

# *Project Manual*

## *ToDo++*



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# ToDo++

## User Guide

For v0.5 software



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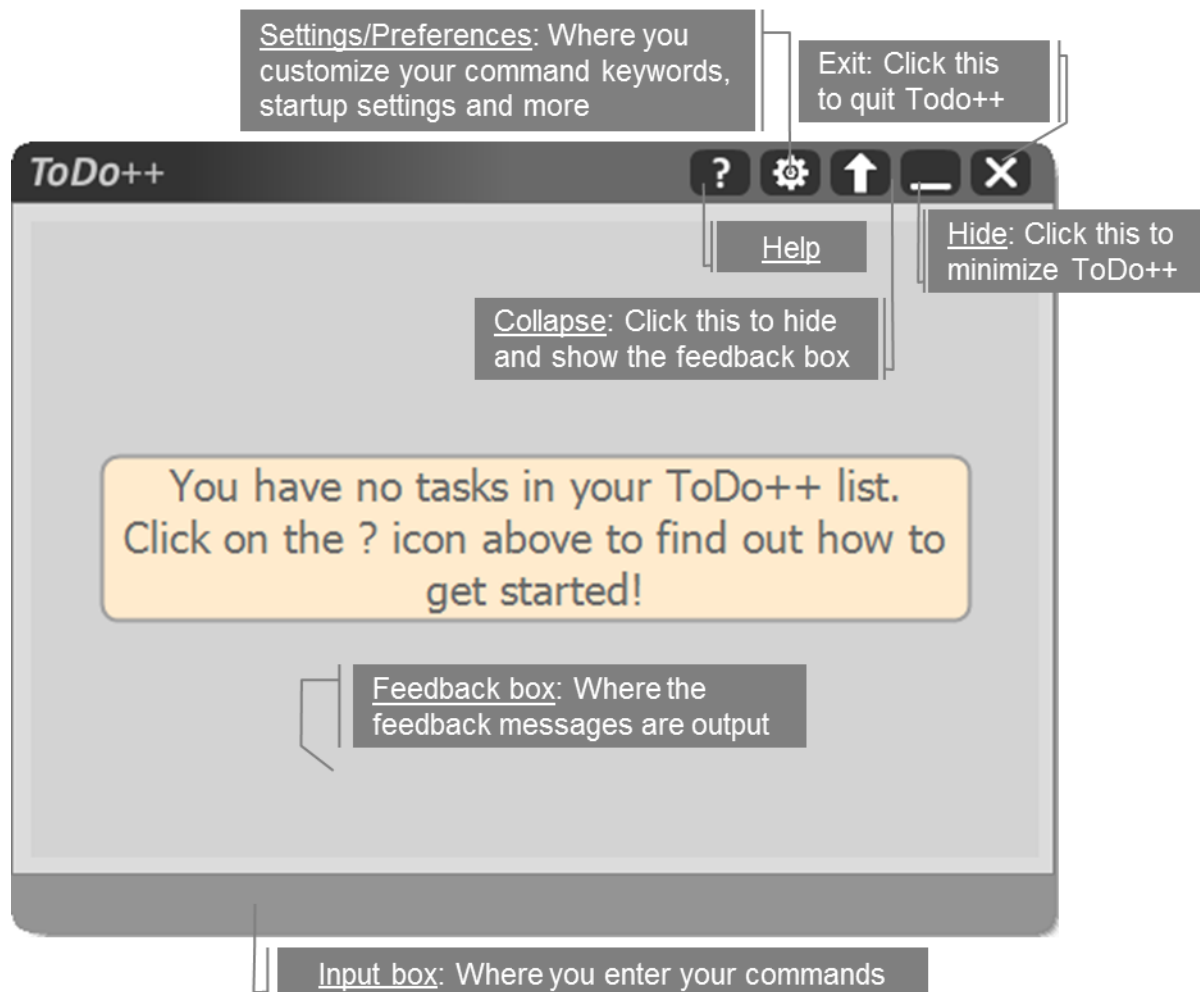
# Section 1: The Basics

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## 1.1. Introduction


ToDo++ is the to-do application of your choice. Take control of your life like never before, with keyboard shortcut keys and intuitive natural-language-like text commands. Personalize the way you want to interact with the app. Be alerted of your events, and never lose track of your tasks again.

## 1.2. At a Glance



## 1.3. Quick Start

Upon launching ToDo++, you are presented with a minimalistic and intuitive screen. The first time you launch ToDo++, a simple help animation will introduce you to the many wonders of ToDo++! Find it superfluous? Then simply type away! That is all all that you have to do to start creating your to-do list!

- Create your first task/event by typing the keyword “add” followed by your task/event name into the input box, followed by the event time or deadline if any.
- For example, to add your Mom’s birthday brunch this Sunday, simply type in “*add mom’s bday this sunday*”. Hit *Enter* and the item is added!
- To view what you have added, just key in “display” and your list, ordered by date and time (or however you have customized it in the Settings  panel), will be displayed!

*Note: If you have a task/event name that includes a date, time, or keyword, such as ‘Thank God It’s Friday’ or ‘delete ex-girlfriend’s number’, use quotation mark or brackets around the task/event name to prevent ToDo++ from messing up your instruction.*

You can search for, modify and delete your tasks from the list using these very words as the keywords. Alternative keywords can be found in the [Appendix](#).

Remember the order of what you enter does not matter! Take a look at section [3.1. FlexiCommands](#) to find out more and learn how to customize ToDo++ to your needs.

The following sections will describe basic ToDo++ operations in more detail.

## Section 2: Creating Your ToDo++ List

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### 1.1. Types of Tasks

There are three basic types of tasks you can add to your list.

- Event tasks** : items that have a start time (and possibly an end time).  
**Deadline tasks** : items that have to be done before a specific time.  
**Floating tasks** : items that have no timings attached to them.

As always, there is no fixed way to add a certain type of task. Simply type in what makes sense to you, and ToDo++ will know what type of task to add! See the next section, “Adding an Item” for more information.

### 1.2. Basic Operation

The order of input of all required fields is flexible. Date input is context sensitive. For more information, please see section [3.1. FlexiCommands](#).

For a complete list of default keywords and more details on how to use bracketing, please see section [3.1.2. Using Reserved Keywords](#).

You can easily sort your tasks by name and date, schedule your task to be happening at your earliest free time slot and quickly undo a wrongly input command using the “undo” command. For more information, please see section [3.2.5. Undoing a Command](#).

The following sections detail the basic operations.

### 1.3. Adding a Task

Using the default `add` keyword, you can add all types of items to your list easily in a structured format similar to natural language. The task type will depend on the inclusion or omission of start/end times/deadlines. You can add your tasks in the following ways:

Adding a floating task	Enter “ <code>add [task name]</code> ” eg. add finish project
Adding an event (timed) task	Enter “ <code>add [task name] [start time] {end time} {day/date}</code> ” eg. add max birthday 4pm tomorrow eg. add team meeting 2pm-4pm next wed
Adding a deadline item	Enter “ <code>add [task name] by [deadline]</code> ” eg. add do cs2103 CE2 by saturday midnight

*Note: Optional keywords are in curly braces. See [Appendix](#) for a full list of keywords and defaults.*

## 1.4. Searching & Viewing

Using the default `display` or `search` keyword, you can search, filter and view your list of to-do items. ToDo++ has a powerful sort and search algorithm that will help you find your tasks with intuitive commands in consummate ease.

A search request may be made up of more than one search requirement. Below are examples of how you can use this feature to its full potential. Optional commands are in curly braces.

Display all tasks	Enter " <code>display/search</code> "
Search for and display all or some of the tasks scheduled on, before or, after a specific day or date	Enter " <code>display/search [day/date]{before/after}{time}</code> " eg. <code>display 06/09/2012</code> eg. <code>display Sunday after 1500hrs</code> eg. <code>display 6 sept before 10pm</code> eg. <code>display next Saturday</code> eg. <code>display tomorrow</code> eg. <code>display June</code>
Search for and display tasks by task names or descriptions	Enter " <code>display/search [name]</code> " eg. <code>display buy milk</code>

*Note: Optional keywords are in curly braces. See Appendix for a full list of keywords and defaults.*

Search results will be displayed in the feedback window as an indexed list. Each task will be given a numbered ID for easy reference. From here, you can do further operations, such as modifying or deleting an item. See the following sections for more information.

## 1.5. Updating & Modifying

Using the default `modify` keyword, you can easily modify and edit your task details. For example, you may wish to change the scheduled date for a task or rename it to correct a typographical error.

Note that in order to modify a task name, you must first call for the task by its name and then modify it by calling its reference index. The input should not contain any date/time input. Otherwise, it will be regarded as a request to modify the task's start/end times/deadlines.

