

# MINNESOTA INCOME TAX CALCULATION

## OVERALL REPORT

FINAL VERSION

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## INTRODUCTION

Our project for the course **MYE004 - Software Development II** was to refactor a legacy software.

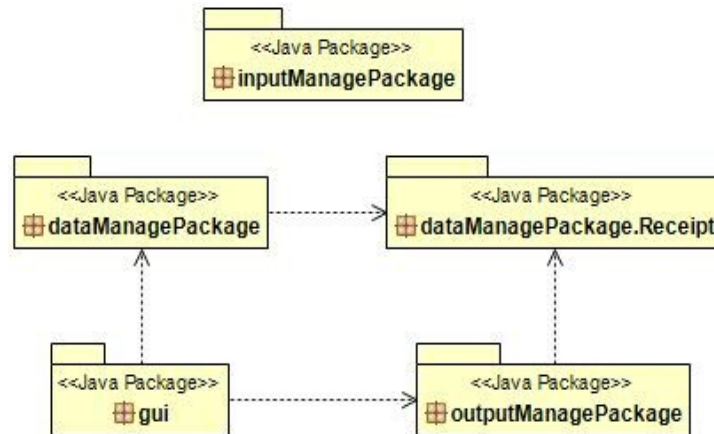
This software's task was to load files containing information about taxpayers and then provide a way for the end-user to easily interact with each taxpayer and their information.

Our task was to refactor this software by using Refactoring Methods and implementing useful Design Patterns, so that it will be easier to maintain and possible future expansions will be simpler.

## OLD DESIGN

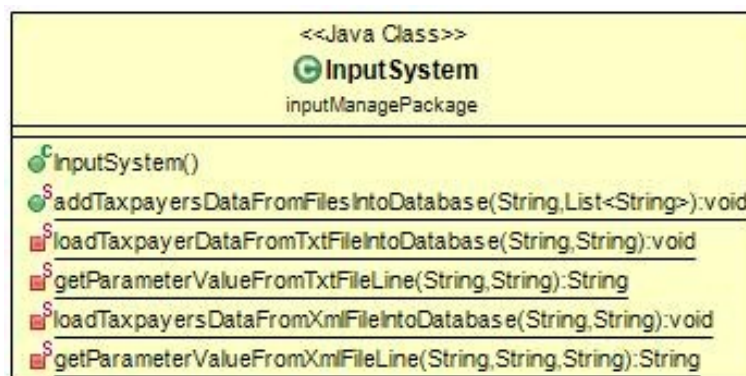
To start the refactoring, we first had to understand the previous implementation.

## ARCHITECTURE



## DETAILED DESIGN

- inputManagePackage

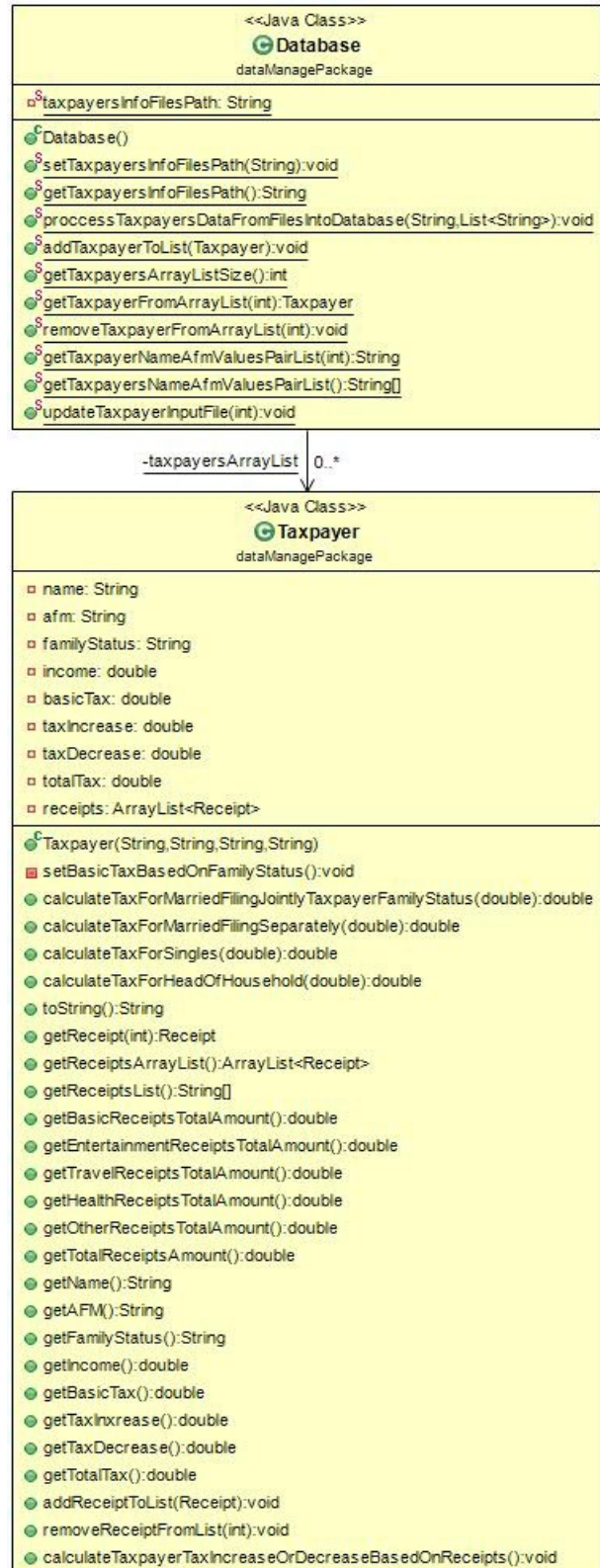


`InputSystem`: Pretty much a class full of static methods that ignores basic OOP principles and makes further refactoring difficult. Also, there is a lot of code duplication, methods that do the same thing but on a different file format.

