

Evon Dong Bing Bing – Project Portfolio for treasurerPro (tP)

1. Introduction

This document serves as a project portfolio for treasurerPro. It outlines my contributions to the project and showcases the features that I have implemented.

1.1. About the team

My team of five members consists of four Year 2 Computer Science students, including me, and a Year 4 Computer Engineering student, all taking the module CS2103T Software Engineering.

1.2. About the project

This project was developed as part of the module - Software Engineering Project, CS2103T. We were tasked to develop a desktop application^[1] with a Command Line Interface ^[2] that allows the user to interact with the system using commands] by enhancing an existing AddressBook desktop application.

My team decided to morph and incorporate the AddressBook application as part of our all-in-one expense tracker. This application aims to enable treasurers and members of Co-Curricular Activities (CCA) Clubs and Societies to regulate their club expenses, manage the stocks in the inventory and retrieve records of reimbursements of its members easily.

In total, this project took place over a span of 8 weeks.

1.3. Typographical Conventions

This section covers the key icons and formatting used in this document.



This symbol indicates important information or definition.

command : Text with blue font and grey highlight indicates a command that can be inputted into the command line by the user and be executed by the application.

Model : Text with grey highlight indicates a component, class, or an object in the architecture of the application.

1.4. Introduction of treasurerPro

This section briefly summarises the main features of treasurerPro.

1. A desktop application is an application that runs on various Operating System including Windows, macOS or Linux.

2. Command Line Interface (CLI) is a text-based user interface (UI) that allows the user to interact with the system using commands

This desktop application consists of 6 tabs, a command box for user inputs and a response box for Leo, our lion mascot. Each tab serves a different purpose, but every tab aims to facilitate seamless and effortless managing of the organisation's finances. The following shows the various tabs and their respective purposes:

- Home Tab: keeps track of individual transactions
- Members Tab: records contact details of all members
- Reimbursements Tab: handles reimbursement records for members who fork in their money
- Inventory Tab: keeps track of items in the inventory
- Cashier Tab: supports cashiering duties and directly input sales into the system
- Overview Tab: gives an analysis of the organisation's finances for future planning

This is what the application looks like when it starts up:

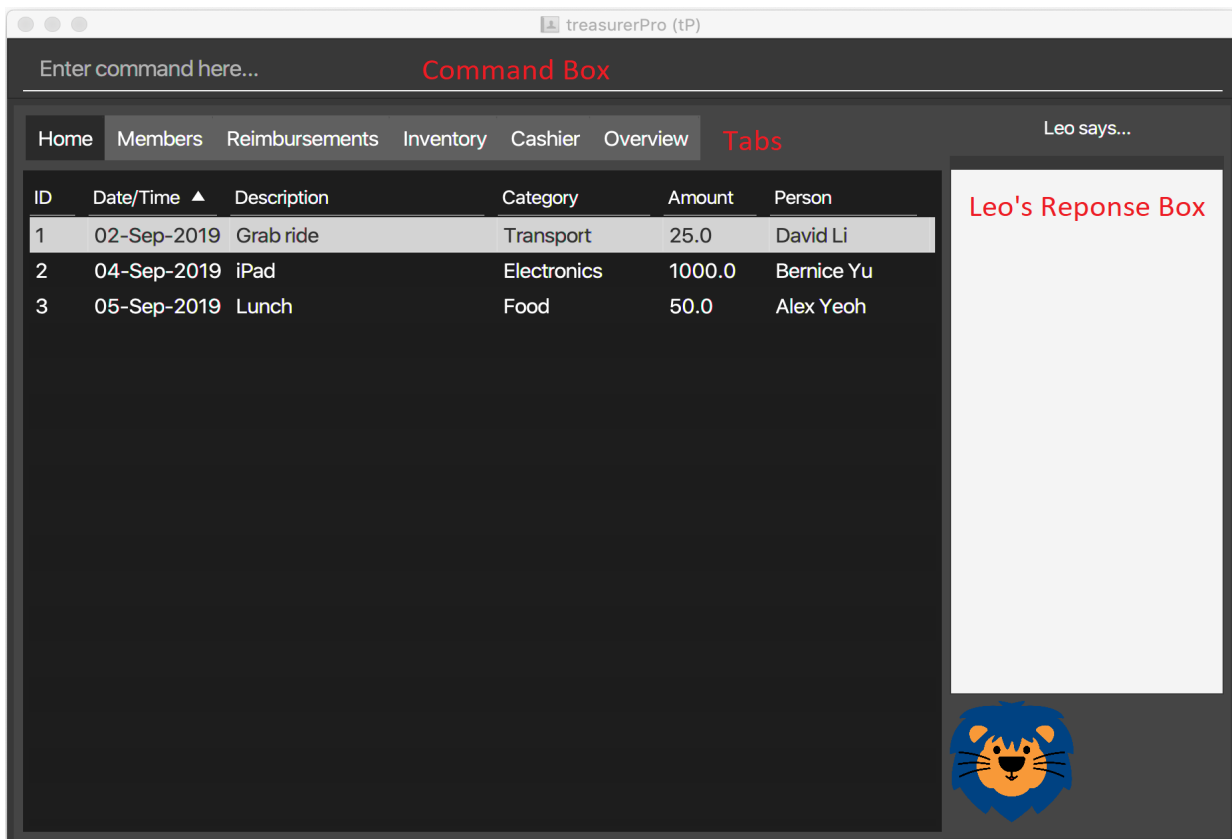


Figure 1. Graphical User Interface (GUI) of treasurerPro

2. Summary of contributions

My responsibilities include designing the layout, implementing features for the Cashier tab and ensuring good code quality across all packages.

The following sections present the enhancements that I have implemented in greater detail, as well as the relevant documentation I have done in the user guide and developer guide.

2.1. Main Enhancements

The following section illustrates some crucial enhancements that I have added for the Cashier tab.

- **Adding, Deleting and Editing of Sales Items**

- What it does: It allows the user to add, delete and update the sales items in the table shown on the tab.
- Justification: These feature incorporates the essential elements of a cash register and is fundamental for the Cashier tab. By expediting the process of calculating and recording the quantity of sales items, it enables the cashier-in-charge to perform cashiering duties more efficiently.
- Highlights: It monitors the current stock in the inventory to ensure that the quantity keyed in does not exceed the stock available. This eliminates any hindrance involving manual checks for the availability of a certain item.
Furthermore, upon any mistyped words or descriptions that do not match an existing item in the inventory, suggestions will be offered. This further augments the hassle-free aspect of this tab.

- **Checking Out the Cart**

- What it does: This checkout feature calculates and displays the total amount and the change to be returned.
- Justification: This feature allows the stock to be updated accordingly automatically on the Inventory tab and abolish any need for manual logging of the stock.
- Highlights: This feature ensures accountability by prohibiting checkout if the cashier has not been set. Additionally, the sales made will be recorded on the Home tab as a transaction. This transaction will contribute towards the revenue and be used in the finance analysis.

- **Cashier Mode**

- What it does: `Cashier Mode` will be automatically turned on when there are items in the table of the Cashier tab. When all the items in the table are cleared, `Cashier Mode` will automatically turn off.
- Justification: This feature prevents the users from modifying any of the existing items in the inventory whenever `Cashier Mode` is turned on. This feature serves as a security measure to ensure that no one can tamper with the existing data in the inventory while a purchase is being made.
- Highlights: While on `Cashier Mode`, only adding of items with new description is allowed in the inventory. Any changes to existing items are strictly prohibited. Users can only alter the items in the inventory after clearing all the items on the Cashier tab.

2.2. Code contributed

The code that I wrote for my features can be found in the following links: [RepoSense](#), [Functional Code](#), [Test Code](#)

2.3. Other contributions

The following section documents other contributions I have made and it includes relevant GitHub pull requests in relation to the relevant contributions.