Modifying task name	Enter " <code>modify [task index] [new name]</code> " eg, (User) <code>modify milk</code> (ToDo++) 1. milk Stevv for more info 2. buy more milk (User) <code>modify 1 milk Steve for more info</code>
Modifying task time	Enter " <code>modify [task index] [new start time/deadline] {end time} {day/date}</code> " eg, (User) <code>modify buy car tomorrow</code> (ToDo++) 1. buy toy car, 5pm 2. buy car parking coupon today (User) <code>modify 2 tomorrow</code>

*Note: Optional keywords are in curly braces. See Appendix for a full list of keywords and defaults.*



## 1.6. Removing Task(s)

Using the default `delete` keyword, you can remove previously added tasks from your ToDo++ list. You can call for a task and delete it in the 2 following ways:

**By task name**                      Call the task by its name.

Note that if more than one task matches the input name, all matching tasks will be reflected in the feedback window. Each task will be given a numbered index for easy reference.

**By task index**                      Call the task by its given index, as displayed in the feedback window.

Deleting a single task	Enter " <code>delete [task name/index]</code> " eg. <code>delete 3</code> eg. <code>delete buy more milk</code> (only one task matching specified task name) eg, <i>(User)</i> <code>delete milk</code> <i>(ToDo++)</i> 1. milk Steven for more info 2. buy more milk <i>(User)</i> <code>delete 2</code>
Deleting all tasks displayed	Enter " <code>delete all</code> "
Deleting all tasks on a specific date	Enter " <code>delete all [day/date]</code> " eg. <code>delete all tmr</code> eg. <code>delete all friday</code> eg. <code>delete all 3 dec</code>

*Note: Optional keywords are in curly braces. See Appendix for a full list of keywords and defaults.*


## Section 3: Advanced Features

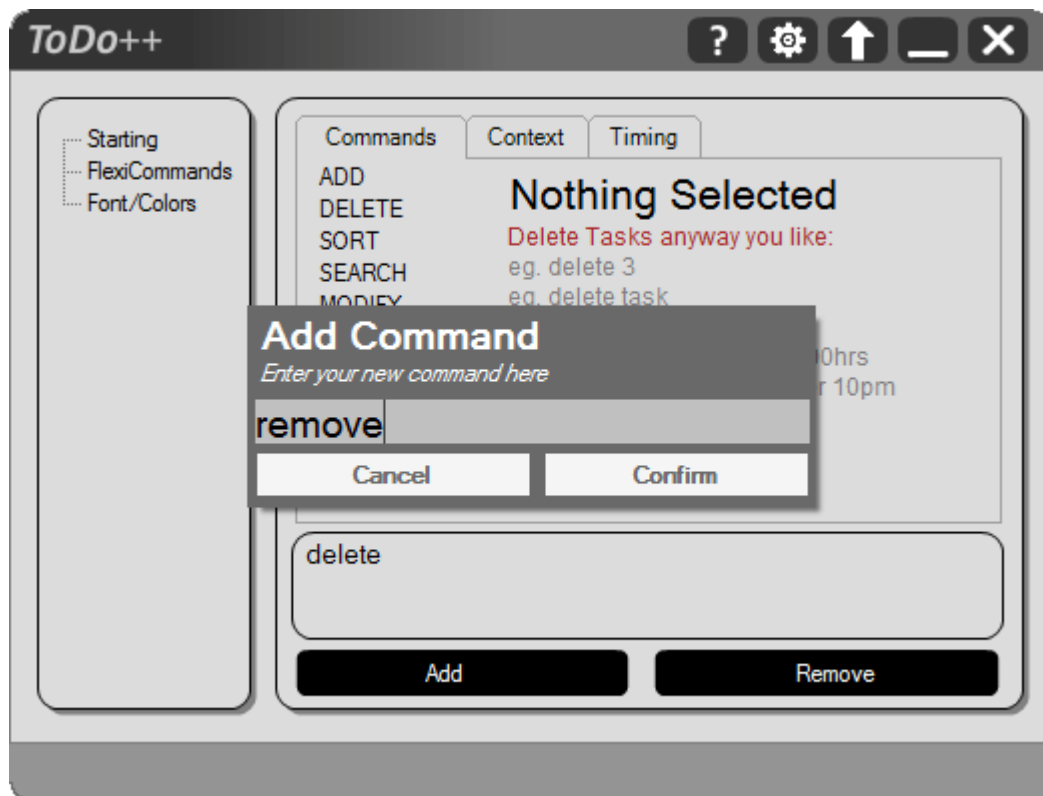
### 3.1. FlexiCommands

ToDo++ is an intelligent software that allows you to input commands in a way that is natural to you. Your input is therefore not case sensitive and not order specific. What this means is that the following commands are both equivalent and valid!

add max's birthday 25th oct	add 25/10 max's birthday	
add movie outing 3pm to 5pm today	3pm – 5pm movie outing add	
add breakfast tmr with family 5am	ADD breakfast with family 5am	<i>[past 5am today]</i>
add party lunch tmr afternoon	party lunch tmr 12pm – 5pm add	<i>[default settings]</i>
add project REMAKE by midnight	add project REMAKE by 12am	

#### 3.1.1. Custom Keywords

ToDo++ is a to-do list made to be familiar and intuitive to the individual user. If you do not wish to use the default keywords provided, you may easily set your own custom keywords for the various basic operations in Settings  FlexiCommands.



*Adding the remove keyword for command delete*

### 3.1.2. Using Reserved Keywords

There may be times when you wish to use a keyword (a command, day, date or time keyword) as part of your task name. Simply enclose the keyword within any of the following delimiters to do so:

- Quotation marks
  - add “add hot girl on facebook”
  - delete ‘*delete* issue’
- Brackets/Braces
  - modify 2 {*remove* hot girl from facebook}
  - add (go to 2*am* Bar) 2am tomorrow
  - display [2*1st* birthday]

## 3.2. Important Features for Power Users

### 3.2.1. Sorting Tasks

Using the default `sort` keyword, you can sort the items in your list easily in the following ways:

By task date	Enter " <code>sort date</code> " eg. (User) search tomorrow (ToDo++) 1. lunch with colleagues 11 Nov, 1:00PM 2. breakfast 11 Nov, 5:00AM 3. morning run 11 Nov, 3:00AM – 4:30AM 4. supper 11 Nov, 11:00PM (User) sort name (ToDo++) 1. morning run 11 Nov, 3:00AM – 4:30AM 2. breakfast 11 Nov, 5:00AM 3. lunch with colleagues 11 Nov, 1:00PM 4. Supper 11 Nov, 11:00PM
By task name	Enter " <code>sort name</code> " eg. (User) display (ToDo++) 1. peter asked me out! DATE! 2. richard asked me out! DATE! 3. simon asked me out! DATE! 4. david asked me out! DATE! (User) sort name (ToDo++) 1. david asked me out! DATE! 2. peter asked me out! DATE! 3. richard asked me out! DATE! 4. simon asked me out! DATE!

Note that "date" and "name" are keywords that must be used in conjunction with the `sort` command.

### 3.2.2. Marking Task(s)

[SIMILAR TO THE DELETE AND POSTPONE COMMAND]

Using the default `done` and `undone` keyword, you can easily mark the tasks/items in your to-do list as complete (aka done) or incomplete (aka undone). Your task will then be displayed as [DONE] and [UNDONE] respectively.

You can call for a task and mark it as done or undone in the 2 following ways:

<b>By task name</b>	Call the task by its name.  Note that if more than one task matches the input name, all matching tasks will be reflected in the feedback window. Each task will be given a numbered index for easy reference.
<b>By task index</b>	Call the task by its given index, as displayed in the feedback window.

Marking a single task	Enter " <code>done/undone [task name/index]</code> " eg. done 3 eg, done buy more milk
-----------------------	--


	(only one task matching specified task name) eg, (User) done milk (ToDo++) 1. milk Steven for more info 2. buy more milk (User) done 2
Marking all tasks displayed	Enter “done/undone all”
Marking all tasks on a specific date	Enter “done/undone all [day/date]” eg. done all today eg. undone all tomorrow eg. done all june

### 3.2.3. Postponing Task(s)

[SIMILAR TO THE DELETE AND DONE COMMAND]

Using the default postpone keyword, you can easily postpone your deadline or timed event task by a duration specified in hours, days or weeks. For example, you may wish to postpone a dinner date by an hour due to unforeseen heavy traffic or unplanned overtime.

Some points to note:

- A task with no specific time cannot be postponed by a number of hours and a task with no specific date cannot be postponed by a number of days.
- If a duration is not specified, the task will be automatically postponed by the default postpone duration specified in Settings  > FlexiCommands > Postpone.

You can call for a task and postpone it in the 2 following ways:

**By task name** Call the task by its name.

Note that if more than one task matches the input name, all matching tasks will be reflected in the feedback window. Each task will be given a numbered index for easy reference.

**By task index** Call the task by its given index, as displayed in the feedback window.

Postponing a single task	Enter “postpone [task name/index] {duration}” eg. postpone 3 1 hour eg. postpone buy more milk 2 days (only one task matching specified task name) eg, (User) postpone milk (ToDo++) 1. milk Steven for more info 11 Nov, 1:00PM 2. buy more milk 11 Nov (User) postpone 2 2 days
Postponing all tasks displayed	Enter “postpone all”
Postponing all tasks on a specific date	Enter “postpone all [day/date] {duration}” eg. postpone all tmr 1 hour eg. postpone all Friday 1 day eg. postpone all 3 dec eg. postpone all june, 1 week


*Note: Optional keywords are in curly braces. See Appendix for a full list of keywords and defaults.*

### 3.2.4. Scheduling a Task

Using the default `schedule` keyword, you can schedule your event task to be automatically allocated your earliest free time slot within your specified time range. For example, you may wish to schedule a short 1 hour dental appointment on Friday but find it a pain to look through your Friday schedule for a suitable time slot.