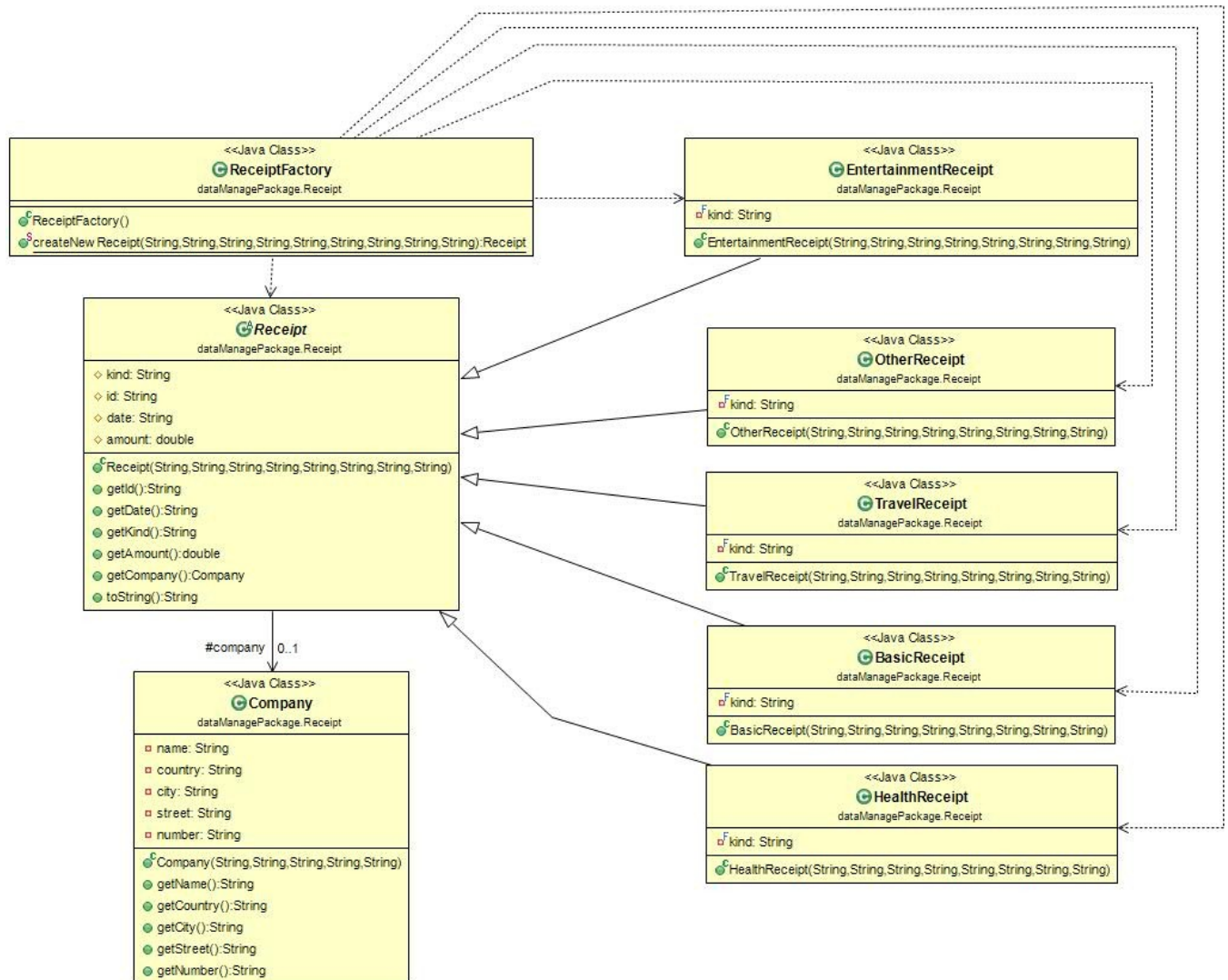
- dataManagePackage

Database: Again, a class full of static methods.

Taxpayer: Some code duplication for different types of taxpayers; this could be parameterized.

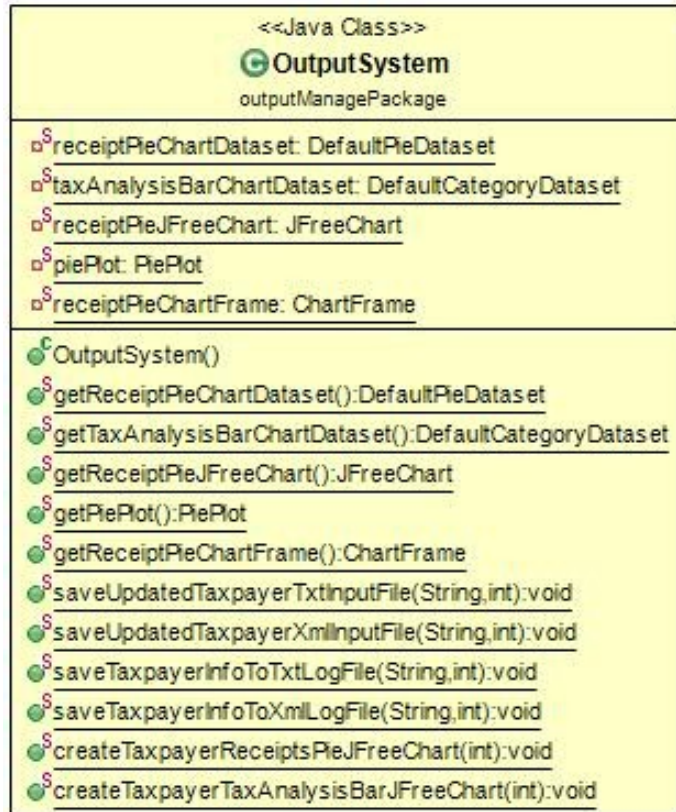


- dataManagePackage.Receipt



Receipt: Doesn't make sense for this class to be abstract since all its children are almost the same. The only difference is the field 'kind' which could easily be another parameter for the Receipt constructor.

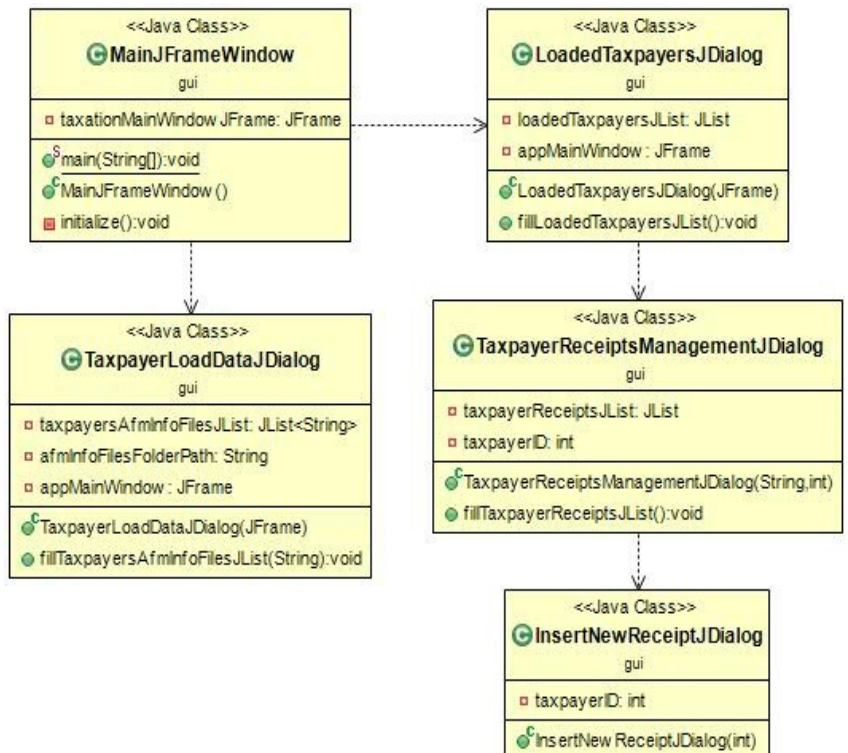
- outputManagePackage



OutputSystem: Same problems as the InputSystem class. Also, this is a god class that handles a lot of responsibilities that could be split into lesser classes.

