

LATEX EDITOR

OVERAL PROJECT REPORT

VERSION <2.0>

Βασιλείδης Μιλτιάδης	2944
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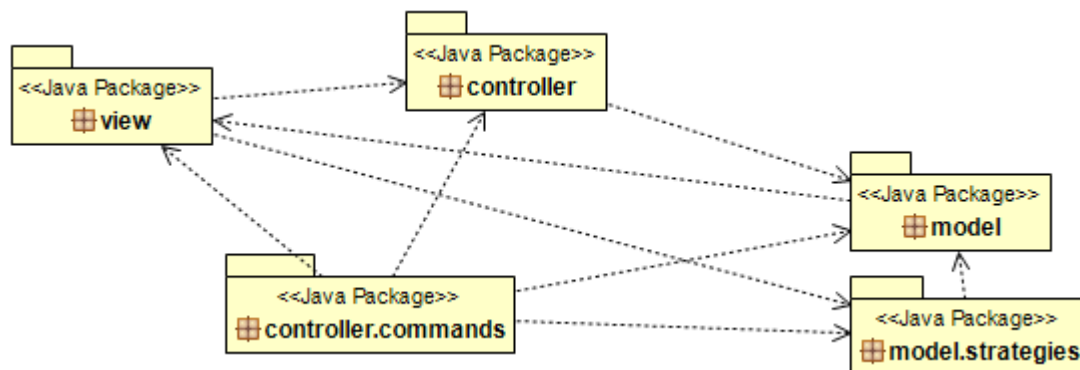
Θωμά Αθανάσιος	2979
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INTRODUCTION

The goal of this project is to reengineer a Java application. At a glance, the objective of this project is to develop a simple Latex editor for inexperienced Latex users. Latex is a well known high quality document preparation markup language. It provides a large variety of styles and commands that enable advanced document formatting. Typically, a Latex document is compiled with a tool like MikTex, Lyx, etc. to produce a respective formatted document in pdf, ps, etc. Formatting documents with Latex is like a programming process as it involves the proper usage of Latex commands which are embedded in the document contents. The goal of the Latex editor is to facilitate the usage of Latex commands for the preparation of Latex documents. One of the prominent features that distinguishes the LatexEditor from other similar applications is its multi-strategy version tracking functionalities that enable undo and redo actions.