Tasks duration may be specified in hours, days, weeks, or months. For example, a task may be 3 hours long or 5 days long in duration. Schedule time ranges may be specified by dates (days or months) or keywords like morning, afternoon, evening and night.

Some points to note:

- i. If there is no time slot available within the specified time range, the task will not be scheduled.
- ii. If the task duration is not specified, the default task duration specified in `Settings`  `> FlexiCommands > Schedule`.
- iii. If no time range is specified, the task will be scheduled at your earliest fitting free time slot.

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Scheduling an event task	Enter " <code>schedule [task name] {task duration} {time range}</code> " eg. <code>schedule dental appointment 1 hour Friday afternoon</code> eg. <code>schedule dental appointment Friday afternoon</code> eg. <code>schedule dental appointment</code> eg. <code>schedule chalet 3 days, june</code>
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*Note: Optional keywords are in curly braces. See [Appendix](#) for a full list of keywords and defaults.*

### 3.2.5. Undoing a Command

In order to undo a mistyped command, simply enter `undo` to revert to the state before the last undoable entered command.

Note that commands such as `search` and `sort` cannot be undone.

```
eg, (User)    display
      (ToDo++) 1. milk Steven for more info
                2. buy more milk
                3. buy car coupon
                4. visit supermarket to enter lucky draw ticket
      (User)    delete 4
      (ToDo++) 1. milk Steven for more info
                2. buy more milk
                3. buy car coupon
      (User)    sort name
      (ToDo++) 1. buy car coupon
                2. buy more milk
                3. milk Steven for more info
      (User)    undo
      (ToDo++) 1. buy car coupon
                2. buy more milk
```

*[late undoable command was `delete`]*

3. milk Steven for more info
4. visit supermarket to enter lucky draw ticket


### 3.2.6. Redoing a Command

In order to redo an undone command, simply enter redo to revert to the state before the last undone.

### 3.2.7. Exiting ToDo++

To exit ToDo++, you can simply click on the cross in the top right hand corner or enter exit. Alternatively, you can also use the *CTRL+Q* keyboard shortcut to exit the program.

### 3.2.8. Minimizing to TaskBar



Simply click on  to minimize ToDo++ to the system tray. Alternatively, you can also use the *ALT+Q* keyboard shortcut. You will still be able to see the ToDo++ icon in the taskbar notification area while it runs in the background.


To restore the ToDo++ window, simply double-click on the icon or use the same minimizing *ALT+Q* keyboard shortcut.



*Icon minimized to notification area*

### 3.2.9. Autorun & Other Settings

You can get ToDo++ to run automatically on Windows startup by simply checking the Settings  > Load on Startup option. Additionally, you can also check Settings  > Start Minimized if you wish for ToDo++ to start running in the minimized state.

If you wish for ToDo++ to always be placed floating on top of all your other programs, simply check Settings  > Stay On Top.

### 3.2.10. Hotkeys

A list of default hotkeys such as *ALT-Q* to toggle between the minimized and restored states can be found in the Appendix.

# Appendix

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Note: Optional keywords are in {curly braces}. Inputs in [square brackets] must be valid in order for the keywords to work.

## COMMAND KEYWORDS

<b>ADD:</b> add	<b>UNDONE:</b> undone
<b>SEARCH/VIEW:</b> display, search	<b>POSTPONE:</b> postpone
<b>MODIFY:</b> modify	<b>SCHEDULE:</b> schedule
<b>DELETE:</b> delete	<b>UNDO:</b> undo
<b>SORT:</b> sort	<b>REDO:</b> redo
<b>DONE:</b> done	<b>EXIT:</b> exit

## GENERAL COMMAND KEYWORDS

**DATE SEPARATOR:** hyphen (-), period (.), forward slash (/)

**DAY:** mon, monday, tues, tuesday, wed, wednesday, thurs, thursday, fri, friday, sat, saturday, sun, sunday, today, tomorrow

**MONTH:** jan, feb, mar, apr, may, jun, jul, aug, sep, sept, oct, nov, dec, january, february, march, april, may, june, july, august, september, october, november, december

**DATE:** {1-31}[DATE SEPARATOR]{1-12}[DATE SEPARATOR]{valid year}

**DATE:** {1-31}{st/nd/rd/th}{MONTH}{valid year}

*\* accepted partial dates must be a combination of suffixed day, day and month or month and year (see below for more information)*

**TIME:** [1-12] am/pm

*\* spaces are optional*

**TIME:** midnight, noon

**TIME RANGES:** morning, afternoon, evening, night

**CONDITIONAL ADJECTIVES:** [next/following] [DAY/MONTH]

## QUASI-GENERAL COMMAND KEYWORDS

**INDEX:** all integer numbers are reserved if and only if it is used with a relevant command that may require an index

*\* such as modify, delete, postpone, done and undone*

**ALL:** the all keyword is reserved if and only if it is used with a relevant command

*\* such as modify, delete, postpone, done and undone*

**DURATION:** hr, hrs, wk, wks, hours, hours, day, days, week, weeks

duration keywords are reserved if and only if used with relevant commands

*\* such as postpone and schedule ; must be used with a preceding integer*

## SPECIFICALLY ADD COMMAND KEYWORDS

**TIME:** [0000-2359] hrs/hours

*\* spaces are optional*

**EVENT SEPARATOR:** hyphen (-), to



### **SIGNIFY EVENT (TIMED) TASK:**

{from} [DATE/DAY/TIME] {EVENT SEPARATOR} {DATE/DAY/TIME}

*\* omission of time/month keyword for start time is valid as long as it is present in the end time (e.g. 2-4pm)*

**SIGNIFY DEADLINE TASK:** by [DATE/DAY/TIME]

### **SPECIFICALLY SCHEDULE COMMAND KEYWORDS**

**DURATION:** mth, mths, month, months

these duration keywords are reserved if and only if used with the schedule command

*\* must be used with a preceding integer*

### **ADD COMMAND DEFAULT BEHAVIOR**

- A task must be given a valid name that consists of at least non-space character.
- Not specifying any fields in date or time will cause the software to assume the most upcoming date which fits the entered fields. For example, "add event 2nd" will set the event to be on 2nd October if today's date is 3rd September but 2nd September if today's date is 1st September.
- The valid partial date inputs include inputs consisting of only the
  - (1) day with suffixes i.e. 15th
  - (2) day and month i.e. 15/10
  - (3) month and year i.e. 10/2012 (requires full year input of YYYY)
- Not specifying the **by** keyword will create an event (timed) task instead of a deadline task even if only one date/time is specified. The date/time specified will be the event's start time.
- Omission of both time and month keyword when creating an event task will cause ToDo++ to assume that the numbers refer to month by default.

### **SEARCH/DISPLAY COMMAND DEFAULT BEHAVIOR**


- All possible results will be displayed when keywords are omitted. For more specific results, try to enter a more specific search string.
- When searching by date or day, as long as the specified search date or day falls within the time window of an event task, the event task will also be displayed as a search result.

### **MODIFY COMMAND DEFAULT BEHAVIOR**


- When the modify operation is called with an input that includes a date/day/time, it will be automatically considered to be a request for modification of the start/end times/deadline of the relevant task. If there is only one task found to match the input, its start/end times/deadline will thus be automatically modified. Otherwise, the modify operation functions like a search/view operation and returns a list of matching hits.
- In order to modify a task name, the task must be called by its index. Otherwise, the request will not be recognized.

### **POSTPONE COMMAND DEFAULT BEHAVIOR**

- In order to postpone a deadline or timed event task by a specific duration type, the task must be accordingly time-specific.

- If a duration is not specified, the task will be automatically postponed by the default postpone duration specified in Settings  > FlexiCommands > Postpone.

## SCHEDULE COMMAND DEFAULT BEHAVIOR

- If there is no time slot available within the specified time range, the task will not be scheduled.
- If the task duration is not specified, the default task duration specified in Settings  > FlexiCommands > Schedule.
- The task duration must be specified in full i.e. with a specified amount and valid duration type.
- If no time range is specified, the task will be scheduled at your earliest fitting free time slot.
- A scheduled task will only begin at the start of every hour.
- If a time is specified in conjunction with a time range keyword such as morning and afternoon, it will be taken to be the end time and will override the time range's end time. Therefore, by default, "schedule task tomorrow morning 1pm" will attempt to schedule the task some time tomorrow from 5am to 1pm.
- If both the start time and end time are specified in conjunction with a time range keyword such as morning and afternoon, the specified times will override the time range's start time and end time. Therefore, by default, "schedule task tomorrow morning 4am to 1pm" will attempt to schedule the task some time tomorrow from 4am to 1pm.