- gui

We will leave the gui classes as they are.



## IMPLEMENTATION

- inputManagePackage CRC Cards

<b>Class Name: InputSystem</b>	
<b>Responsibilities</b>	<b>Collaborations</b>
<ul style="list-style-type: none"><li>▪ This class is responsible for:<ul style="list-style-type: none"><li>o loading Taxpayer data from input files</li><li>o adding said data to the Database</li></ul></li></ul>	<ul style="list-style-type: none"><li>▪ Database</li><li>▪ Taxpayer</li></ul>

- dataManagePackage CRC Cards

<b>Class Name: Database</b>	
<b>Responsibilities</b>	<b>Collaborations</b>
<ul style="list-style-type: none"><li>▪ This class is responsible for:<ul style="list-style-type: none"><li>o Storing Taxpayers and their info into the database from their corresponding input files</li><li>o Accessing said Taxpayers</li><li>o Updating input files if there are changes in the database</li></ul></li></ul>	<ul style="list-style-type: none"><li>▪ Taxpayer</li><li>▪ InputSystem</li><li>▪ OutputSystem</li><li>▪ InsertNewReceiptJDialog</li><li>▪ LoadedTaxpayersJDialog</li><li>▪ MainJFrameWindow</li><li>▪ TaxpayerLoadDataJDialog</li><li>▪ TaxpayerReceiptsManagementJDialog</li></ul>



<b>Class Name: Taxpayer</b>	
<b>Responsibilities</b>	<b>Collaborations</b>
<ul style="list-style-type: none"> <li>▪ This class is responsible for:               <ul style="list-style-type: none"> <li>o Accessing Taxpayer's info</li> <li>o Accessing Taxpayer's receipts</li> <li>o Calculating Taxpayer's taxes</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ Database</li> <li>▪ Receipt</li> <li>▪ InputSystem</li> <li>▪ OutputSystem</li> </ul>

- dataManagePackage.Receipt CRC Cards

<b>Class Name: ReceiptFactory</b>	
<b>Responsibilities</b>	<b>Collaborations</b>
<ul style="list-style-type: none"> <li>▪ This class is responsible for:               <ul style="list-style-type: none"> <li>o Creating the proper kind of Receipt</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ InsertNewReceiptJDialog</li> <li>▪ InputSystem</li> <li>▪ EntertainmentReceipt</li> <li>▪ BasicReceipt</li> <li>▪ TravelReceipt</li> <li>▪ HealthReceipt</li> <li>▪ OtherReceipt</li> </ul>

<b>Class Name: Receipt (Abstract)</b>	
<b>Responsibilities</b>	<b>Collaborations</b>
<ul style="list-style-type: none"> <li>▪ This class is responsible for setting the base responsibilities for every kind of Receipt</li> </ul>	<ul style="list-style-type: none"> <li>▪ ReceiptFactory</li> <li>▪ Company</li> </ul>

Class Name: BasicReceipt	
Responsibilities	Collaborations
<ul style="list-style-type: none"> <li>This class is responsible for creating a basic receipt</li> </ul>	<ul style="list-style-type: none"> <li>Receipt</li> <li>ReceiptFactory</li> </ul>

Class Name: EntertainmentReceipt	
Responsibilities	Collaborations
<ul style="list-style-type: none"> <li>This class is responsible for creating a receipt of type <i>entertainment</i></li> </ul>	<ul style="list-style-type: none"> <li>Receipt</li> <li>ReceiptFactory</li> </ul>

Class Name: HealthReceipt	
Responsibilities	Collaborations
<ul style="list-style-type: none"> <li>This class is responsible for creating a receipt of type <i>health</i></li> </ul>	<ul style="list-style-type: none"> <li>Receipt</li> <li>ReceiptFactory</li> </ul>

Class Name: TravelReceipt	
Responsibilities	Collaborations
<ul style="list-style-type: none"> <li>This class is responsible for creating a receipt of type <i>travel</i></li> </ul>	<ul style="list-style-type: none"> <li>Receipt</li> <li>ReceiptFactory</li> </ul>

Class Name: OtherReceipt	
Responsibilities	Collaborations
<ul style="list-style-type: none"> <li>▪ This class is responsible for creating a receipt of type <i>other</i></li> </ul>	<ul style="list-style-type: none"> <li>▪ Receipt</li> <li>▪ ReceiptFactory</li> </ul>

Class Name: Company	
Responsibilities	Collaborations
<ul style="list-style-type: none"> <li>▪ This class is responsible for: <ul style="list-style-type: none"> <li>o creating a Company</li> <li>o accessing said company's info</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ Receipt</li> </ul>

- outputManagePackage CRC Cards

<b>Class Name: OutputSystem</b>	
<b>Responsibilities</b>	<b>Collaborations</b>
<ul style="list-style-type: none"><li>▪ This class is responsible for:<ul style="list-style-type: none"><li>o Saving the updated input files (txt and/or xml)</li><li>o Saving the Taxpayer's info into a file (txt and/or xml)</li><li>o Creating and accessing a pie chart of the Taxpayer's registered Receipts</li><li>o Creating and accessing a bar chart of the Taxpayer's taxes</li></ul></li></ul>	<ul style="list-style-type: none"><li>▪ Database</li><li>▪ Taxpayer</li><li>▪ Receipt</li><li>▪ LoadedTaxpayersJDialog</li></ul>

- gui CRC Cards

<b>Class Name: InsertNewReceiptJDialog</b>	
<b>Responsibilities</b>	<b>Collaborations</b>
<ul style="list-style-type: none"><li>▪ This class is responsible for passing user input into a new Receipt for a selected Taxpayer</li></ul>	<ul style="list-style-type: none"><li>▪ Receipt</li><li>▪ ReceiptFactory</li><li>▪ Database</li><li>▪ Taxpayer</li><li>▪ TaxpayerReceiptsManagementJDialog</li></ul>

<b>Class Name: LoadedTaxpayersJDialog</b>	
<b>Responsibilities</b>	<b>Collaborations</b>
<ul style="list-style-type: none"><li>▪ This class is responsible for:<ul style="list-style-type: none"><li>o Initializing the graphical user interface for:<ul style="list-style-type: none"><li>▪ Displaying a selected Taxpayer's info</li><li>▪ Deleting a selected Taxpayer from the database</li><li>▪ Displaying a selected Taxpayer's receipts</li></ul></li><li>o filling an array with the loaded Taxpayers' name and AFM pairs so they can be displayed</li></ul></li></ul>	<ul style="list-style-type: none"><li>▪ Database</li><li>▪ OutputSystem</li><li>▪ MainJFrameWindow</li></ul>