DESIGN RECOVERY

ARCHITECTURE



DETAILED DESIGN

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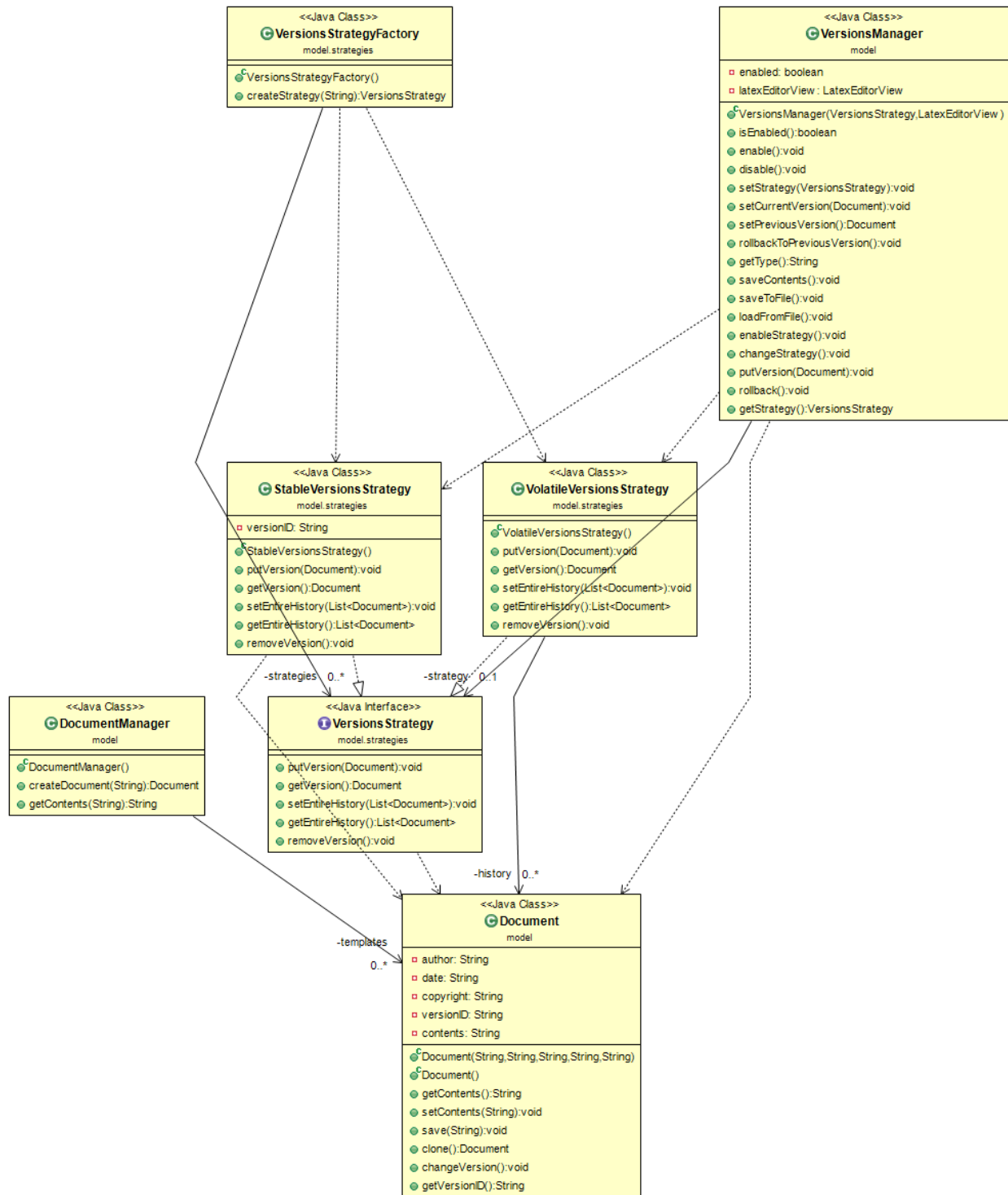
classDiagram
 class CommandFactory {
 <<Java Class>>
 <<CommandFactory>>
 +documentManager: DocumentManager
 +versionsManager: VersionsManager
 +CommandFactory(VersionsManager)
 +createCommand(String) Command
 }
 class Command {
 <<Java Class>>
 <<Command>>
 +versionsManager: VersionsManager
 +execute() void
 }
 class UndoCommand {
 <<Java Class>>
 <<UndoCommand>>
 +versionsManager: VersionsManager
 +undoCommand: UndoCommand
 +execute() void
 }
 class RedoCommand {
 <<Java Class>>
 <<RedoCommand>>
 +versionsManager: VersionsManager
 +redoCommand: RedoCommand
 +execute() void
 }
 class AddCommand {
 <<Java Class>>
 <<AddCommand>>
 +versionsManager: VersionsManager
 +addCommand: AddCommand
 +execute() void
 }
 class DeleteCommand {
 <<Java Class>>
 <<DeleteCommand>>
 +versionsManager: VersionsManager
 +deleteCommand: DeleteCommand
 +execute() void
 }
 class RollbackToPreviousVersionCommand {
 <<Java Class>>
 <<RollbackToPreviousVersionCommand>>
 +versionsManager: VersionsManager
 +rollbackToPreviousVersionCommand: RollbackToPreviousVersionCommand
 +execute() void
 }
 class ChangeVersionsStrategyCommand {
 <<Java Class>>
 <<ChangeVersionsStrategyCommand>>
 +versionsManager: VersionsManager
 +changeVersionsStrategyCommand: ChangeVersionsStrategyCommand
 +execute() void
 }
 class EditCommand {
 <<Java Class>>
 <<EditCommand>>
 +versionsManager: VersionsManager
 +editCommand: EditCommand
 +execute() void
 }
 class DisableVersionManagementCommand {
 <<Java Class>>
 <<DisableVersionManagementCommand>>
 +versionsManager: VersionsManager
 +disableVersionManagementCommand: DisableVersionManagementCommand
 +execute() void
 }
 class EnableVersionManagementCommand {
 <<Java Class>>
 <<EnableVersionManagementCommand>>
 +versionsManager: VersionsManager
 +enableVersionManagementCommand: EnableVersionManagementCommand
 +execute() void
 }
 class LoadCommand {
 <<Java Class>>
 <<LoadCommand>>
 +versionsManager: VersionsManager
 +loadCommand: LoadCommand
 +execute() void
 }
 class SaveCommand {
 <<Java Class>>
 <<SaveCommand>>
 +versionsManager: VersionsManager
 +saveCommand: SaveCommand
 +execute() void
 }
 class EditorController {
 <<Java Class>>
 <<EditorController>>
 +latestEditorController: EditorController
 +executeString() void
 }
 CommandFactory --> Command
 CommandFactory --> UndoCommand
 CommandFactory --> RedoCommand
 CommandFactory --> AddCommand
 CommandFactory --> DeleteCommand
 CommandFactory --> RollbackToPreviousVersionCommand
 CommandFactory --> ChangeVersionsStrategyCommand
 CommandFactory --> EditCommand
 CommandFactory --> DisableVersionManagementCommand
 CommandFactory --> EnableVersionManagementCommand
 CommandFactory --> LoadCommand
 CommandFactory --> SaveCommand
 EditorController --> CommandFactory
 EditorController --> UndoCommand
 EditorController --> RedoCommand
 EditorController --> AddCommand
 EditorController --> DeleteCommand
 EditorController --> RollbackToPreviousVersionCommand
 EditorController --> ChangeVersionsStrategyCommand
 EditorController --> EditCommand
 EditorController --> DisableVersionManagementCommand
 EditorController --> EnableVersionManagementCommand
 EditorController --> LoadCommand
 EditorController --> SaveCommand
 Command --> UndoCommand
 Command --> RedoCommand
 Command --> AddCommand
 Command --> DeleteCommand
 Command --> RollbackToPreviousVersionCommand
 Command --> ChangeVersionsStrategyCommand
 Command --> EditCommand
 Command --> DisableVersionManagementCommand
 Command --> EnableVersionManagementCommand
 Command --> LoadCommand
 Command --> SaveCommand
 UndoCommand --> RedoCommand
 RedoCommand --> AddCommand
 AddCommand --> DeleteCommand
 DeleteCommand --> RollbackToPreviousVersionCommand
 RollbackToPreviousVersionCommand --> ChangeVersionsStrategyCommand
 ChangeVersionsStrategyCommand --> EditCommand
 EditCommand --> DisableVersionManagementCommand
 DisableVersionManagementCommand --> EnableVersionManagementCommand
 EnableVersionManagementCommand --> LoadCommand
 LoadCommand --> SaveCommand
 SaveCommand --> UndoCommand

```

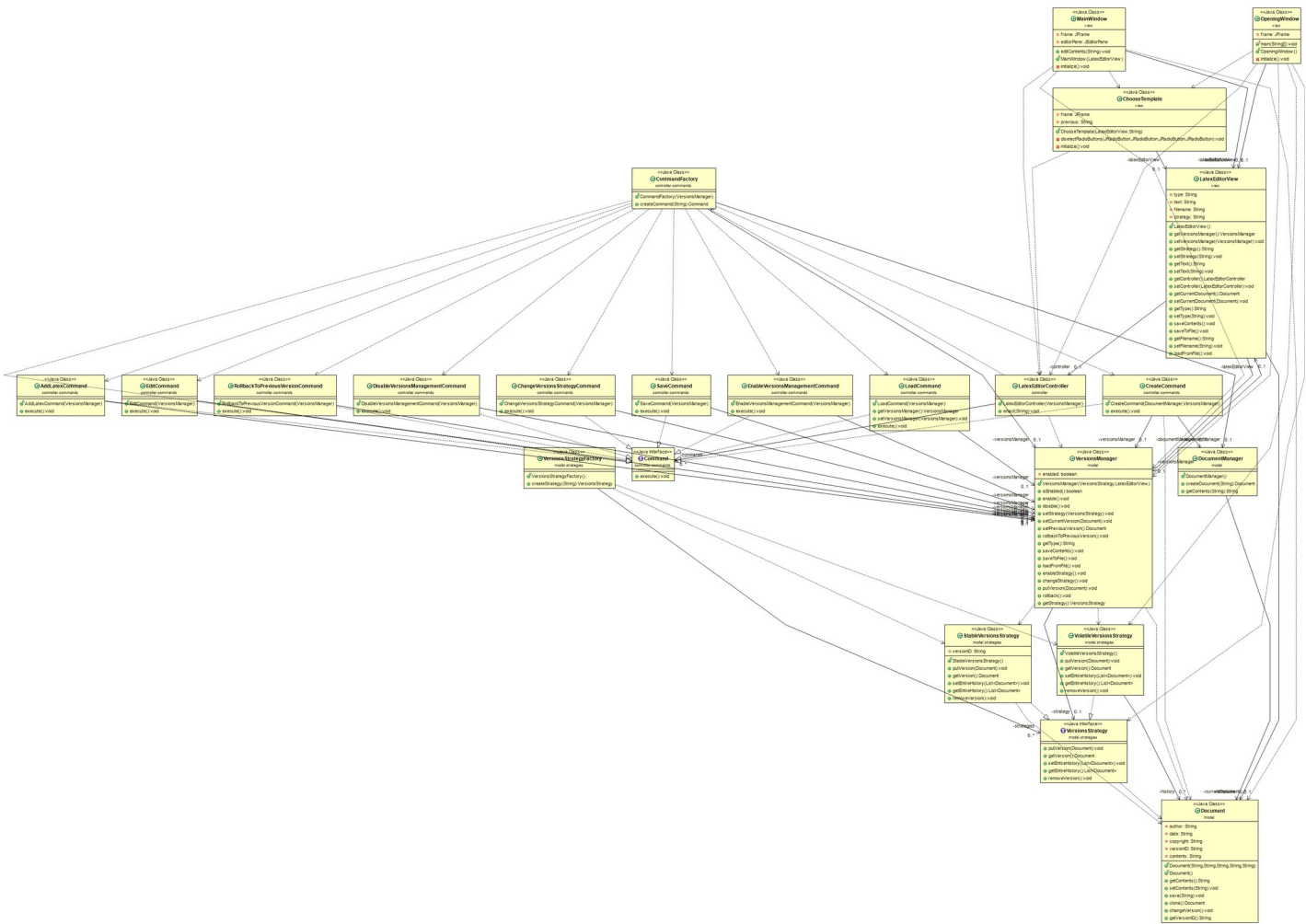
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classDiagram
    class LatexEditorView {
        <<Java Class>>
        controller: LatexEditorController
        currentDocument: Document
        type: String
        text: String
        filename: String
        strategy: String
        versionsManager: VersionsManager
        +LatexEditorView()
        +getVersionsManager(): VersionsManager
        +setVersionsManager(VersionsManager): void
        +getStrategy(): String
        +setStrategy(String): void
        +getText(): String
        +setText(String): void
        +getController(): LatexEditorController
        +setController(LatexEditorController): void
        +getCurrentDocument(): Document
        +setCurrentDocument(Document): void
        +getType(): String
        +setType(String): void
        +saveContents(): void
        +saveToFile(): void
        +getFilename(): String
        +setFilename(String): void
        +loadFromFile(): void
    }
    class MainWindow {
        <<Java Class>>
        +frame: JFrame
        +editorPane: JEditorPane
        +editContents(String): void
        +MainWindow(LatexEditorView)
        +initialize(): void
    }
    class OpeningWindow {
        <<Java Class>>
        +frame: JFrame
        +main(String[]): void
        +OpeningWindow()
        +initialize(): void
    }
    class ChooseTemplate {
        <<Java Class>>
        +frame: JFrame
        +previous: String
        +ChooseTemplate(LatexEditorView, String)
        +dis electRadioButtons(JRadioButton, JRadioButton, JRadioButton, JRadioButton): void
        +initialize(): void
    }
    LatexEditorView --> "0..1" LatexEditorView : -latexEditorView
    LatexEditorView --> "0..1" LatexEditorView : -latexEditorView
    LatexEditorView --> "0..1" LatexEditorView : -latexEditorView
    LatexEditorView --> ChooseTemplate : -latexEditorView
    MainWindow ..> ChooseTemplate : 
    OpeningWindow ..> ChooseTemplate : 
  