## UNDO COMMAND DEFAULT BEHAVIOR

- The last undoable command will be undone. This means that previously entered commands that did not result in any changes as well as search and sort commands will simply be disregarded.

## HOTKEYS AND KEYBOARD SHORTCUTS

<b>CTRL+A</b>	select all text in input box
<b>CTRL+Q</b>	exit ToDo++
<b>ALT+C</b>	toggle between feedback panel and console panel
<b>ALT+H</b>	toggle between main window and help panel
<b>ALT+S</b>	toggle between main window and settings panel
<b>ALT+SPACE</b>	return cursor to input box
<b>ALT+UP/DOWN</b>	toggle between expanded and collapsed state
<b>ALT + BACKSPACE</b>	delete previous word or current word till selection position
<b>CTRL/ALT+LEFT</b>	move to start of current word in input field
<b>CTRL/ALT+RIGHT</b>	move to start of next word in input field
<b>UP/DOWN</b>	retrieve previous/next input

# ToDo++

## Developer Guide

For v0.5 software



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# Section 1: An Overview

---

## 1.1. Where We Are Now

### 1.1.1. Basic Features

The basic features of ToDo++ include support for 3 types of tasks, as follows:

- Event tasks** : items that have a start time (and possibly an end time).
- Deadline tasks** : items that have to be done before a specific time.
- Floating tasks** : items that have no timings attached to them.

They include the following:

1. Add, Display/Search, Modify, Delete (CRUD)
2. Undo
3. Redo
4. Schedule
5. Postpone
6. Mark (as done/undone)
7. Sort

### 1.1.2. Extra Feature

The focus good-to-have feature is FlexiCommand. This means to say that the user is allowed high flexibility in his command format; highly ordered/structured input is not required. A simple GUI has also been implemented such that keyboard shortcuts/hotkeys and user customization of command keywords are also available.

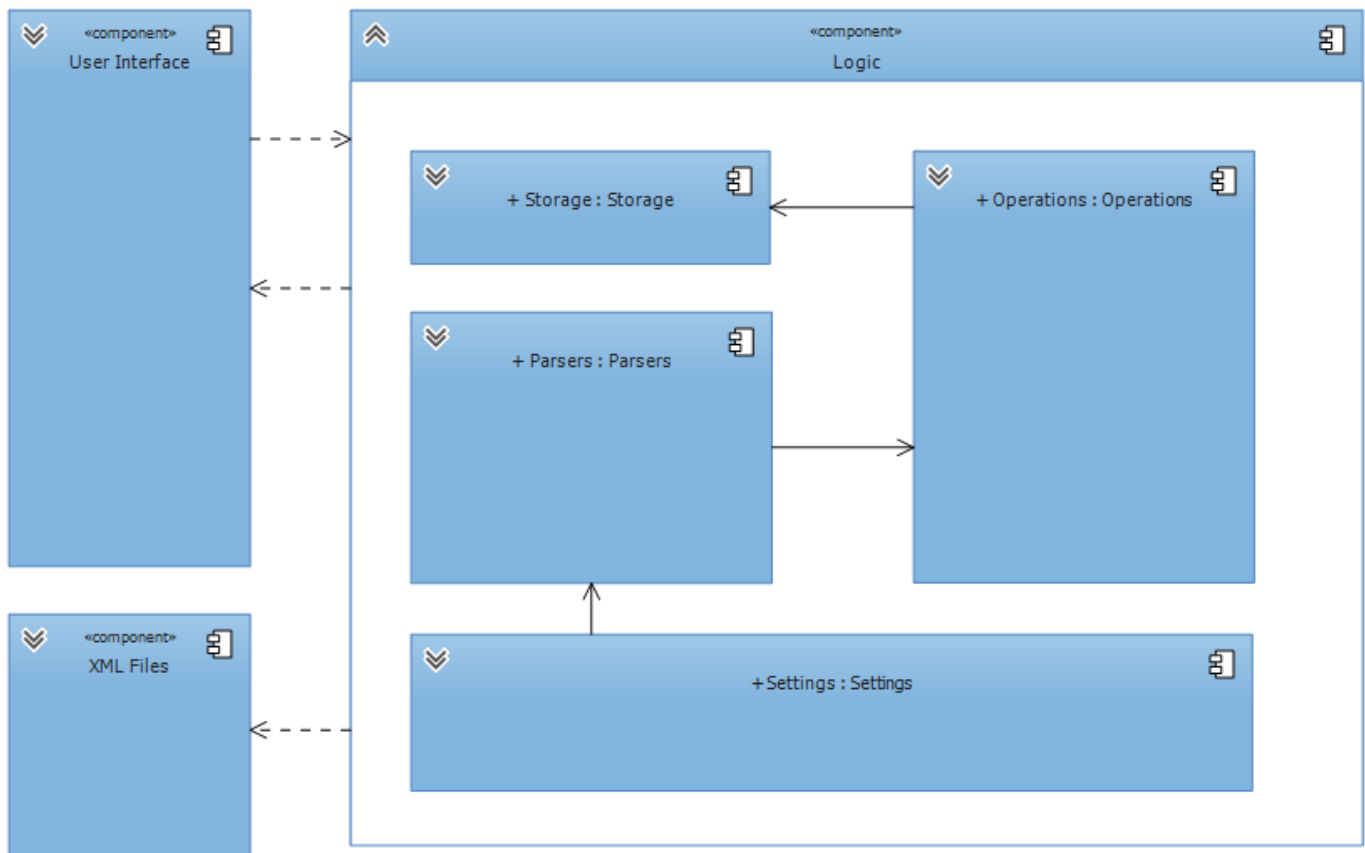
## Section 2: Architecture & Implementation

### 2.1 Architecture

This section will provide you with a top-down model of ToDo++.

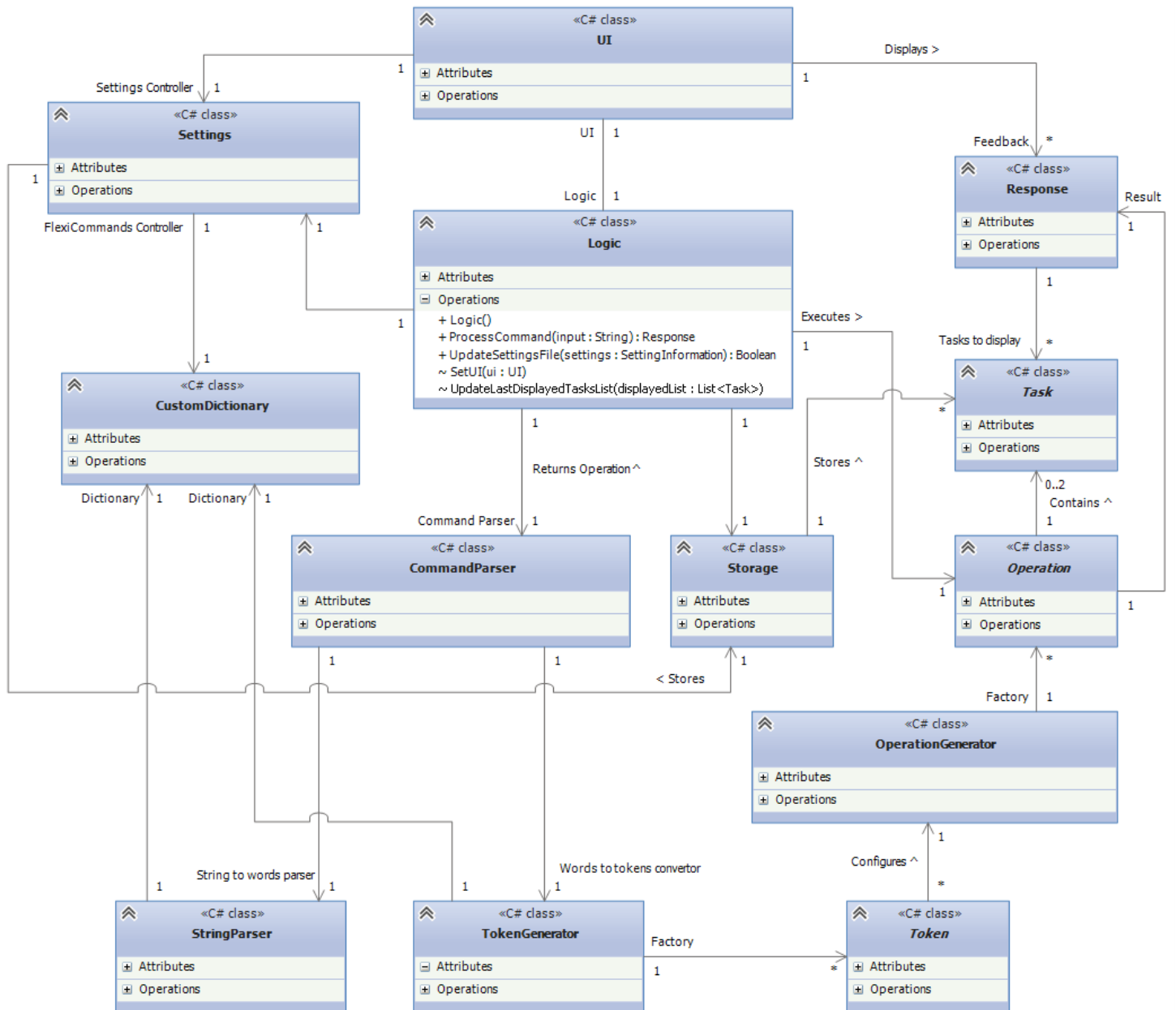
#### 2.1.1. Architecture Diagram

The following describes the general architectural overview of our software.



