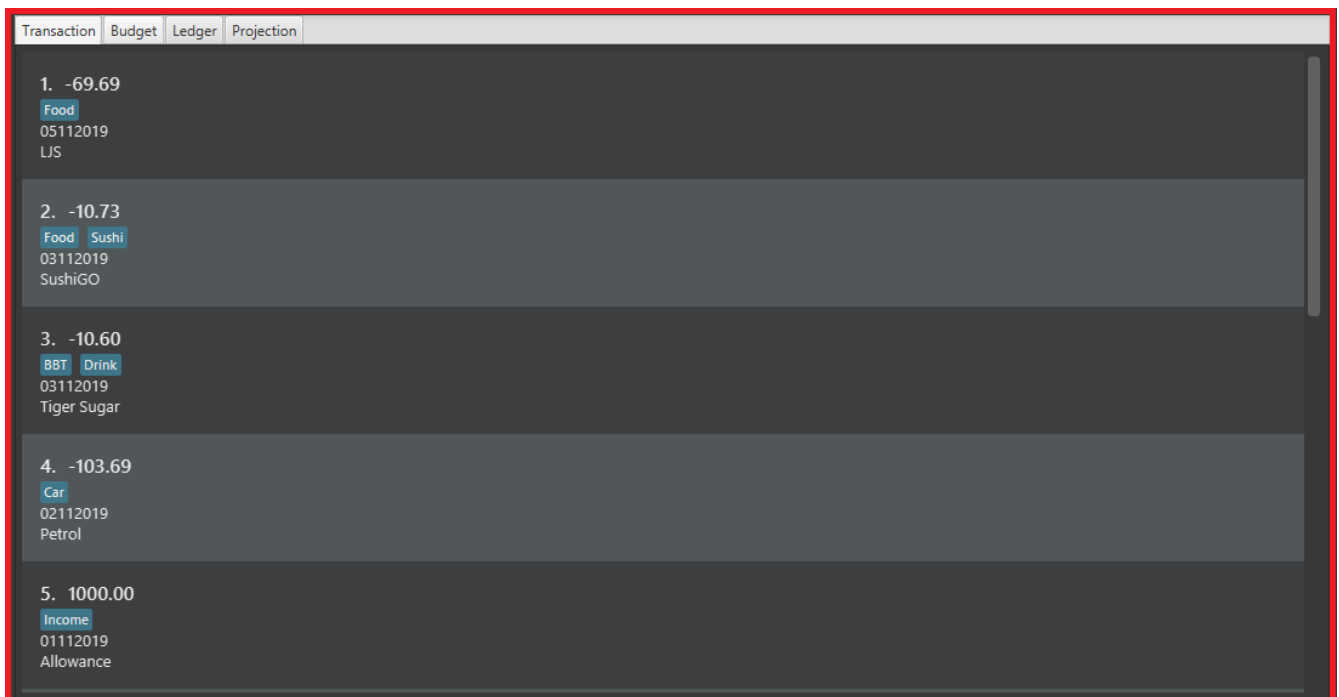


Figure 4. After Sorting of Transactions

## Design Considerations

### Aspect: Sorting of the Bank Account

- **Alternative 1 (Current Choice):** Creating a comparator for each area to be sorted.
  - **Pros:** Easy to implement.
  - **Cons:** Users can only sort by comparators that have been implemented. Developers have to create a new comparator class to sort a new area.
- **Alternative 2:** Users can define the area to be sorted.
  - **Pros:** Extremely flexible for the users as they are not limited to the number of areas to be sorted.
  - **Cons:** Difficult to implement.

## Undo / Redo Command Feature: undo/redo

### Current Implementation

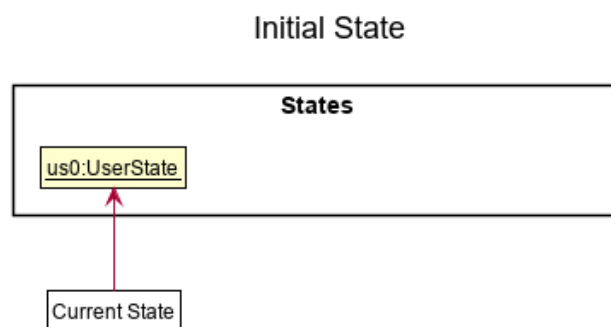
The undo/redo mechanism is facilitated by `VersionedUserState`. It extends `UserState` with an undo/redo history, stored internally as an `userStateList` and `currentStatePointer`. Additionally, it implements the following operations:

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

These operations are exposed in the `Model` interface as `Model#commitUserState()`, `Model#undoUserState()` and `Model#redoUserState()` respectively.