```
- The diagram illustrates the relationships between four Java classes: **LatexEditorView**, **MainWindow**, **OpeningWindow**, and **ChooseTemplate**.
- LatexEditorView** (view):
 - Attributes: `controller: LatexEditorController`, `currentDocument: Document`, `type: String`, `text: String`, `filename: String`, `strategy: String`, `versionsManager: VersionsManager`.
 - Operations: `LatexEditorView()`, `getVersionsManager(): VersionsManager`, `setVersionsManager(VersionsManager): void`, `getStrategy(): String`, `setStrategy(String): void`, `getText(): String`, `setText(String): void`, `getController(): LatexEditorController`, `setController(LatexEditorController): void`, `getCurrentDocument(): Document`, `setCurrentDocument(Document): void`, `getType(): String`, `setType(String): void`, `saveContents(): void`, `saveToFile(): void`, `getFilename(): String`, `setFilename(String): void`, `loadFromFile(): void`.
 - MainWindow** (view):
 - Attributes: `frame: JFrame`, `editorPane: JEditorPane`.
 - Operations: `editContents(String): void`, `MainWindow(LatexEditorView)`, `initialize(): void`.
 - OpeningWindow** (view):
 - Attributes: `frame: JFrame`.
 - Operations: `main(String[]): void`, `OpeningWindow()`, `initialize(): void`.
 - ChooseTemplate** (view):
 - Attributes: `frame: JFrame`, `previous: String`.
 - Operations: `ChooseTemplate(LatexEditorView, String)`, `dis electRadioButtons(JRadioButton, JRadioButton, JRadioButton, JRadioButton): void`, `initialize(): void`.
- Relationships:**
- LatexEditorView** has three self-association relationships, each with a multiplicity of `0..1` and the role name `-latexEditorView`.
 - LatexEditorView** has an association relationship with **ChooseTemplate** with a multiplicity of `0..1` and the role name `-latexEditorView`.
 - MainWindow** has a dashed association relationship with **ChooseTemplate**.
 - OpeningWindow** has a dashed association relationship with **ChooseTemplate**.