- **Enhancements**
 - Wrote tests for several `Inventory` classes: [\(PR #148\)](#)
 - Refactored code to write to and from `Inventory` and `Transaction` package and updated the respective models: [\(PR #202\)](#)
- **Community**
 - Reviewed pull requests and offered suggestions (with non-trivial review comments): [\(PR #221\)](#), [\(PR #196\)](#)
 - Integrated `Cashier` package with other packages, fixed and added some `Inventory` classes: [\(PR #96\)](#), [\(PR #94\)](#)
 - Standardized decimal places for all amounts attributes in all packages for calculation and display: [\(PR #297\)](#)
- **Documentation**
 - Updated the developer guide with diagrams and information about `Inventory` and `Cashier` parsers: [\(PR #209\)](#)
 - Added implementation details for the `Cashier Tab` in Developer Guide: [\(PR #209\)](#), [\(PR #164\)](#), [\(PR #162\)](#)
 - Added guide to use `Cashier` tab in user guide: [\(PR #209\)](#), [\(PR #212\)](#)
 - Enhanced user guide to make it more user-friendly and updated `Members` tab: [\(PR #303\)](#), [\(PR #252\)](#)
 - Amended README document to make it more comprehensible with a better format: [\(PR #230\)](#)
 - Updated glossary and FAQ questions: [\(PR #301\)](#)

3. Contributions to the User Guide

The following section showcases my contribution to the user guide for features specific to the `Cashier` tab.

{Start of First Extract from User Guide}

5.5.1 Add a Sales Item to the Table

This command enables you to add a sales item into the table.

- Command: `add [c/CATEGORY] d/DESCRIPTION q/QUANTITY`

The quantity that you input must be less than or equal to the stock available in the `Inventory` tab. The category field is optional. If you are unsure about the description of the desired item, you can refer to the `Inventory` tab or simply key in the category without any other fields. Leo will display all the items in the specified category that are available for sale.

Additionally, if the description is misspelled or does not match any of the items in the inventory, Leo will recommend items with similar description that you might be looking for.

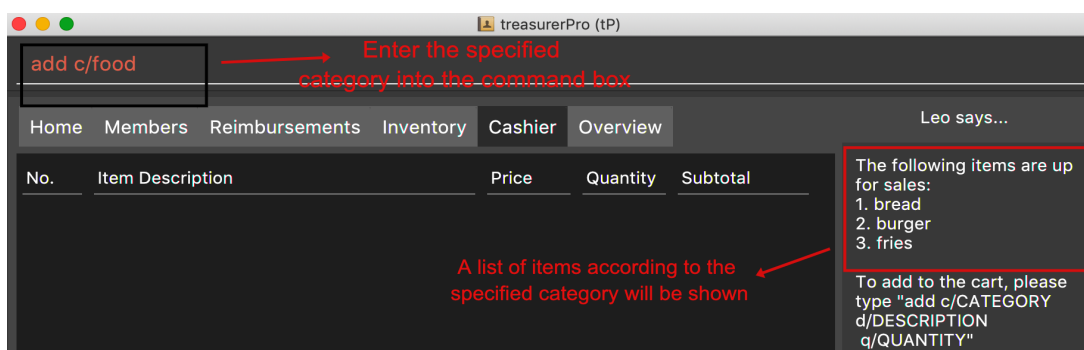
- Example:
 - `add c/food` - Displays all items that are under the 'food' category in the response box
 - `add c/stationary d/pancake q/3` - Adds 3 similar items which have the description "pancake"
 - `add d/pancake q/3` - Adds 3 similar items which have the description "pancake"



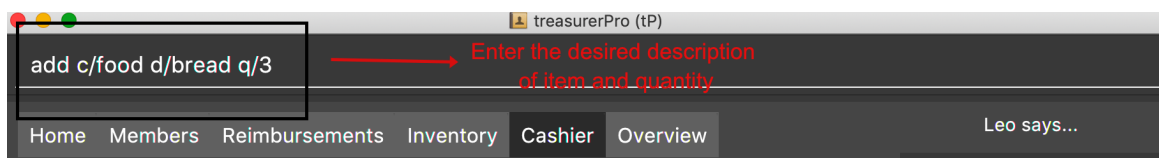
The system will allow a valid item to be added even if the category of the item does **not** match with the specified category inputted.