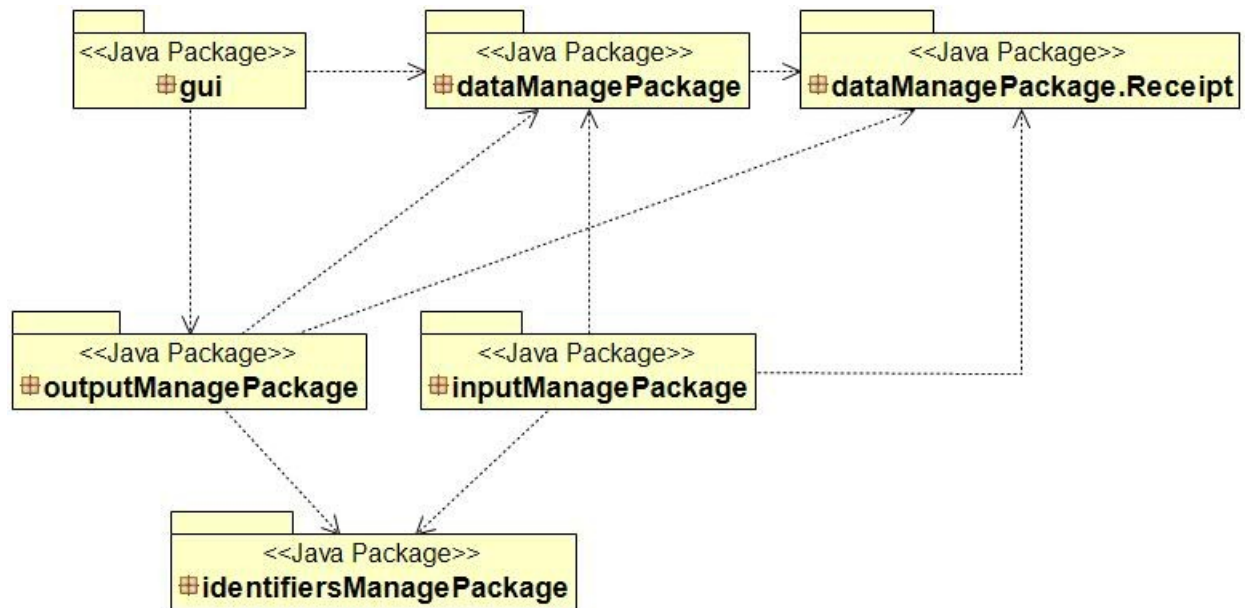
<b>Class Name: MainJFrameWindow</b>	
<b>Responsibilities</b>	<b>Collaborations</b>
<ul style="list-style-type: none"> <li>▪ This class is responsible for initializing the main graphical user interface so the user can choose to:               <ul style="list-style-type: none"> <li>o Load the Taxpayers' data from the system explorer into the Database</li> <li>o Display the Database's loaded Taxpayers</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ Database</li> <li>▪ TaxpayerLoadDataJDialog</li> <li>▪ LoadedTaxpayersJDialog</li> </ul>

<b>Class Name: TaxpayerLoadDataJDialog</b>	
<b>Responsibilities</b>	<b>Collaborations</b>
<ul style="list-style-type: none"> <li>▪ This class is responsible for initializing the graphical user interface for the user to choose input file(s) from the system explorer</li> </ul>	<ul style="list-style-type: none"> <li>▪ MainJFrameWindow</li> <li>▪ Database</li> </ul>

<b>Class Name:</b> TaxpayerReceiptsManagementJDialog	
<b>Responsibilities</b>	<b>Collaborations</b>
<ul style="list-style-type: none"> <li>▪ This class is responsible for: <ul style="list-style-type: none"> <li>o initializing the graphical user interface for the user to choose to: <ul style="list-style-type: none"> <li>▪ Add a new Receipt for the specified Taxpayer</li> <li>▪ Remove a selected Receipt from the specified Taxpayer</li> <li>▪ Display selected Receipt's info</li> </ul> </li> <li>o filling an array with the loaded Taxpayer's Receipt(s) so they can be displayed</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ Database</li> <li>▪ Receipt</li> <li>▪ LoadedTaxpayersJDialog</li> <li>▪ InsertNewReceiptJDialog</li> </ul>

## REFACTORED DESIGN

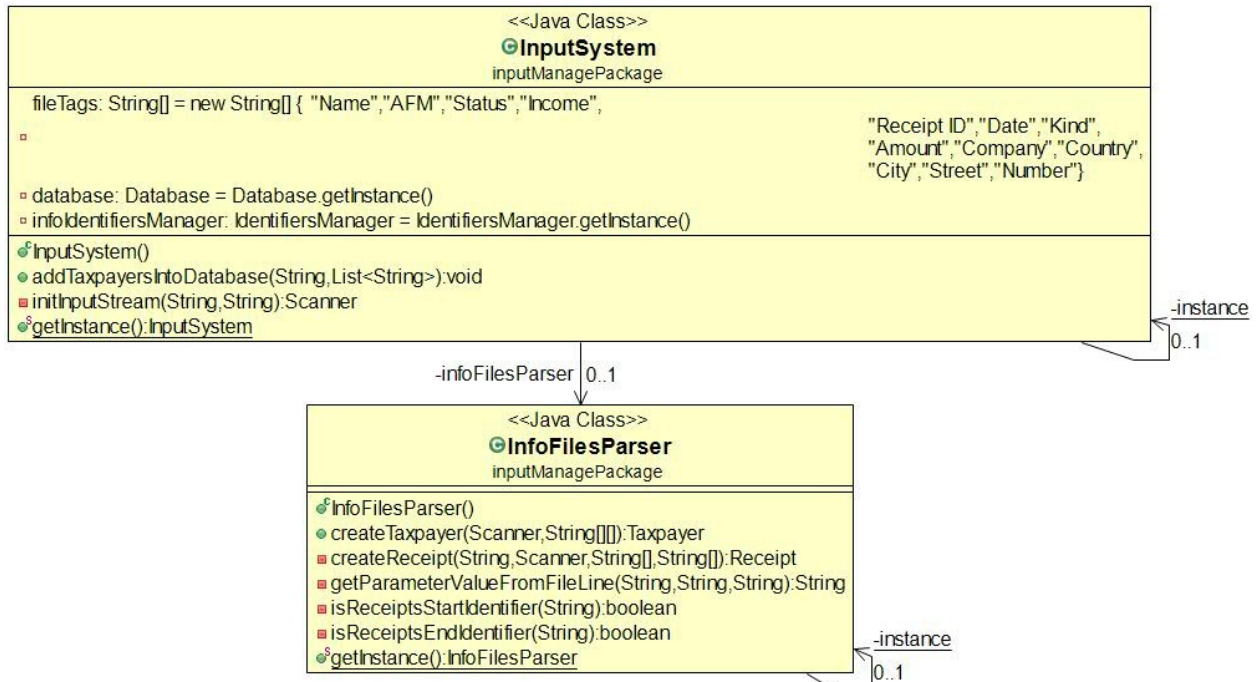
### ARCHITECTURE





## DETAILED DESIGN

### - inputManagePackage



We split the responsibilities of the `InputSystem` class into 2 classes.