model package



- overall graph



QUALITY ASSESSMENT

Problematic Methods:

- Document.clone() ~ creates shallow instead of deep copy.
- DocumentManager.constructor() ~ Document constructor is not used correctly, instead the contents of each document template is filled through setter method.
- VersionsManager.rollbackToPreviousVersion() ~ does nothing.
- StableVersionsStrategy.putVersion() ~ calls Document.save() method instead of implementing its own mechanism to write to the disk.
- LoadCommand ~ has setter and getter methods. Dead code.
- ChooseTemplate.initialize() ~ has duplicate code inside.
- LatexEditorView ~ has setter and getter methods. Dead code.

Classes with many responsibilities:

~Model Package

- Document: also has save() method.
- DocumentManager: getContents() method should be in Document class.
- VersionsManager: is a God class. It is not only responsible for the versioning system. This is the class that all the command classes send their job to. It also handles some of the communication with the GUI.

~View Package

- MainWindow: method editContents() should be in AddLatexCommand class.
- LatexEditorView: this is the “controller” class of the GUI package. Responsibilities such as loadFromFile() and saveContents() are shoved in here. Has some duplicate code.

Classes with very few responsibilities:

~Controller Package

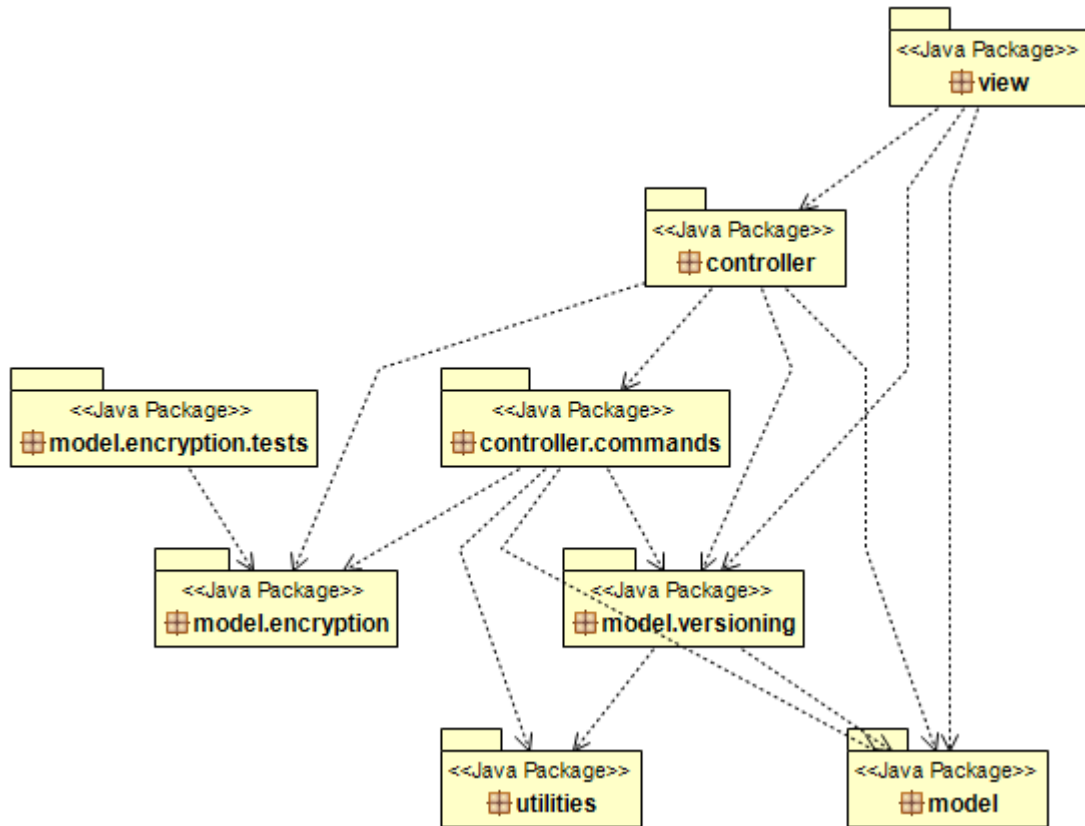
- LatexEditorController: this class should be the one communicating with the GUI.