- Steps:

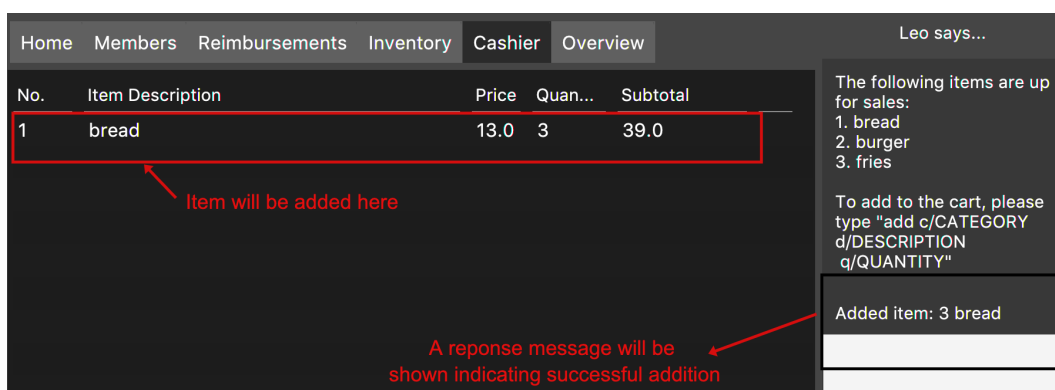
1. Type the command with a category specified as shown in the screenshot below:



2. Enter the desired description and quantity according to the items suggested by Leo as shown below:



3. Hit Enter



Leo will respond to the successful addition with a response message. The newly added item will be shown on the table.

{End of First Extract from User Guide}

{Start of Second Extract from User Guide}

5.5.5 Checkout All Sales Items

This command enables you to perform a checkout of all the sales items in the table.

- Command: `checkout AMOUNT_PAID_BY_CUSTOMER`

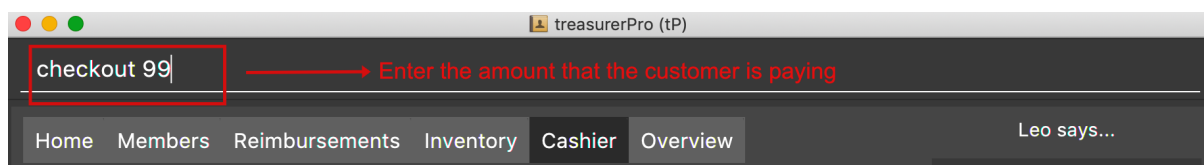
You should input the amount that the customer is paying. This amount must be greater than or equal to the total amount listed on the bottom row of the table. If the amount is valid, Leo will display the amount of change that the cashier should return.

After checking out, all items in the table will be cleared and the cashier will be reset.