- `InputSystem`, which initializes the `Scanner` for reading the file along with the specific identifiers based on the given file type each time using the `IdentifiersManager` class.
- `InfoFilesParser`, which is a class to read the given INFO file and initialize a `Taxpayer` with their Receipts. The `Taxpayer` is then returned to the `InputSystem` class and is added to the Database.

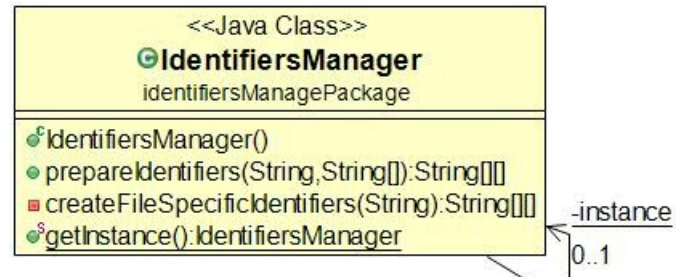
- identifiersManagePackage

A helper class that lets us parameterize the file reading and writing.

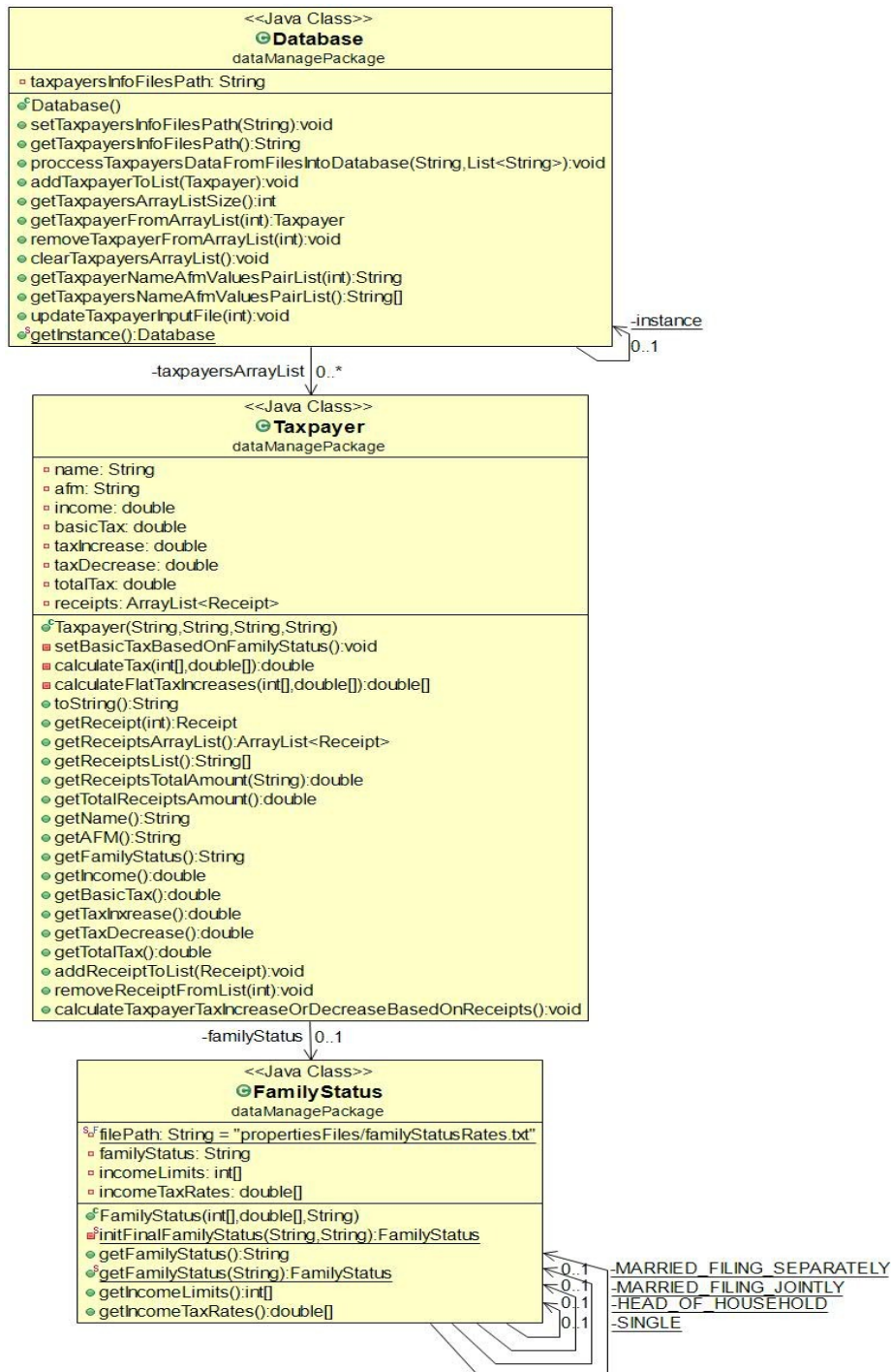
Based on the file type, it prepares the file specific tags that are needed, based on the tags it receives from the classes that need help.

eg. the word 'Income' for the .txt files needs to be 'Income: ' and for the .xml files needs to be '<Income> '

Future support for other file types can be accomplished by modifying this class.