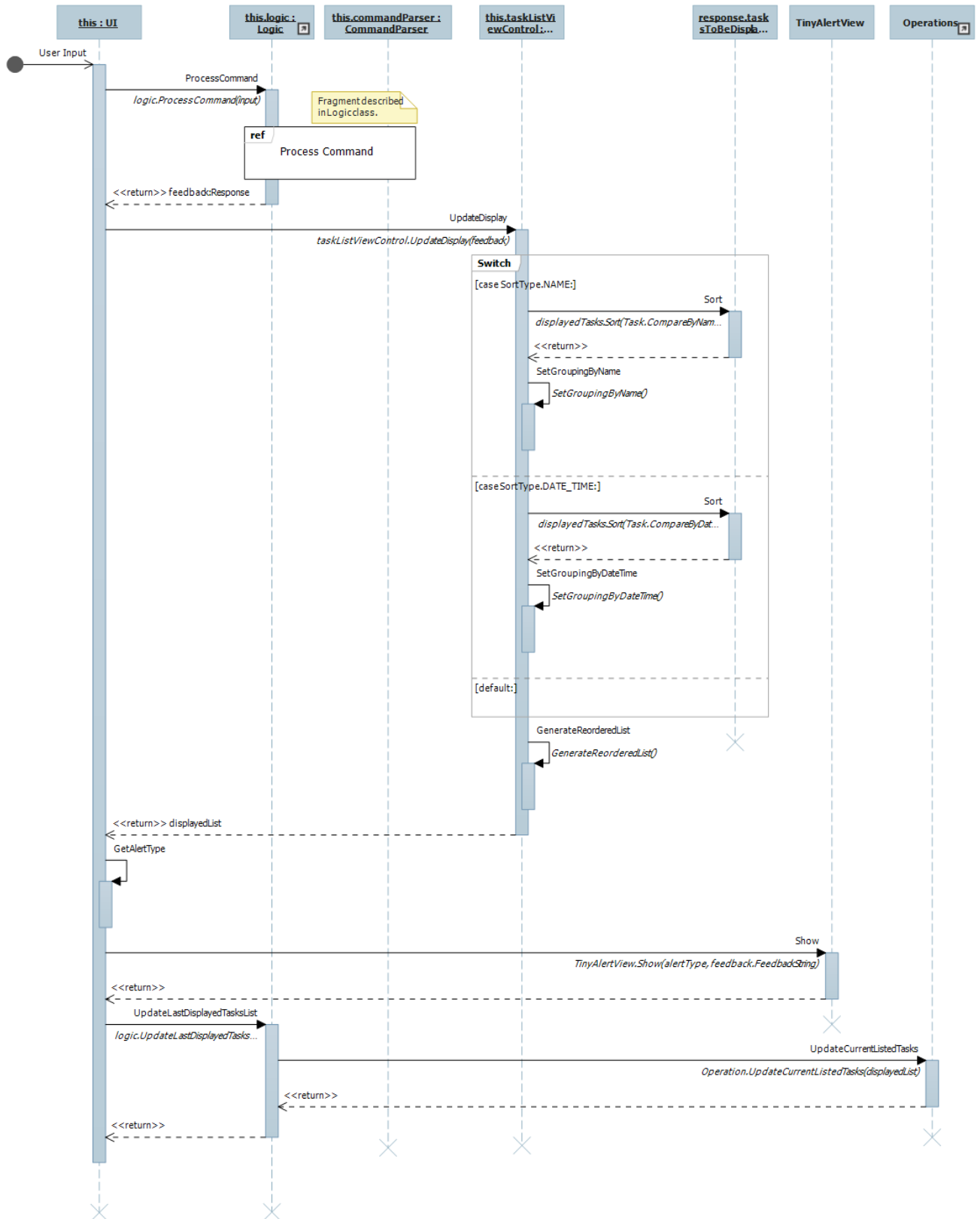
## 2.1.2. Class Diagram

The following class diagram captures the basic relationships between all the important classes of the software.



## 2.1.3. User Sequence Diagram

The following is the sequence diagram describing the steps involved when a user inputs a command into the GUI's input box.



## 2.2. General Class Descriptions

Program Class	
Class	Description
Program (static)	The main entry point for the application

Logger Class	
Class	Description
Logger	Static class which allows logging to be done

Response Class	
Class	Description
Response	Container which stores all necessary details for a UI to feedback the command results to the user.

User Interface Classes	
Class	Description
UI	Takes in all user input Displays returned feedback
PreferencesPanel	The class controlling the settings panel
FlexiCommandsControl	The class controlling the FlexiCommands input
FontAlertBox	The class controlling the font
AlertBox	The class controlling the static alert box
TinyAlert	The class controlling the display for the feedback string

Settings Classes	
Class	Description
SettingsInformation	Contains a list of settings
Settings	Takes in and implements the settings

Logic Class	
Class	Description
Logic	Takes in and processes user input Executes the command Returns feedback

Parser Classes (Parsers)	
Class	Description
CommandParser	Takes in and parses command string Returns an Operation object
CustomDictionary	The dictionary which all keywords are referred from
OperationGenerator	Factory class which creates Operations
StringParser	Parses the command string into a list of words



TokenGenerator	Uses a list of words and to create Tokens
----------------	---

**Token Classes (Tokens)**

Class	Description
Token (abstract)	An abstract class from which all the other Token classes inherit from
TokenCommand : Token	Stores the details pertaining to the command information of a task
TokenContext : Token	Stores the details pertaining to the context information of a task
TokenDate : Token	Stores the details pertaining to the date information of a task
TokenDay : Token	Stores the details pertaining to the day information of a task
TokenIndexRange : Token	Stores the details pertaining to the index(es) information of a task
TokenLiteral : Token	Stores the details pertaining to the literal information of a task
TokenSortType : Token	Stores the details pertaining to the sort type information of a task
TokenTime : Token	Stores the details pertaining to the time information of a task
TokenTimeRange : Token	Stores the details pertaining to the time range information of a task (specified by duration keywords)

**Task Classes (Tasks)**

Class	Description
Specificity	Stores the date and time specificity of a task
Task (abstract)	An abstract class from which all the other Task classes inherit from
TaskFloating : Task	Stores the task details of a floating task
TaskDeadline : Task	Stores the task details of a deadline task
TaskEvent : Task	Stores the task details of an event (timed) task

**Operation Classes (Operations)**

Class	Description
Operation (abstract)	An abstract class from which all the other Operation classes inherit from
OperationAdd : Operation	Stores the operation details for an add operation
OperationDelete : Operation	Stores the operation details for a delete operation
OperationDisplayDefault: Operation	Stores the operation details for the default display operation
OperationMarkAsDone : Operation	Stores the operation details for a mark as done operation
OperationMarkAsUndone : Operation	Stores the operation details for a mark as undone operation
OperationModify : Operation	Stores the operation details for a modify operation
OperationPostpone : Operation	Stores the operation details for a postpone operation
OperationRedo : Operation	Stores the operation details for a redo operation
OperationSchedule : Operation	Stores the operation details for a schedule operation
OperationSearch : Operation	Stores the operation details for a search operation

OperationSort : Operation	Stores the operation details for a sort operation
OperationUndo : Operation	Stores the operation details for an undo operation

Storage Class	
Class	Description
Storage	Handles the storage of tasks information Takes in a Task object and writes it to an XML file