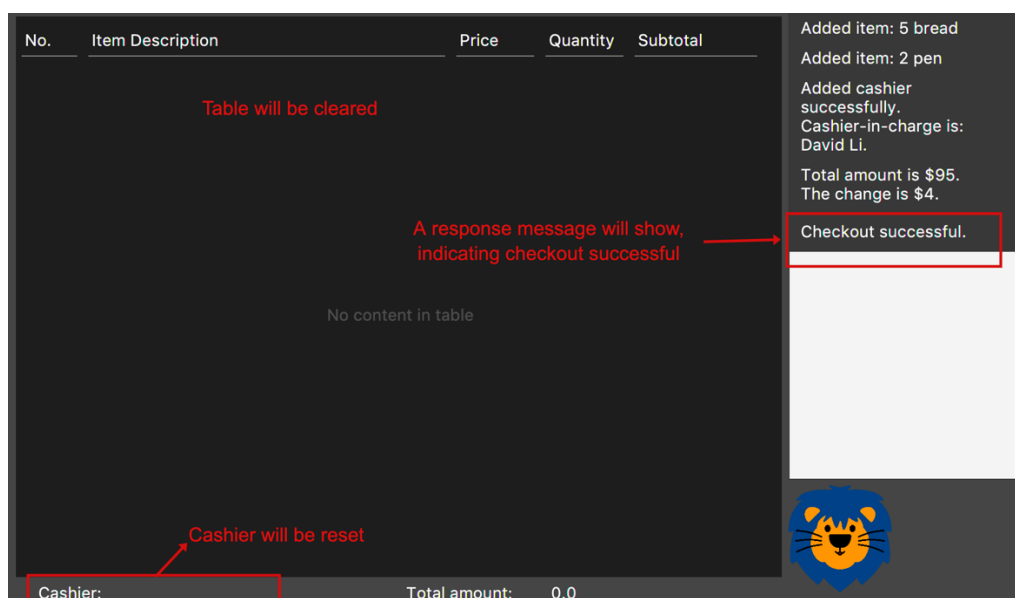


You must set the cashier before checking out. Else, checkout cannot proceed.

- Example:
 - `checkout 850` - Customer pays \$850 to cashier
- Steps:
 1. Type the command and specify the amount that the customer is paying as shown in the screenshot below:



2. Hit Enter



If checkout is successful, Leo will respond with a response message. The table will be cleared and the cashier will be reset. The Home tab will be updated with this transaction and the remaining stock in the Inventory tab will also be updated.

{End of Second Extract from User Guide}

4. Contributions to the Developer Guide

The following section showcases my contribution to the developer guide for features specific to the Cashier tab.

{Start of First Extract from Developer Guide}

3.5.1 Add Sales Item Feature

This feature allows the adding of sales items to the cart.

Adding of a sales item to the cart will require an input of its description and quantity. If only the category field is inputted, `Model` will search all the sales items in the `Inventory List` according to the specified category and suggestions would be shown by Leo.

If the description inputted does not match any valid item, the `Model` will call the `getRecommendedItems(description)` method, which will in turn call `getCombination(arr, arr.length)` method to return an `ArrayList` containing all subsets of the inputted description that are of at least length 3. These subsets strings are then compared with the actual description of all items in the inventory to check if either contains the other.

The following is a code snippet from `getCombination(arr, arr.length)` method:

```
public ArrayList<String> getCombination(char[] arr, int n) {
    ArrayList<String> result = new ArrayList<>();
    for (int start = 1; start <= n; start++) {
        String word = "";
        for (int i = 0; i <= n - start; i++) {
            // Adds characters from current starting character to current ending
            character
            int j = i + start - 1;
            for (int k = i; k <= j; k++) {
                word += String.valueOf(arr[k]);
            }
            result.add(word);
        }
    }
    return result.stream()
        .filter(str -> str.length() >= 3)
        .collect(Collectors
            .toCollection(ArrayList::new));
}
```

The `getCombination(arr, arr.length)` consists of 3 nested loops. The first loop decides the starting character. The second loop takes each of the characters on the right of the starting character as the ending character. The last loop appends characters from the starting character to the ending character.

After the nested loops, the `ArrayList result` is passed into a stream to filter out all subsets strings that are of length less than 3.

If description and quantity are both specified and valid, the `ModelManager` will directly add the item into the sales list. The following sequence diagram shows how the `AddCommand` works and is referenced in [2.3. Logic component: Figure 5](#):

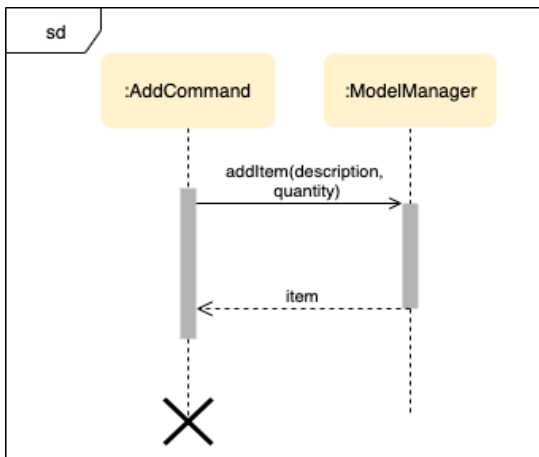


Figure 2. Sequence Diagram of Add Command in Cashier Tab (cashier package)



Once the item is added, boolean `onCashierMode` in `ModelManager` will be immediately set to true if it is initially false.