## - dataManagePackage

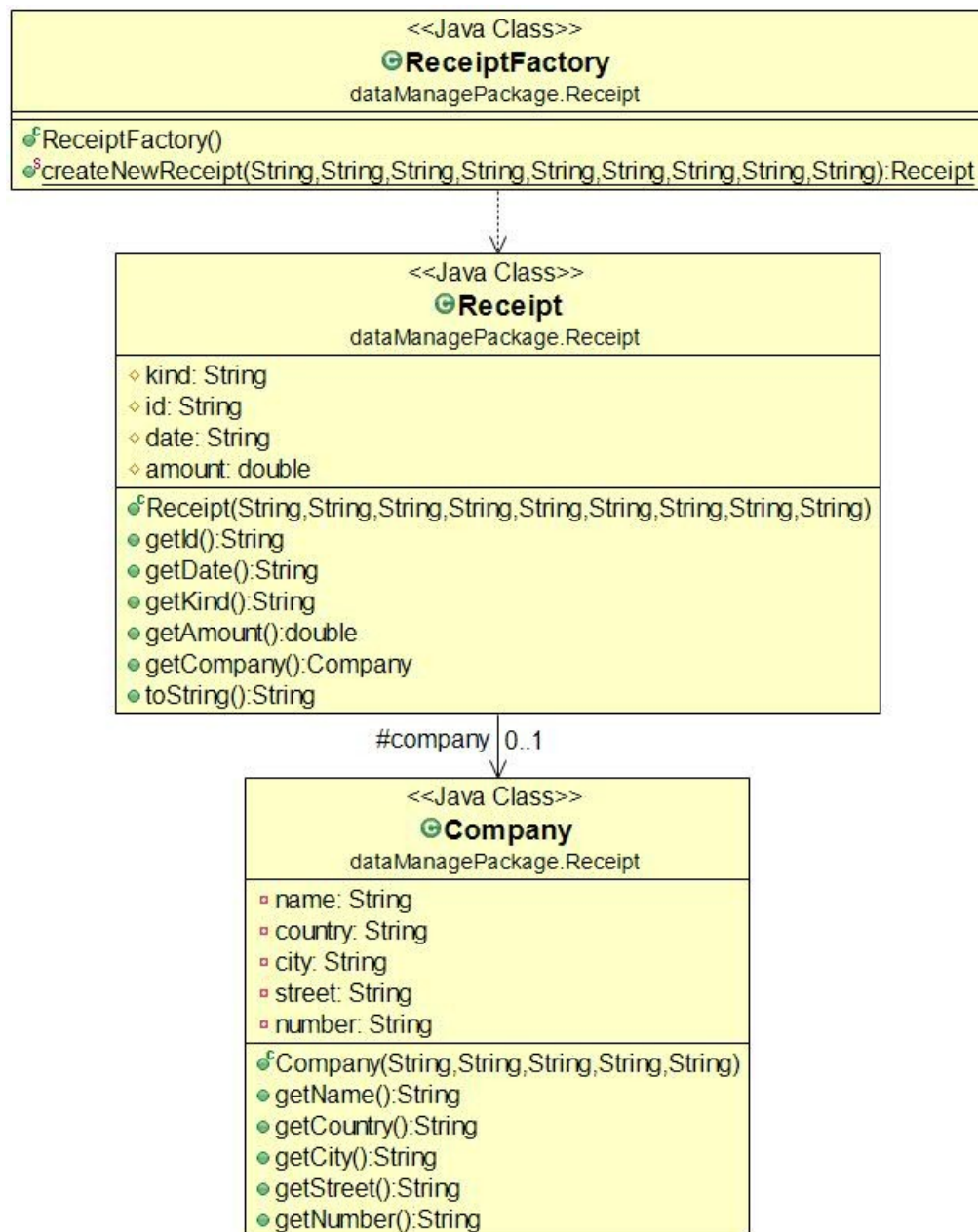


The only notable change for the Database class is the implementation of the Singleton pattern. This pattern was also used for all the classes of the inputManagePackage and the output ManagePackage.

For the Taxpayer class we parameterized the methods that used to calculate the basic tax with the help of the FamilyStatus class, which initializes the constant values based on the family status of each taxpayer and then at the Taxpayer class the basic tax is now calculated using those constants.

FamilyStatus works by reading a properties file containing important values that are needed for tax calculation.

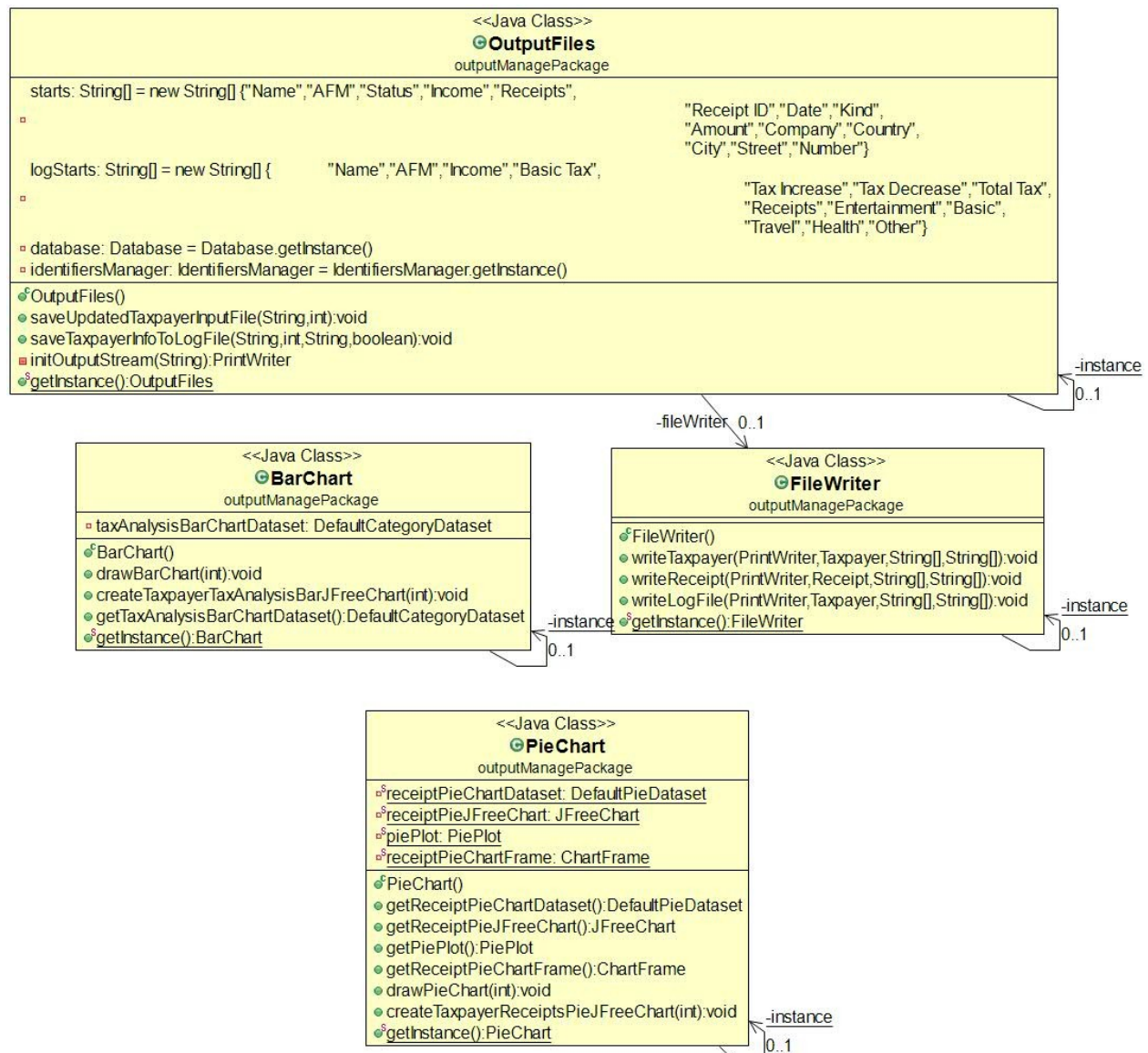
- dataManagePackage.Receipt



We removed the unnecessary child-classes of the Abstract class Receipt and instead we added another parameter in the Receipt Constructor.

Also, by adding an array in the ReceiptFactory class it's now easier to add other kinds of Receipts.