## Section 3: Application Programming Interface (API)

### 3.1. UI Classes

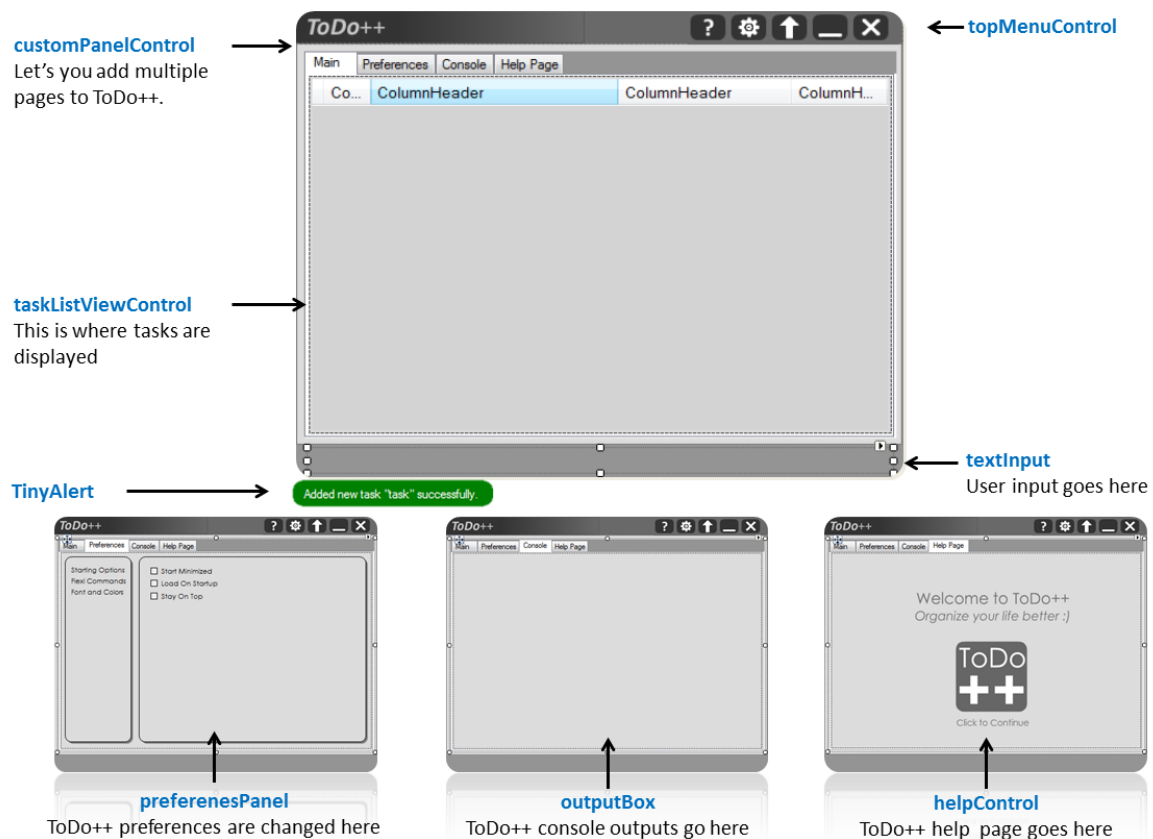
#### 3.1.1. UI

##### Summary

The class that contains all user interface components and interacts directly with Logic and Settings, displaying the relevant output to the user

##### Detailed Description

UI contains the following components. They have been labeled in the images below



##### Adding or Displaying Pages (#PanelSwitching)

UI employs a developer friendly component called `CustomPanelControl` that allows you to add multiple pages/panels. These panels can be switched easily by modifying the `SelectedIndex` property. Implementation can be seen in the `#region PanelSwitching`

##### Adding Keyboard Shortcuts (#Hotkeys)

UI contains a function `ProcessCmdKey` that lets developers add new hotkeys as long as you are within the scope of `ToDo++`. This function can be found in `#Hotkeys`. Adding global hotkeys that are accessible outside `ToDo++` however is a Win32 Function that can be found in the section below

## Internal Design Functions (#InternalDesignFunctions)

This region contains code for animations such as collapsing and expanding of form (#CollapseExpand), Fading in and Out (#FormFadeInOut), Minimizing to the TaskBar (#SystemTray), and other Win32 based functions such as loading on startup, shadows and rounded edges.

### Constructor

UI(Logic logic);	Starts by initializing all designer components, including Logic and MainSettings. References of these are then passed into some components such as <a href="#">preferencesControl</a>
------------------	---

### Important API (Public Method)

Method	Description
ToggleHelpToDoPanel()	Toggles between Help and TaskListView Panel
ToggleToDoPreferencesPanel()	Toggles between Preferences and TaskListView Panel
ToggleConsolePanel()	Toggle between TaskListView and Console Panels

### Important API (Private Methods)

Method	Description
InitializeSettings()	Checks if ToDo++ should be minimized to tray when started and ensures that ToDo++ should load on startup depending on user settings
RegisterInStartup(bool isChecked)	Adds a registry entry to ensure that ToDo++ opens when started up
MinimiseMaximiseTray()	Toggles between minimizing and maximizing ToDo++ from the system tray
ProcessText()	Takes in the user input and processes it via logic, displaying the task list in <a href="#">taskListViewControl</a>

### 3.1.2. PreferencesPanel

#### Summary

Manages all Preferences Controls

#### Detailed Description

PreferencesPanel uses a `CustomPanelControl` to switch between components. This means you can add as many preference controls as long as space permits. The controls found here directly modify `MainSettings`, and the settings are saved immediately.

#### Constructor

<code>PreferencesPanel()</code>	Loads preference names and all preference controls and components
---------------------------------	---

#### Important API (Public Method)

Method	Description
<code>InitializeWithSettings(Settings settings)</code>	Loads <code>MainSettings</code> into this class. The controls <b>cannot</b> function without a reference to this

#### Important API (Private Methods)

Method	Description
<code>LoadPreferencesTree()</code>	You can set the preference titles here for your controls and modify the event handler for selecting preferences

In this developer manual, we will only be looking at the `FlexiCommandControl` component, as that is likely the component you will be interacting with as a developer.

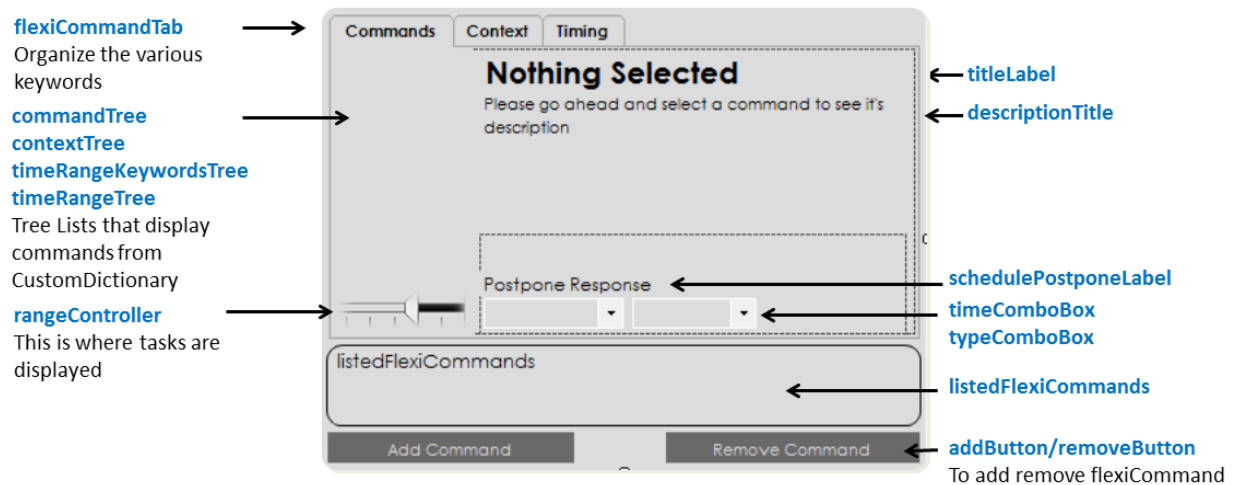
### 3.1.3. FlexiCommandsControl

#### Summary

This is where the user can modify the commands and keywords

#### Detailed Description

FlexiCommandsControl is a user interface wrapper that calls and modifies the flexicommand properties of MainSettings.



#### Constructor

PreferencesPanel()	Loads all keywords from CustomDictionary and displays them
--------------------	--

#### Important API (Public Method)

Method	Description
InitializeFlexiCommands(Settings settings)	Loads MainSettings into this class. This control <b>cannot</b> function without a reference to this

#### Important API (Private Methods)

Method	Description
CommandType ConvertStringToCommand(string command)	Automatically converts a string into a CommandType
ContextType ConvertStringToContext(string context)	Automatically converts a string into a ContextType
TimeRangeKeywordsType ConvertStringToTimeRangeKeyword(string rangeKeyword)	Automatically converts a string into a TimeRangeKeywordType
TimeRangeType ConvertStringToTimeRange(string timeRange)	Automatically converts a string into a TimeRangeType
LoadCommandList()	Automatically load all CommandType from CustomDictionary

LoadContextList()	Automatically load all ContextType from CustomDictionary
LoadTimeKeywordRangeList()	Automatically load all TimeRangeKeywordsType from CustomDictionary
LoadTimeRangeList()	Automatically load all TimeRangeType from CustomDictionary
ClearSelectedCommands()	Clears commands from listedFlexiCommands
ShowUserInputBox()	Shows the UserInputBox for user to add a new flexi command
UpdateFlexiCommandList()	Updated listedFlexiCommands with all the latest flexiCommands from the selected item
UpdateTimeRangeUI()	Updates the rangeController with the modified time ranges
AddFlexiCommandToSettings(string flexiCommand)	Adds a flexiCommand by calling the function in settings
RemoveFlexiCommandToSettings(string flexiCommand)	Removes the selected flexiCommand by calling the function in settings
UpdateDescription()	Updates the description of the selected flexiCommand to descriptionLabel and descriptionTitle
UpdateTimeRangeDescription()	Updates the description of time ranges
UpdateSchedulePostponeLabel()	Updates description of schedule and postpone default time ranges
UpdateTabDescription()	Updates description of the selected tabs in flexiCommandTab

### 3.1.4. Custom Message Boxes

Custom Message Boxes contain custom built pop-ups you can call to get display alerts, change fonts, or get user input. They are designed to fit the style of ToDo++, and are static classes that can be called at any place.