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

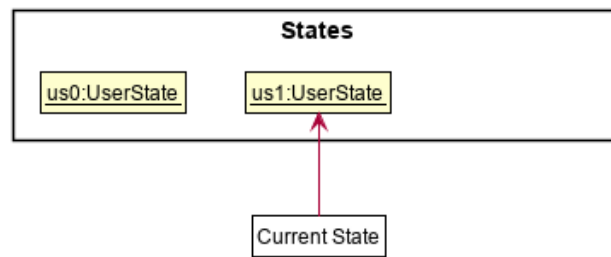
**Step 1.** The user launches the application for the first time. The `VersionedUserState` will be initialized with the initial user state, and the `currentStatePointer` pointing to that single user state.



**Step 2.** The user executes `delete t5` command to delete the 5th transaction in the transaction list. The `delete` command calls `Model#commitUserState()`, causing the modified state of the user state after the `delete t5` command executes to be saved in the `userStateList`, and the `currentStatePointer`

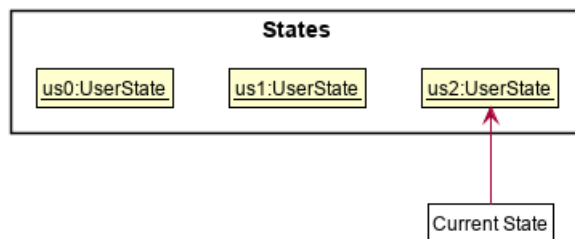
is shifted to the newly inserted user state.

After "delete t1" Command



**Step 3.** The user executes `in $/10 n/Allowance d/07112019` to log a new transaction. The `in` command also calls `Model#commitUserState()`, causing another modified user state to be saved into the `userStateList`.

After "in \$/10 n/Allowance d/07112019" Command

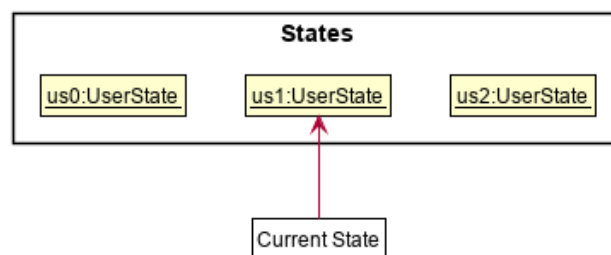


**NOTE**

If a command fails its execution, it will not call `Model#commitUserState()`, so the user state will not be saved into the `userStateList`.

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

After "undo" Command



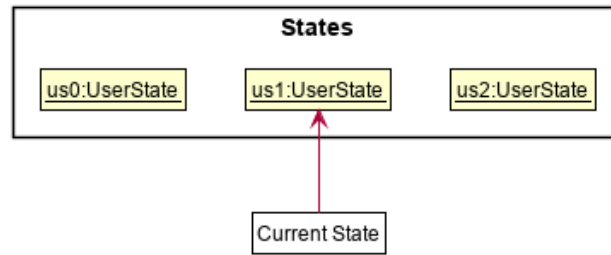
**NOTE**

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

**Step 5.** The user then decides to execute the command `list`. Commands that do not modify the user state, such as `list`, will usually not call `Model#commitUserState()`, `Model#undoUserState()` or `Model#redoUserState()`. Thus, the `userStateList` remains unchanged.