~Controller.Commands Package

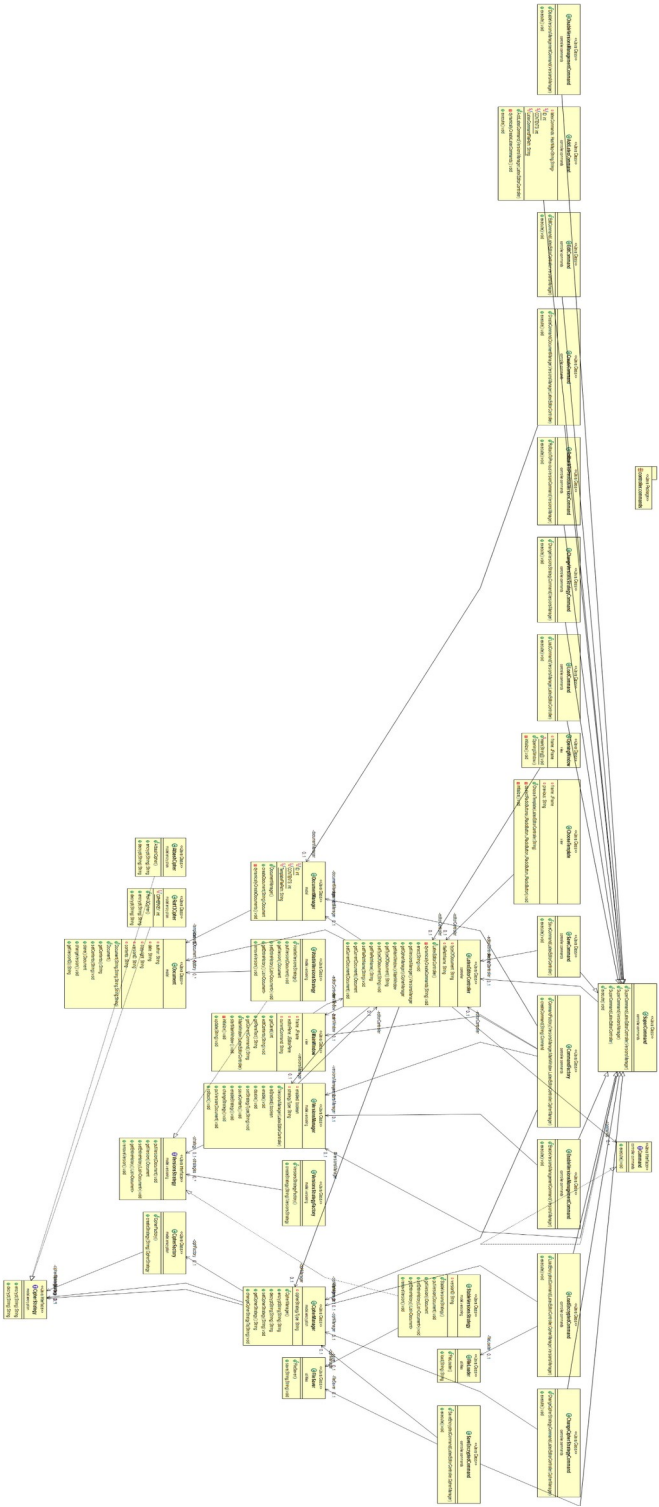
- AddLatexCommand: the job of this class is implemented elsewhere. The whole class is a duplicate of EditCommand.
- EditCommand: doesn't do anything, just calls the VersionsManager.
- ChangeVersionsStrategyCommand: doesn't do anything, just passes calls VersionsManager.
- LoadCommand: doesn't do anything, just calls the VersionsManager.
- RollbackToPreviousVersionCommand: doesn't do anything, just calls the VersionsManager.
- SaveCommand: doesn't do anything, just calls the VersionsManager.