#### FontDialogBox

##### Summary

Get and Set Font Size, Color and name.



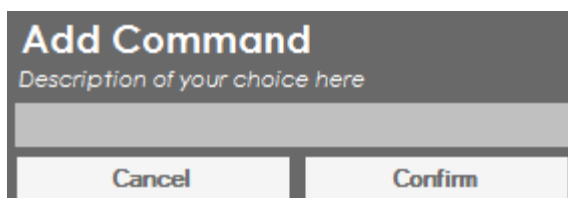
##### Static Methods

Method	Description
InitializeOptions(string font, int size, Color color)	Set the initial options so the preview label is displayed with these settings
int GetSize()	Gets size selected by user
string GetFont()	Gets Font selected by user
Color GetColor()	Gets Color Selected by user
bool ConfirmHit()	Checks if the Okay Button was Hit or Not
Show(bool font, bool size, bool color)	Displays the Font Dialog Box with whichever controls that need to be enabled or disabled
OnTop(bool val)	Set this to be on top of other forms

#### UserInputDialog

##### Summary

A input box to get and set user input



##### Static Methods

Method	Description
Show(string title, string subtitle)	Shows the UserInputDialog with the title and subtitle set

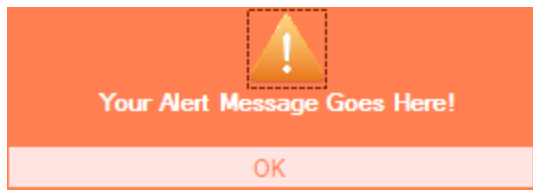


subTitle)	
bool ValidData()	Check if Confirm was hit or not
string GetInput()	Gets the user input
OnTop(bool val)	Set this to be on top of other forms

## AlertBox

### Summary

Shows an alert message. Alternative for MessageBox.



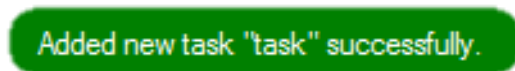
### Static Methods

Method	Description
Show(string alertText)	Shows the alert with stated text
OnTop(bool val)	Set this to be on top of other forms

## TinyAlert

### Summary

TinyAlert is where the response from Logic is displayed. It normally flashes green when successful, orange when a warning is issued and red if a command has failed



### Static Methods

Method	Description
SetUI(UI uiPass)	Pass an instance of UI in so TinyAlertView knows its position
Show(StateTinyAlert state, string response)	Flashes TinyAlert for the pre-set number of seconds with the state and response
SetLocation()	Sets the location of TinyAlert
SetTiming(int time)	Sets how long TinyAlert should stay until it fades away
DismissEarly()	Dismisses TinyAlert before it's preset timing

## 3.2. Settings Classes

### 3.2.1. SettingsInformation

#### Summary

This is the class that stores all settings information, and is what is actually written to file

#### Default Values

Default values for the various settings are modifiable here. If no settings file exists, or one is loading ToDo++ for the first time, these values will be loaded.

#### Adding new settings

To add new settings, you have to create a default value for your setting, add your setting to the `MiscSettings` struct and modify its constructor to load the default value, and finally, create a Property for it. The settings file will automatically accommodate all new settings without any issue.

#### Constructor

SettingInformation()	Initializes default settings. These settings can later be modified
----------------------	--

#### Settings

Variable	Description
MiscSettings misc;	Contains all Miscellaneous settings you may wish to add
Dictionary<string, CommandType> userCommandKeywords;	Contains user flexi commands for CommandType Keywords
Dictionary<string, ContextType> userContextKeywords;	Contains user flexi commands for ContextType Keywords
Dictionary<string, TimeRangeKeywordsType> userTimeRangeKeywordsType;	Contains user flexi commands for TimeRangeKeywordsType Keywords
Dictionary<string, TimeRangeType> userTimeRangeType;	Contains user flexi commands for TimeRangeType Keywords
Dictionary<TimeRangeKeywordsType, int> userTimeRangeKeywordsStartTime;	Contains the start time for TimeRangeKeywords
Dictionary<TimeRangeKeywordsType, int> userTimeRangeKeywordsEndTime;	Contains the end time for TimeRangeKeywords

#### Important API (Public Methods)

Method	Description
bool ContainsFlexiCommandKeyword(string userKeyword, Enum flexiCommandType)	Checks if such a flexi command already exists in the relevant type that is passed in

### 3.2.2. Settings

#### Summary

Contains an instance of `SettingsInformation`, and acts a wrapper, modifying the values safely

#### Adding Settings Methods

You can add new getters and setters for your settings added to `SettingsInformation`

#### Constructor

<code>Settings()</code>	Calls <code>InitializeSettings</code> which loads <code>settingInfo</code> with all default values
-------------------------	--

#### Important API (Private Method)

Method	Description
<code>InitializeSettings()</code>	Initializes <code>settingInfo</code> of type <code>SettingsInformation</code> with default values. You can load a new instance of <code>SettingsInformation</code> by calling the method <code>UpdateSettings()</code>
<code>UpdateDictionaryPostponeSchedule()</code>	Modifies <code>CustomDictionary</code> by setting the schedule and postpone length and type

#### Important API (Public Methods)

Method	Description
<code>UpdateSettings(SettingsInformation updatedInfo)</code>	Completely wipes and re-updates Settings Data with the instance of <code>SettingsInformation</code> passed in
<b>Other Settings</b>	
<code>bool GetFirstLoadStatus()</code>	Gets whether this is the first time loading <code>ToDo++</code> . Once gotten, it is set to false
<code>SetTextSize(int size)</code>	Set default text size of Task View
<code>int GetTextSize()</code>	Get the text size of Task View
<code>SetLoadOnStartupStatus(bool status)</code>	Sets the load on startup status
<code>bool GetLoadOnStartupStatus()</code>	Get the load on startup status
<code>SetStartMinimized(bool status)</code>	Set start minimized status
<code>bool GetStartMinimizeStatus()</code>	Get the start minimized status
<code>SetStayOnTop(bool status)</code>	Set stay on top status
<code>bool GetStayOnTopStatus()</code>	Get stay on top status
<code>SetFontSelection(string font)</code>	Set Task View font
<code>string GetFontSelection()</code>	Gets Task View font
<b>Task Color Settings</b>	
<code>SetTaskDoneColor(Color col)</code>	Set task done color
<code>Color GetTaskDoneColor()</code>	Get task done color

SetTaskMissedDeadlineColor(Color col)	Set task missed deadline color
Color GetTaskMissedDeadlineColor()	Get task missed deadline color
SetTaskNearingDeadlineColor(Color col)	Set task nearing deadline color
Color GetTaskNearingDeadlineColor()	Get task nearing deadline color
SetTaskOverColor(Color col)	Set task over color
Color GetTaskOverColor()	Get task over color
<b>Time Range</b>	
SetDefaultScheduleTimeLength(int length)	Set default time length for Command SCHEDULE
int GetDefaultScheduleTimeLength()	Get default time length for Command SCHEDULE
SetDefaultPostponeDurationLength(int length)	Set default duration length for Command POSTPONE
int GetDefaultPostponeDurationLength()	Get default duration length for Command POSTPONE
SetDefaultScheduleTimeLengthType(TimeRangeType timeRange)	Set default time length type (HOUR, DAY etc.) for Command SCHEDULE
TimeRangeType GetDefaultScheduleTimeLengthType()	Get default time length type (HOUR, DAY etc.) for Command SCHEDULE
SetDefaultPostponeDurationType(TimeRangeType timeRange)	Set default duration type (HOUR, DAY etc.) for Command POSTPONE
TimeRangeType GetDefaultPostponeDurationType()	Get default duration type (HOUR, DAY etc.) for Command POSTPONE