## - outputManagePackage



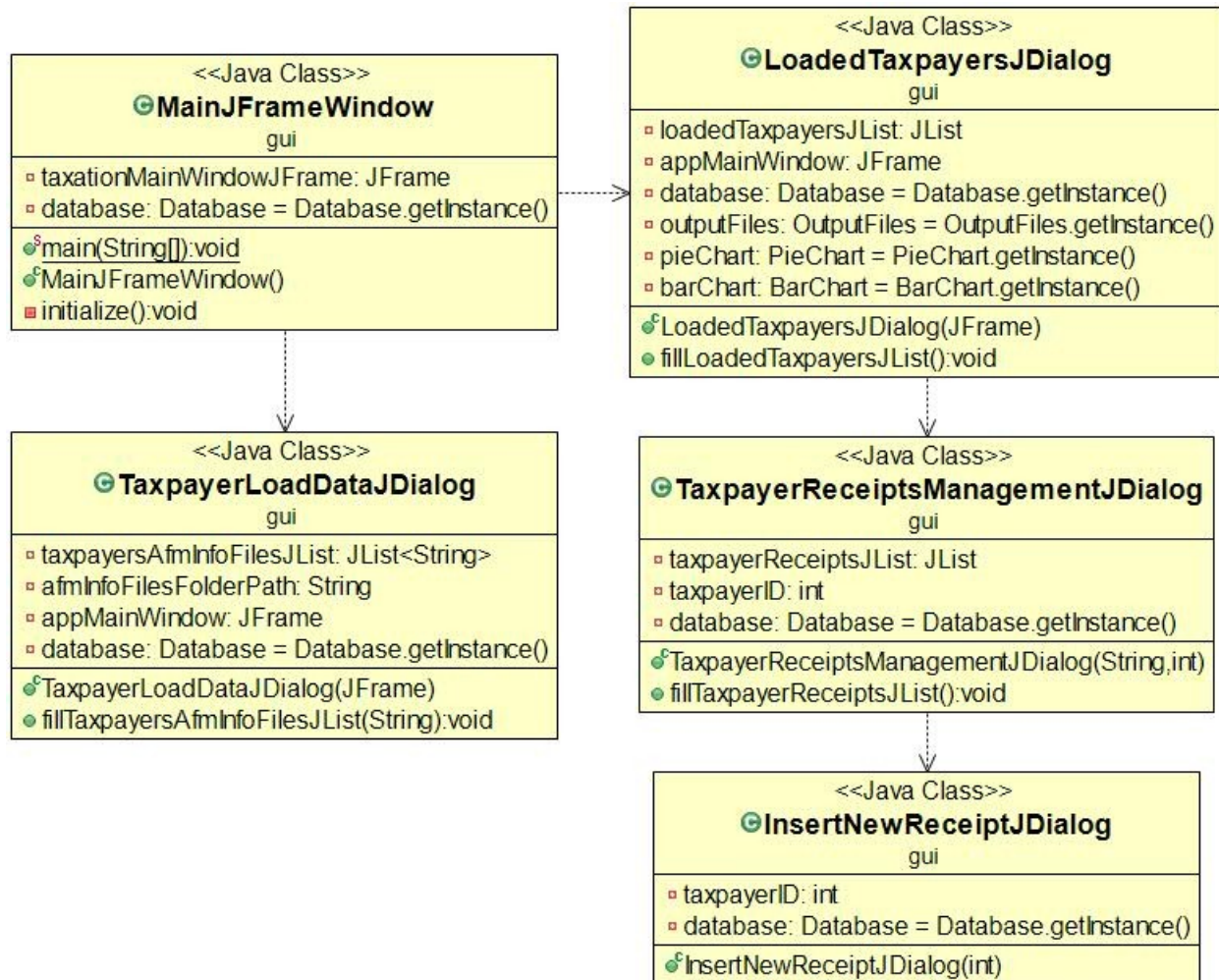
Same as the InputSystem we split the class's responsibilities into different classes so that they can be maintained easily.

The OutputFiles class cooperates with the FileWriter and the IdentifiersManager classes to update changes on INFO files and write LOG files.

The classes BarChart and PieChart are also split from the main OutputSystem and instead do their own thing.



- gui



No changes were made to any classes of the gui package.

## IMPLEMENTATION

- inputManagePackage CRC Cards

<b>Class Name:</b> InfoFilesParser	
<b>Responsibilities</b>	<b>Collaborations</b>
<ul style="list-style-type: none"><li>▪ This class is responsible for creating a Taxpayer and Receipts for said Taxpayer out of an input file</li></ul>	<ul style="list-style-type: none"><li>▪ InputSystem</li><li>▪ Taxpayer</li><li>▪ Receipt</li><li>▪ ReceiptFactory</li></ul>

<b>Class Name:</b> InputSystem	
<b>Responsibilities</b>	<b>Collaborations</b>
<ul style="list-style-type: none"><li>▪ This class is responsible for adding Taxpayers' data to the Database</li></ul>	<ul style="list-style-type: none"><li>▪ Database</li><li>▪ Taxpayer</li><li>▪ IdentifiersManager</li><li>▪ InfoFilesParser</li></ul>

- identifiersManagePackage CRC Cards

<b>Class Name:</b> IdentifiersManager	
<b>Responsibilities</b>	<b>Collaborations</b>
<ul style="list-style-type: none"> <li>This class is responsible for preparing file specific identifiers such as: "&lt;Receipts&gt; ", "Receipts: " etc.</li> </ul>	<ul style="list-style-type: none"> <li>InputSystem</li> <li>OutputFiles</li> </ul>

- dataManagePackage CRC Cards

<b>Class Name: Database</b>	
<b>Responsibilities</b>	<b>Collaborations</b>
<ul style="list-style-type: none"> <li>This class is responsible for: <ul style="list-style-type: none"> <li>Storing Taxpayers and their info into the database from their corresponding input files</li> <li>Accessing said Taxpayers</li> <li>Updating input files if there are changes in the database</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Taxpayer</li> <li>InputSystem</li> <li>BarChart</li> <li>PieChart</li> <li>OutputFiles</li> <li>InsertNewReceiptJDialog</li> <li>LoadedTaxpayersJDialog</li> <li>MainJFrameWindow</li> <li>TaxpayerLoadDataJDialog</li> <li>TaxpayerReceiptsManagementJDialog</li> </ul>



<b>Class Name: Taxpayer</b>	
<b>Responsibilities</b>	<b>Collaborations</b>
<ul style="list-style-type: none"> <li>▪ This class is responsible for:               <ul style="list-style-type: none"> <li>○ Accessing Taxpayer's info</li> <li>○ Accessing Taxpayer's receipts</li> <li>○ Calculating Taxpayer's taxes</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ Database</li> <li>▪ FamilyStatus</li> <li>▪ Receipt</li> <li>▪ InsertNewReceiptJDialog</li> <li>▪ LoadedTaxpayersJDialog</li> <li>▪ TaxpayerReceiptsManagementJDialog</li> <li>▪ InfoFilesParser</li> <li>▪ InputSystem</li> <li>▪ BarChart</li> <li>▪ PieChart</li> <li>▪ OutputFiles</li> <li>▪ FileWriter</li> </ul>