`AddCommandParser` will carry out multiple checks to check the validity of the inputs. `hasItemInInventory(description)` and `hasSufficientQuantityToAdd(description, quantity)` methods will be called to ensure the item has sufficient stock left in the inventory. There will also be checks to ensure that the item specified is available for sale.

The following activity diagram shows the steps proceeding after the user input an add command:

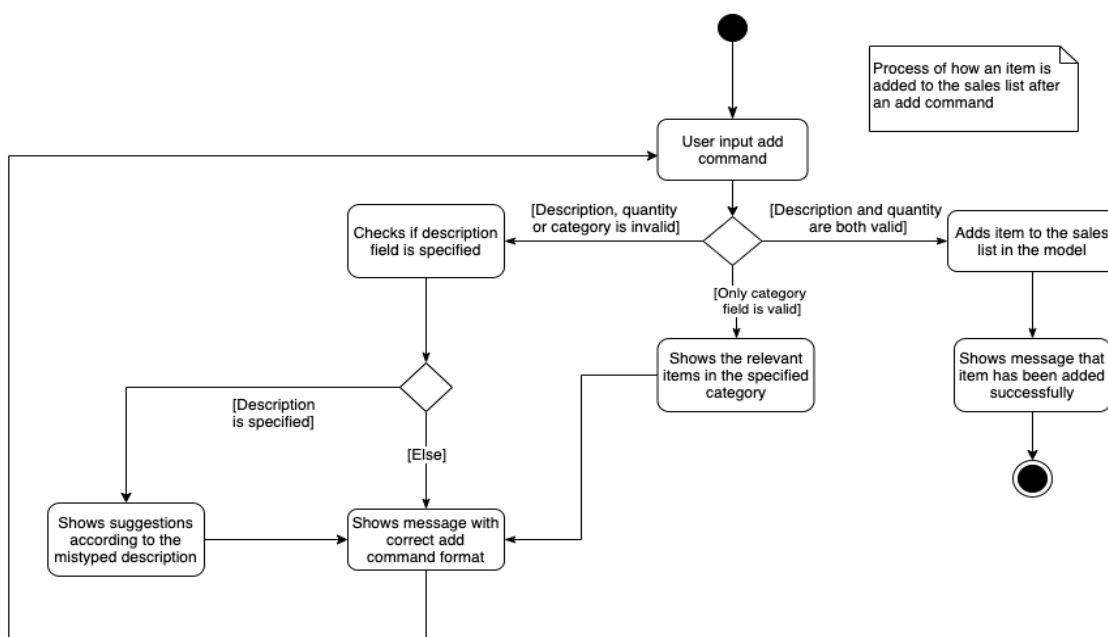


Figure 3. Activity Diagram of Add Command (cashier package)

{End of First Extract from Developer Guide}

{Start of Second Extract from Developer Guide}

3.5.3 Checkout Feature

This feature records all the sales items in the table as one transaction under the `Sales` category.

The Home tab will be updated with the new transaction labelled as `Items sold`. The remaining stock will also be updated on the Inventory tab.

During the execution of the command, `getCashier()` method will be called which will return a person. This person will be used to create a `Transaction` object. If the cashier is null, the execution of the command cannot proceed and Leo will prompt the user to set a cashier. Else, if the amount inputted is valid and cashier has been set, the `ModelManager` will create a new transaction of the sales made.