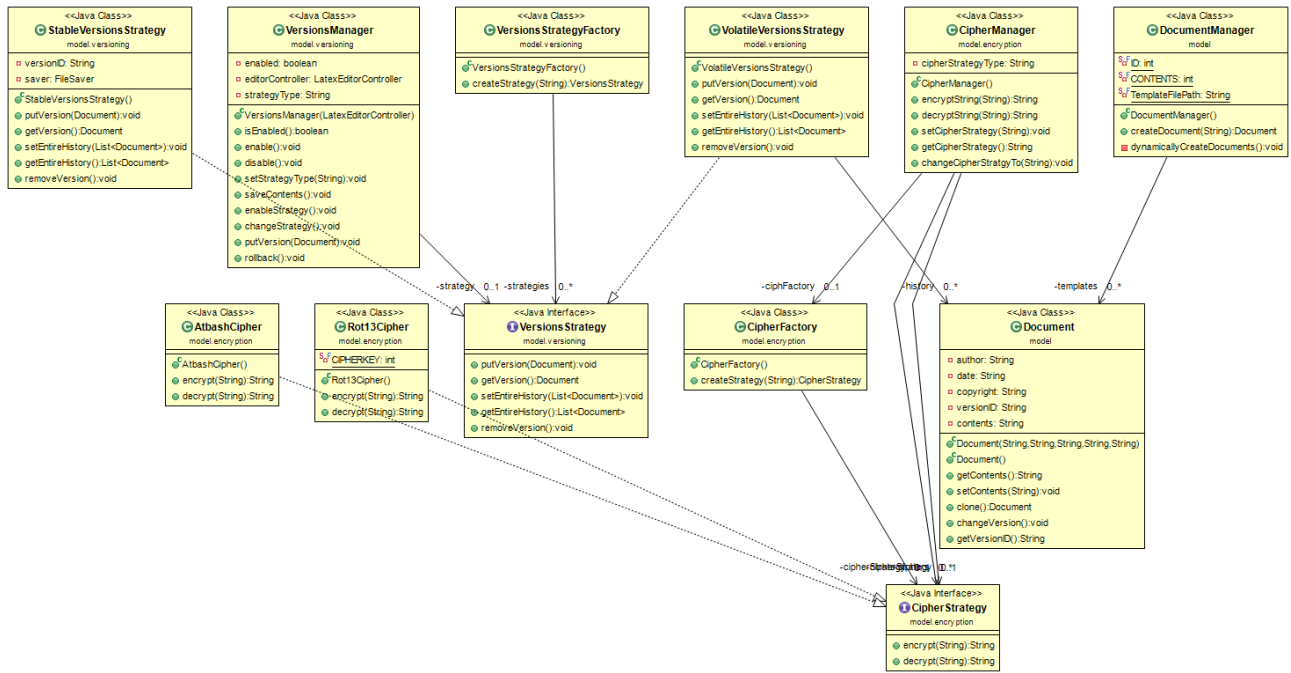
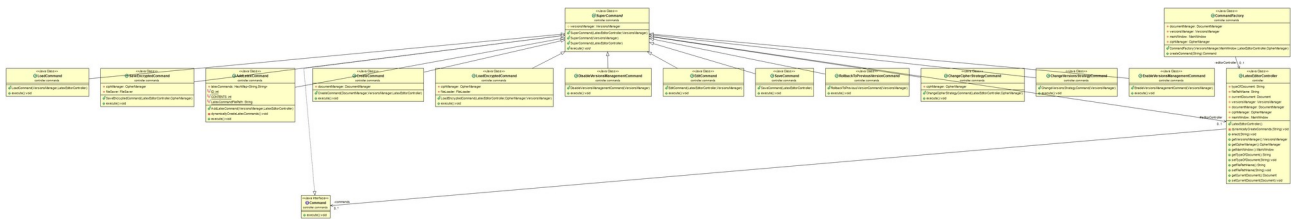
Re-Engineered Design