<b>Class Name: FamilyStatus</b>	
<b>Responsibilities</b>	<b>Collaborations</b>
<ul style="list-style-type: none"> <li>▪ This class is responsible for:               <ul style="list-style-type: none"> <li>○ Initializing the final statuses</li> <li>○ Determining and accessing the taxation rates based on a file</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ Taxpayer</li> </ul>

- dataManagePackage.Receipt CRC Cards

<b>Class Name: ReceiptFactory</b>	
<b>Responsibilities</b>	<b>Collaborations</b>
<ul style="list-style-type: none"><li>▪ This class is responsible for:<ul style="list-style-type: none"><li>○ Creating the proper kind of Receipt</li></ul></li></ul>	<ul style="list-style-type: none"><li>▪ Receipt</li><li>▪ InsertNewReceiptJDialog</li><li>▪ InfoFilesParser</li></ul>

<b>Class Name: Receipt</b>	
<b>Responsibilities</b>	<b>Collaborations</b>
<ul style="list-style-type: none"><li>▪ This class is responsible for:<ul style="list-style-type: none"><li>○ creating a Receipt</li><li>○ accessing said Receipt's info</li></ul></li></ul>	<ul style="list-style-type: none"><li>▪ Taxpayer</li><li>▪ Company</li><li>▪ ReceiptFactory</li><li>▪ InsertNewReceiptJDialog</li><li>▪ TaxpayerReceiptsManagementJDialog</li><li>▪ InfoFilesParser</li><li>▪ FileWriter</li><li>▪ OutputFiles</li></ul>

<b>Class Name: Company</b>	
<b>Responsibilities</b>	<b>Collaborations</b>
<ul style="list-style-type: none"><li>▪ This class is responsible for:<ul style="list-style-type: none"><li>○ creating a Company</li><li>○ accessing said company's info</li></ul></li></ul>	<ul style="list-style-type: none"><li>▪ Receipt</li></ul>

- outputManagePackage CRC Cards

<b>Class Name:</b> BarChart	
<b>Responsibilities</b>	<b>Collaborations</b>
<ul style="list-style-type: none"><li>▪ This class is responsible for creating a bar chart analysis of a selected Taxpayer's taxes</li></ul>	<ul style="list-style-type: none"><li>▪ LoadedTaxpayersJDialog</li><li>▪ Database</li><li>▪ Taxpayer</li></ul>

<b>Class Name:</b> PieChart	
<b>Responsibilities</b>	<b>Collaborations</b>
<ul style="list-style-type: none"><li>▪ This class is responsible for creating a pie chart analysis of a selected Taxpayer's Receipts</li></ul>	<ul style="list-style-type: none"><li>▪ LoadedTaxpayersJDialog</li><li>▪ Database</li><li>▪ Taxpayer</li></ul>

<b>Class Name:</b> OutputFiles	
<b>Responsibilities</b>	<b>Collaborations</b>
<ul style="list-style-type: none"><li>▪ This class is responsible for:<ul style="list-style-type: none"><li>○ Updating the Taxpayer's input file</li><li>○ Writing a log file for the Taxpayer</li></ul></li></ul>	<ul style="list-style-type: none"><li>▪ LoadedTaxpayersJDialog</li><li>▪ FileWriter</li><li>▪ IdentifiersManager</li><li>▪ Database</li><li>▪ Taxpayer</li><li>▪ Receipt</li></ul>

<b>Class Name:</b> FileWriter	
<b>Responsibilities</b>	<b>Collaborations</b>
<ul style="list-style-type: none"> <li>▪ This class is responsible for: <ul style="list-style-type: none"> <li>○ Writing a Taxpayer into a file</li> <li>○ Writing a Receipt into a file</li> <li>○ Writing the Taxpayer into a log file</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ Taxpayer</li> <li>▪ Receipt</li> <li>▪ OutputFiles</li> </ul>

– gui CRC Cards

<b>Class Name:</b> InsertNewReceiptJDialog	
<b>Responsibilities</b>	<b>Collaborations</b>
<ul style="list-style-type: none"> <li>▪ This class is responsible for passing user input into a new Receipt for a selected Taxpayer</li> </ul>	<ul style="list-style-type: none"> <li>▪ Receipt</li> <li>▪ ReceiptFactory</li> <li>▪ Database</li> <li>▪ Taxpayer</li> <li>▪ TaxpayerReceiptsManagementJDialog</li> </ul>

<b>Class Name: LoadedTaxpayersJDialog</b>	
<b>Responsibilities</b>	<b>Collaborations</b>
<ul style="list-style-type: none"> <li>▪ This class is responsible for: <ul style="list-style-type: none"> <li>○ Initializing the graphical user interface for: <ul style="list-style-type: none"> <li>▪ Displaying a selected Taxpayer's info</li> <li>▪ Deleting a selected Taxpayer from the database</li> <li>▪ Displaying a selected Taxpayer's receipts</li> </ul> </li> <li>○ filling an array with the loaded Taxpayers' name and AFM pairs so they can be displayed</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ Database</li> <li>▪ Taxpayer</li> <li>▪ OutputFiles</li> <li>▪ PieChart</li> <li>▪ BarChart</li> <li>▪ MainJFrameWindow</li> <li>▪ TaxpayerReceiptsManagementJDialog</li> </ul>

<b>Class Name: MainJFrameWindow</b>	
<b>Responsibilities</b>	<b>Collaborations</b>
<ul style="list-style-type: none"> <li>▪ This class is responsible for initializing the main graphical user interface so the user can choose to:               <ul style="list-style-type: none"> <li>○ Load the Taxpayers' data from the system explorer into the Database</li> <li>○ Display the Database's loaded Taxpayers</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ Database</li> <li>▪ TaxpayerLoadDataJDialog</li> <li>▪ LoadedTaxpayersJDialog</li> </ul>

<b>Class Name: TaxpayerLoadDataJDialog</b>	
<b>Responsibilities</b>	<b>Collaborations</b>
<ul style="list-style-type: none"> <li>▪ This class is responsible for initializing the graphical user interface for the user to choose input file(s) from the system explorer</li> </ul>	<ul style="list-style-type: none"> <li>▪ MainJFrameWindow</li> <li>▪ Database</li> </ul>

<b>Class Name:</b> TaxpayerReceiptsManagementJDialog	
<b>Responsibilities</b>	<b>Collaborations</b>
<ul style="list-style-type: none"> <li>▪ This class is responsible for: <ul style="list-style-type: none"> <li>○ initializing the graphical user interface for the user to choose to: <ul style="list-style-type: none"> <li>▪ Add a new Receipt for the specified Taxpayer</li> <li>▪ Remove a selected Receipt from the specified Taxpayer</li> <li>▪ Display selected Receipt's info</li> </ul> </li> <li>○ filling an array with the loaded Taxpayer's Receipt(s) so they can be displayed</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ Database</li> <li>▪ Taxpayer</li> <li>▪ Receipt</li> <li>▪ LoadedTaxpayersJDialog</li> <li>▪ InsertNewReceiptJDialog</li> </ul>