The following sequence diagram shows how the checkout command is executed:

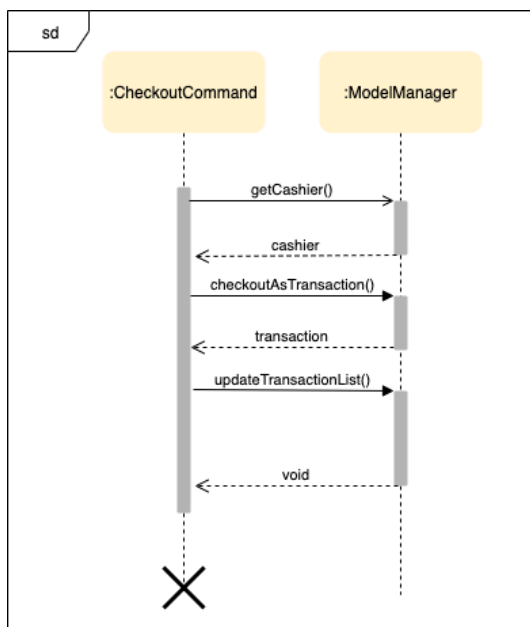


Figure 4. Sequence Diagram of Checkout Command (cashier package)

The `Cashier Logic` will call relevant methods to update the inventory list and newly-generated transaction to the respective `.txt` file.



After checkout command is executed, boolean `onCashierMode` in `ModelManager` will be immediately set to false.

To update the view on the Inventory tab and Transaction tab, `readInUpdatedList()` method of `inventory Model` will be called to read in the entire inventory data file and transaction will be added to the `transaction Model`.

{End of Second Extract from Developer Guide}

{Start of Third Extract from Developer Guide}

3.5.4 Overall Design Considerations

This section explains the design considerations for some crucial implementations in the Cashier tab.

Alternative 1	Alternative 2	Conclusion and Explanation
<p>An <code>ArrayList</code> is used to store the list of sales item shown on the Cashier tab.</p> <p>Pros: Elements are be accessed directly more efficiently.</p> <p>Cons: Adding and removing from the head of the list is less time-efficient for <code>ArrayList</code>.</p>	<p>A <code>LinkedList</code> is used to store the list of sales item.</p> <p>Pros: Elements can be accessed from the head and tail of the list in constant time.</p> <p>Cons: When accessing directly via the index, performance is poor with respect to time.</p>	<p>Alternative 1 is selected. An <code>ArrayList</code> has better performance with respect to time when accessing each elements directly. As the sales list will be updated and accessed regularly, an <code>ArrayList</code> is more fitting.</p>
<p>The <code>Transaction</code>, <code>Inventory</code> and <code>Person Model</code> interfaces are passed as parameters into the constructor of <code>Cashier's Logic</code> to call relevant methods to update the inventory and transactions.</p> <p>Pros: <code>Cashier's Logic</code> can access all public methods in the respective <code>Model</code>.</p> <p>Cons: It might result in unintended modification to some of the data in the <code>Models</code>.</p>	<p>Interfaces that only contains the required methods are created. The methods are called via these interfaces to update the data.</p> <p>Pros: Prevents any unwanted changes through other methods. This adheres to the Facade Pattern.</p> <p>Cons: If more methods are needed, they need to be added to these interfaces.</p>	<p>Alternative 2 was implemented as only a few methods are required from each <code>Model</code>, so the new interfaces can act as facades and restrict access to all public methods in the models. This prevents <code>Cashier's Logic</code> from causing any unintended modification to any of the data in the <code>Models</code>.</p>
<p>The <code>Cashier's Storage</code> directly writes to and from the data file of the inventory and transaction.</p> <p>Pros: It can access the data file directly without any dependencies.</p> <p>Cons: The data files can be modified from 2 sources, increasing chances of bugs.</p>	<p>The <code>Cashier's Storage</code> accesses the methods from the <code>Transaction</code> and <code>Inventory Storage</code> via their <code>Logic</code> to update the data.</p> <p>Pros: The data files are only modified from 1 source, ensuring cohesiveness in the format of data stored.</p> <p>Cons: It introduces more dependencies on the <code>Storage</code> of other packages.</p>	<p>Alternative 2 is implemented to enforce defensive programming, so that the data files are not modified via 2 different methods from different sources and eliminates any chances of uncoordinated data in the data files.</p>

{End of Third Extract from Developer Guide}