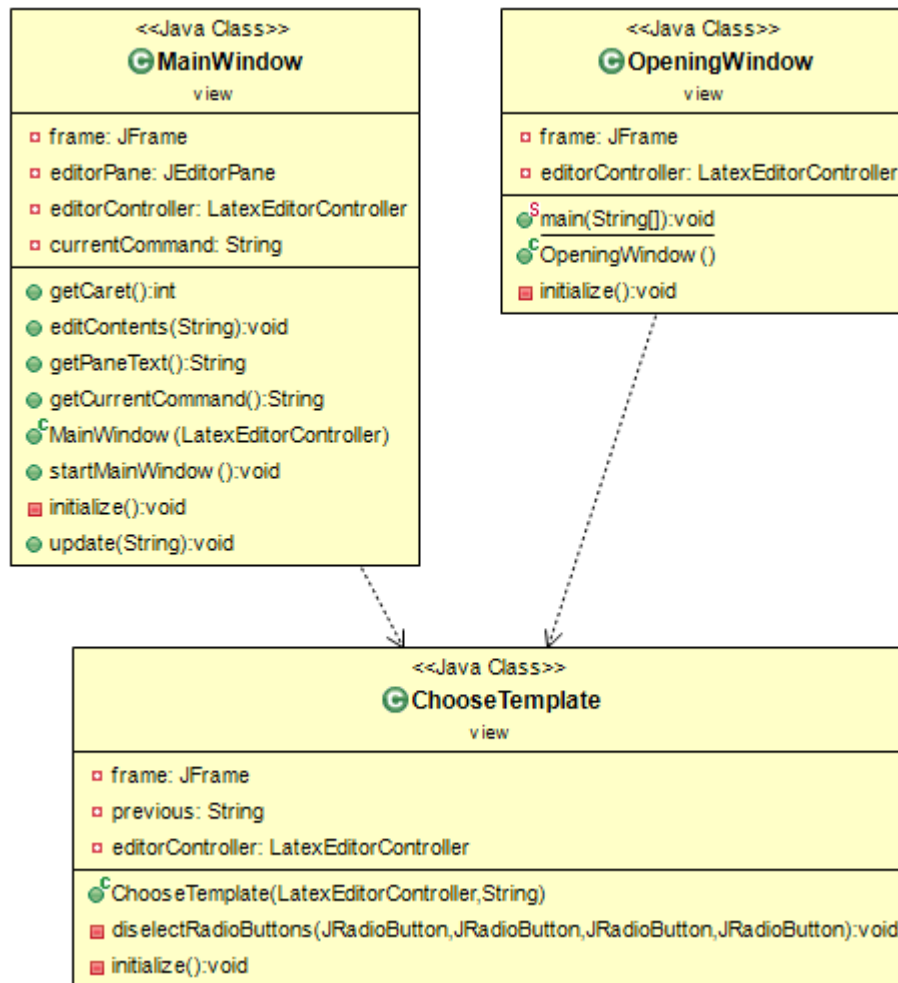
ARCHITECTURE



DETAILED DESIGN







To address the problem of Duplicate Code in the Document Manager and LatexEditorController classes we implemented the alternative algorithm method, now the document templates and the types of commands are read from properties files from the disk that are in separate folders in the project. This also helps with the extending the project without needing to touch multiple classes, in order to add a new Latex Document template or a new Command.

In the controller.commands package we extracted a SuperCommand abstract class from all classes that implement the Command interface. Now the SuperCommand class contains the fields that all commands required. SuperCommand has protected fields. The Commands can call methods from the fields of SuperCommand.

In addLatexCommand we moved code from the MainWindow class that added the commands in the document. Delegation of responsibilities was wrong so we fixed that.

EditCommand is now responsible for setting the document contents taking input from the main window. Moved the responsibility from the mainWindow and latexEditorView classes.

Moved the save to disk of a .tex file from DocumentClass to the SaveCommand class.

Moved responsibility of loading files from VersionsManager to LoadCommand class.

Regarding the model.versioning subsystem. (renamed the package from strategy):

VersionManager had some methods that were dead code, not called anywhere in the project we removed those methods from the project completely.

VersionManager besides having responsibility for the VersioningSubsystem also served the role of a middle man that was called from most of the classes from the back end to communicate with the front end namely the LatexEditorView class. We started by removing middle man methods and passing reference to the LatexEditorView to every class that needed access to it's methods/fields.

View Package:

Latex EditorView this class contained data and methods that had nothing to do with the GUI, we decided that we should remove this class from the project entirely. This class was the interface between the back end and the front end, so after removing this class most of re responsibilities moved to LatexEditorController except those that had nothing to do with interfacing like load and save functionalities that were moved to their respective command classes.

We set the LatexEditorController to have the currentVersion of the Document and fields with references to the other classes of the project as well as get methods for these fields so commands can use them.

In the mainWindow class we mended the “long method” problem that actually was the addlatexCommand we moved that method to it's respective command class.

Other tweaks to the code were minor and were to ensure that the program compiled and ran after the refactoring.

Added a utilities package to ensure we have no duplicate code.
Two classes handle loading and saving from and to the disk.

Extension

The Encryption package consists of :

A Manager class that handles the switch from an encryption method to another and also provides a simple interface to the main system logic.

A Factory that creates instances of encryption algorithms classes.

An Interface for the different encryption algorithms.

An implementation of the Atbash algorithm and
an implementation of the Rot13 algorithm.

This package follows the Strategy Pattern for simple addition of new ways to encrypt documents and to switch from one to another.

IMPLEMENTATION

Document	
<ul style="list-style-type: none">• Represents the main model of the data of this software	<ul style="list-style-type: none">• None

Document Manager	
<ul style="list-style-type: none">• Handles creation of new objects of type Document• Handles template creation	<ul style="list-style-type: none">• Document

VersionsManager	
<ul style="list-style-type: none">• Controls the versioning system.• Enables/disables the versioning system• Sets the mode / strategy of operation (Volatile/Stable)	<ul style="list-style-type: none">• VersionsStrategy

Interface VersionsStrategy	
<ul style="list-style-type: none">• Puts new version of document in the versioning system• gets previous version of document• sets entire history of documents• returns entire history of documents• removes latest version from the versioning system	<ul style="list-style-type: none">• Document

VolatileVersionsStrategy		VersionsStrategy
<ul style="list-style-type: none">• Stores document versions in Memory (ArrayList)• Returns most recent version stored.• Returns entire history of document versions (ArrayList)• Can "be fed" entire document history in form of ArrayList		<ul style="list-style-type: none">• Document• VersionsManager

StableVersionsStrategy		VersionsStrategy
<ul style="list-style-type: none">• Saves the document versions on the filesystem in .tex format• Saves new versions of Document• Returns previous version of Document• Can "be fed" entire Document version history to be saved on the filesystem• Returns entire document history from filesystem		<ul style="list-style-type: none">• Document• VersionsManager