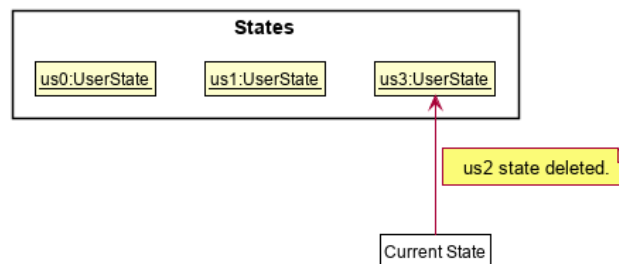


### After "list" Command

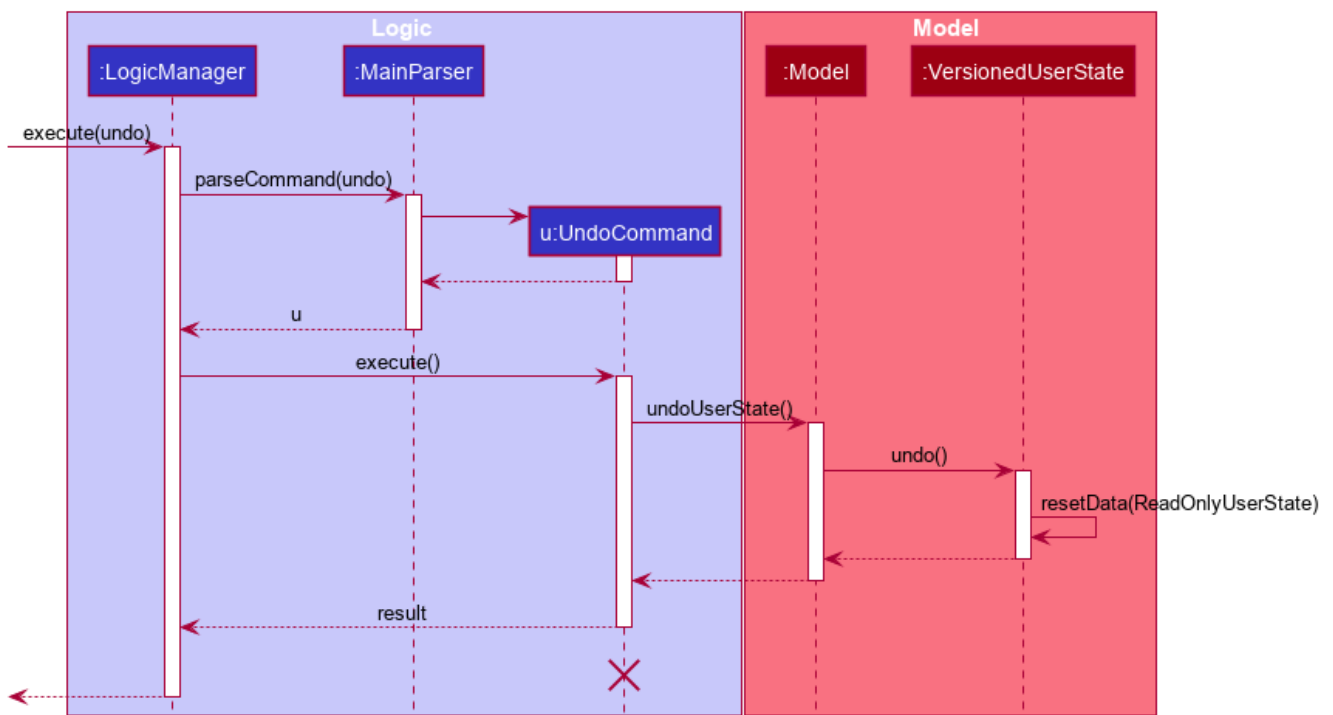


**Step 6.** The user executes `clear`, which calls `Model#commitUserState()`. Since the `currentStatePointer` is not pointing at the end of the `userStateList`, all user states after the `currentStatePointer` will be purged. We designed it this way because it no longer makes sense to redo the `in $/10 n/Allowance d/07112019` command. This is the behavior that most modern desktop applications follow.

### After "clear" Command



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#redoUserState()`, which shifts the `currentStatePointer` once to the right, pointing to the previously undone state, and restores the user

state to that state.

#### NOTE

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

### Aspect: How Undo and Redo Executes

- **Alternative 1 (current choice):** Saves the entire user state.
  - Pros: Easy to implement.
  - Cons: May have performance issues in terms of memory usage.
- **Alternative 2:** Individual command knows how to undo/redo by itself.
  - Pros: Will use less memory (e.g. for `delete t1`, just save the transaction being deleted).
  - Cons: We must ensure that the implementation of each individual command are correct.

### Aspect: Which Data Structure to Support the Undo/Redo Commands

- **Alternative 1 (current choice):** Use a list and a pointer to store the history of user states.
  - Pros: Easy for new Computer Science student undergraduates to understand, who are likely to be the new incoming developers of our project.
  - Cons: Need to manage the list and pointer carefully as the pointer has to point to the correct position in the list at all times. For example, when a new command is executed, we must remember to update both `userStateList` and `currentStatePointer`.
- **Alternative 2:** Use two stacks. One stack stores the commands to undo and the other stores the commands to redo.
  - Pros: Do not need to manage a pointer for the stacks.
  - Cons: Need to manage both stacks carefully. For instance, when a command is popped from the undo stack, it needs to be pushed into the redo stack.