VersionsStrategyFactory	
<ul style="list-style-type: none">• Creates objects of VolatileVersionStrategy or StableVersionStrategy based on Input	

LatexEditorController	
<ul style="list-style-type: none">• Enacts commands according to input from the GUI.• Creates manager objects for the different systems (versioning and encryption).• Keeps the current Document.	<ul style="list-style-type: none">• Command (Interface)• CommandFactory• VersionsManager• DocumentManager• CipherManager• MainWindow• Document

Interface Command	
<ul style="list-style-type: none"> • executes command 	

CommandFactory	
<ul style="list-style-type: none"> • Creates instances of command classes that extend the SuperCommand class and implement the command interface. • With the help of LatexEditorController, each command class gets an instance of the manager they need. 	<ul style="list-style-type: none"> • VersionsManager • DocumentManager • CipherManager • EditCommand • AddLatexCommand • rollbacktoPreviousVersionCommand • SaveCommand • LoadCommand • CreateCommand • enableVersionsCommand • DisableVersionsCommand • ChangeVersionsStrategyCommand • ChangeCipherStrategyCommand • SaveEncryptedCommand • LoadEncryptedCommand

Abstract SuperCommand	
<ul style="list-style-type: none"> • a super class that holds the common fields of command classes. 	<ul style="list-style-type: none"> • Command

EnableVersionsManager SuperCommand	
<ul style="list-style-type: none"> • Enables Versioning system 	<ul style="list-style-type: none"> • VersionsManager

DisableVersionsManager		SuperCommand
<ul style="list-style-type: none">Disables Versioning System	<ul style="list-style-type: none">VersionManager	

AddLatexCommand		SuperCommand
<ul style="list-style-type: none">Adds the selected latex command at the caret position inside the Document.Keeps a copy of the document in the versioning system.	<ul style="list-style-type: none">LatexEditorControllerVersionsManager	

CreateCommand		SuperCommand
<ul style="list-style-type: none">Gets Document manager to create a new document based on input (type)Sets document created as current in LatexEditorController.Keeps a copy of the new document in the versioning system.	<ul style="list-style-type: none">DocumentManagerLatexEditorControllerVersionsManager	

EditCommand		SuperCommand
<ul style="list-style-type: none">Keeps text area and the document in backend updated.Adds a copy of the document in the versioning system.	<ul style="list-style-type: none">LatexEditorControllerVersionsManager	

ChangeVersionsCommand		SuperCommand
<ul style="list-style-type: none">Changes the Strategy of the versioning system	<ul style="list-style-type: none">VersionsManager	

LoadCommand		SuperCommand
<ul style="list-style-type: none">• Loads a file in the system as a new document.	<ul style="list-style-type: none">• LatexEditorController• VersionsManager• FileLoader	

SaveCommand		SuperCommand
<ul style="list-style-type: none">• Saves the document as a file in the hard disk.	<ul style="list-style-type: none">• LatexEditorController• FileSaver	

RollbacktoPreviousVersionCommand		SuperCommand
<ul style="list-style-type: none">• Rolls back to previous version of the document	<ul style="list-style-type: none">• VersionsManager	

ChangeCipherStrategyCommand		SuperCommand
<ul style="list-style-type: none">• Changes the Strategy of the encrypting system	<ul style="list-style-type: none">• LatexEditorController• CipherManager	

SaveEncryptedCommand		SuperCommand
<ul style="list-style-type: none">• Saves the document as an encrypted file in the hard disk.	<ul style="list-style-type: none">• LatexEditorController• CipherManager• FileSaver	

LoadEncryptedCommand		SuperCommand
<ul style="list-style-type: none">• Loads an encrypted file in the system as a new document.	<ul style="list-style-type: none">• LatexEditorController• CipherManager• FileLoader• VersionsManager	

CipherManager		
<ul style="list-style-type: none">• Controls the encryption system.• Sets the algorithm for encryption (Atbash/Rot13)	<ul style="list-style-type: none">• CipherFactory• CipherStrategy	

Interface		CipherStrategy
<ul style="list-style-type: none">• encrypts a String• decrypts a String		

Rot13Cipher		CipherStrategy
<ul style="list-style-type: none">• Encrypts a String based on Rot13 algorithm.• Decrypts a String based on Rot13 algorithm.		

AtbashCipher		CipherStrategy
<ul style="list-style-type: none">• Encrypts a String based on Atbash algorithm.• Decrypts a String based on Atbash algorithm.		

CipherFactory	
<ul style="list-style-type: none">Creates instances of cipher classes that implement the CipherStrategy interface.	<ul style="list-style-type: none">AtbashCipherRot13Cipher

FileLoader		utilities package
<ul style="list-style-type: none">Loads a file from the disk as a String		

FileSaver		utilities package
<ul style="list-style-type: none">Saves a file in the disk		

OpeningWindow	
<ul style="list-style-type: none">Has the 'main' function.Creates the LatexEditorController.Shows the starting window.	<ul style="list-style-type: none">LatexEditorControllerChooseTemplate

ChooseTemplate	
<ul style="list-style-type: none">Shows a window where the user can choose the type of document he wants to write.	<ul style="list-style-type: none">LatexEditorController

MainWindow	
<ul style="list-style-type: none">• Shows the main window and work environment for the user.• Handles all user actions with the help of action listeners.• For each action the user chooses to do, calls the LatexEditorController to work on it on the backend.	<ul style="list-style-type: none">• LatexEditorController