### 3.3. Logic & Parser Classes

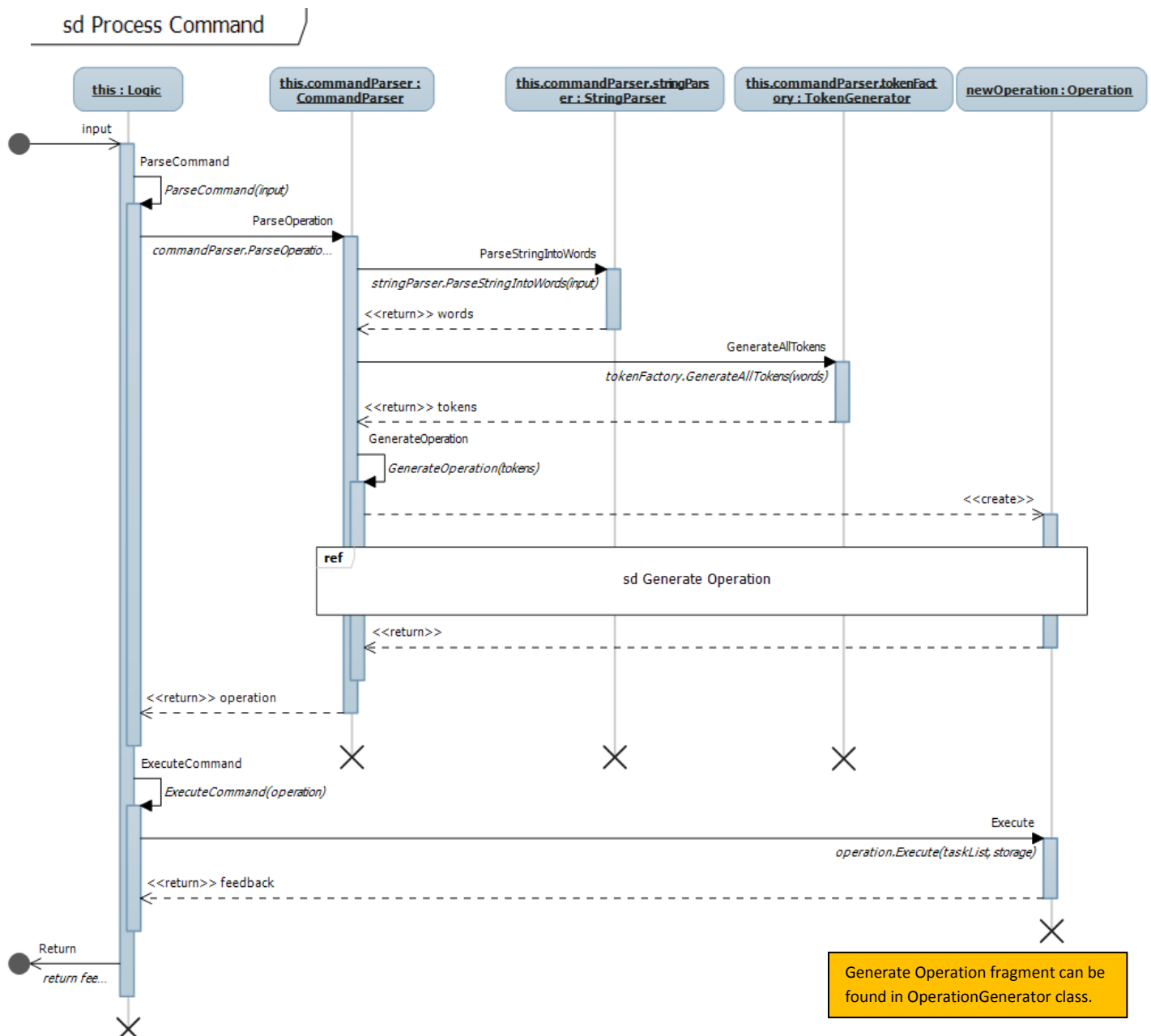
#### 3.3.1. Logic Class

##### Summary

The main logic layer of this program. It is used to process and execute the user input from the UI as well as to update necessary settings. It also acts as a facade to control calls between classes.

##### Sequence Diagram

The following is a sequence diagram describing how Logic will operate when a command string is passed in from the UI.



## Detailed Description

Provides the methods: processing and executing the commands.  
Provides the event handler for the UpdateSettings event.

Getter and setter methods: MainSettings

Public method                      ProcessCommand

Internal methods                  SetUI, GetDefaultView

Private methods                  ParseCommand, ExecuteCommand,  
UpdateLastDisplayedTasksListPromptUser\_CreateNewTaskFile,  
UpdateSettings, UpdateSettingsFile

## Test History

Testing for this class was done during integration testing, after v0.4.0. The tests can be found in the *Integration Tests* project under the *LogicTest* class. The tests were primarily to ensure that all the components worked correctly together and the appropriate feedback was received.

## Important Attributes

Variable
Settings MainSettings

## Constructor

Logic();
----------

## Important API (Public Methods)

Method	Description
Response ProcessCommand (string input);	Processes an input string command and returns the processed Response which contains the result of the operation which can be displayed to the user.  Returns a Response object containing the list of tasks to be displayed and the result of the operation.

## Important API (Internal Methods)

Method	Description
void SetUI (UI ui);	Sets up a UI with logic for two-way communication.
Response GetDefaultView();	Executes the DisplayDefault operation so that the Response object given by the operation can be returned.  Returns the default view.

## Important API (Private Methods)

Method	Description
Operation ParseCommand (String input);	Uses a CommandParser to parse the input string and returns the corresponding Operation.
Response	Executes the input operation and returns the Response returned

ExecuteCommand      from the execution as feedback. (Operation operation);
---

### 3.3.2. CommandParser

#### Summary

This class parses string commands into **Operations**, which describes the derived meaning of the user inputted string command. Parses the input command string into tokens and then generates an **Operation** object containing the relevant task object based on these tokens.

#### Detailed Description

Parses the input command string into tokens and then generates an **Operation** object containing the relevant task object based on these tokens.

Public method	ParseOperation
Private method	GenerateOperation

#### Test History

Black box testing has been employed in setting up test methods to test and validate ParseOperation method. The various following situations/cases have been tested: addition of valid deadline task, addition of invalid task, addition of valid timed event task with only one single specified start time, addition of valid timed event task with both start and end times specified. While certain test have been deprecated as the product evolved, the final tests for this class are contained in *CommandParserTest* with 4 test cases.

#### Constructor

CommandParser();
------------------

#### Important API (Public Method)

Method	Description
<b>Operation</b> ParseCommand (string input);	Parses a input string and returns the Operation that can be executed. Returns an operation object representing the input command.

#### Important API (Private Methods)

Method	Description
<b>Operation</b> GenerateOperation (List<Tokens> tokens);	This method uses the given list of tokens to generate a corresponding Operation. Returns the generated operation object.



### 3.3.3. StringParser

#### Summary

This class processes an input string and uses a `CustomDictionary` to parse them into meaningful substrings.

#### Detailed Description

String parsing is done by first either taking whitespaces or delimiting characters to defined substrings. Relevant substrings with the same meaning for eg. "2" "pm" are then merged as a single substring. A `CustomDictionary` is to derive if substrings correspond to a keyword or meaning. The substrings are returned as a list of string, each string containing a meaningful word which can be converted into `Tokens` by a `TokenGenerator`.

Public method	<code>ParseStringIntoWords</code> , <code>MarkWordsAsAbsolute</code> , <code>UnmarkWordsAsAbsolute</code>
Private methods	<code>SplitStringIntoSubstrings</code> , <code>MergeNumericalRangeWords</code> , <code>AdjacentCharsAreNumerical</code> , <code>MergeTimeRangeWords</code> , <code>MergeDateAndTimeWords</code> , <code>MergeTimeWords</code> , <code>MergeWord_IfValidTime</code> , <code>MergeDateWords</code> , <code>MergeWord_IfValidAlphabeticDate</code> , <code>FindPositionOfDelimiters</code> , <code>RemoveBadIndexes</code>

#### Test History

Unit testing has been employed in setting up test methods to test and validate all date and time parsing methods (`MergeDateWords`, `MergeWord_IfValidAlphabeticDate`, `GenerateDateTokens` etc.), including the testing of all the date and time regexes.

Invalid date inputs such as 33 Feb are currently ignored; they do not flag or call exceptions to notify the user of the erroneous date input.

`StringParserTest` class contains 8 unit tests for this class.

#### Important Attributes

Const Variable	Description
<code>int START_INDEX</code>	0
<code>int END_INDEX</code>	1
<code>char[] delimitingCharacters</code>	Specifies all delimiting characters ([, ], (, ), {, }, ', ")

#### Important API (Public Method)

Method	Description
<code>List&lt;string&gt;</code> <code>ParseStringIntoWords</code> (string input);	This method parses a string of words into a list of substrings determined by their meaning, by spacing, or by delimiting characters. Returns the list of tokens.
<code>string</code> <code>MarkWordsAsAbsolute</code> (string absoluteSubstr);	This method marks each and every word within the input string (as absolute) with a pair of inverted commas at the start and end of the word.

	Returns the marked string of words.
<code>string</code> <code>UnwarkWordsAsAbsolute</code> <code>(string absoluteSubstr);</code>	<p>This method unmarks each and every word within the input string. The words were originally marked by a pair of inverted commas.</p> <p>Returns the unmarked string of words.</p>

### 3.3.4. OperationGenerator

#### Summary

This class is a factory class for creating **Operations**. It must be first configured by **Tokens** representing the requested operation in order to be able to produce a meaningful result.

#### Detailed Description

The **OperationGenerator** can be configured by passing it into a **Token's** **ConfigureGenerator** method. By setting the relevant properties of the generator to fit the keywords or meanings they represent, the **OperationGenerator** can generate an appropriate **Operation** representing the user's desired operation. The tokens must configure the generator in the same order as their string representation's position within the input command. Once all tokens representing a single command have configured the generator, the **FinalizeGenerator** method must be called before the **CreateOperation** method which generates an operation based on the configured settings.

The following sequence diagram on the following page describes how an operation is generated.

Getter and setter methods: **commandType**, **taskName**, **taskRangeIndex**, **isSpecific**, **timeRangeType**, **timeRangeOne**, **timeRangeTwo**, **timeRangeIndex**, **currentSpecifier**, **currentMode**

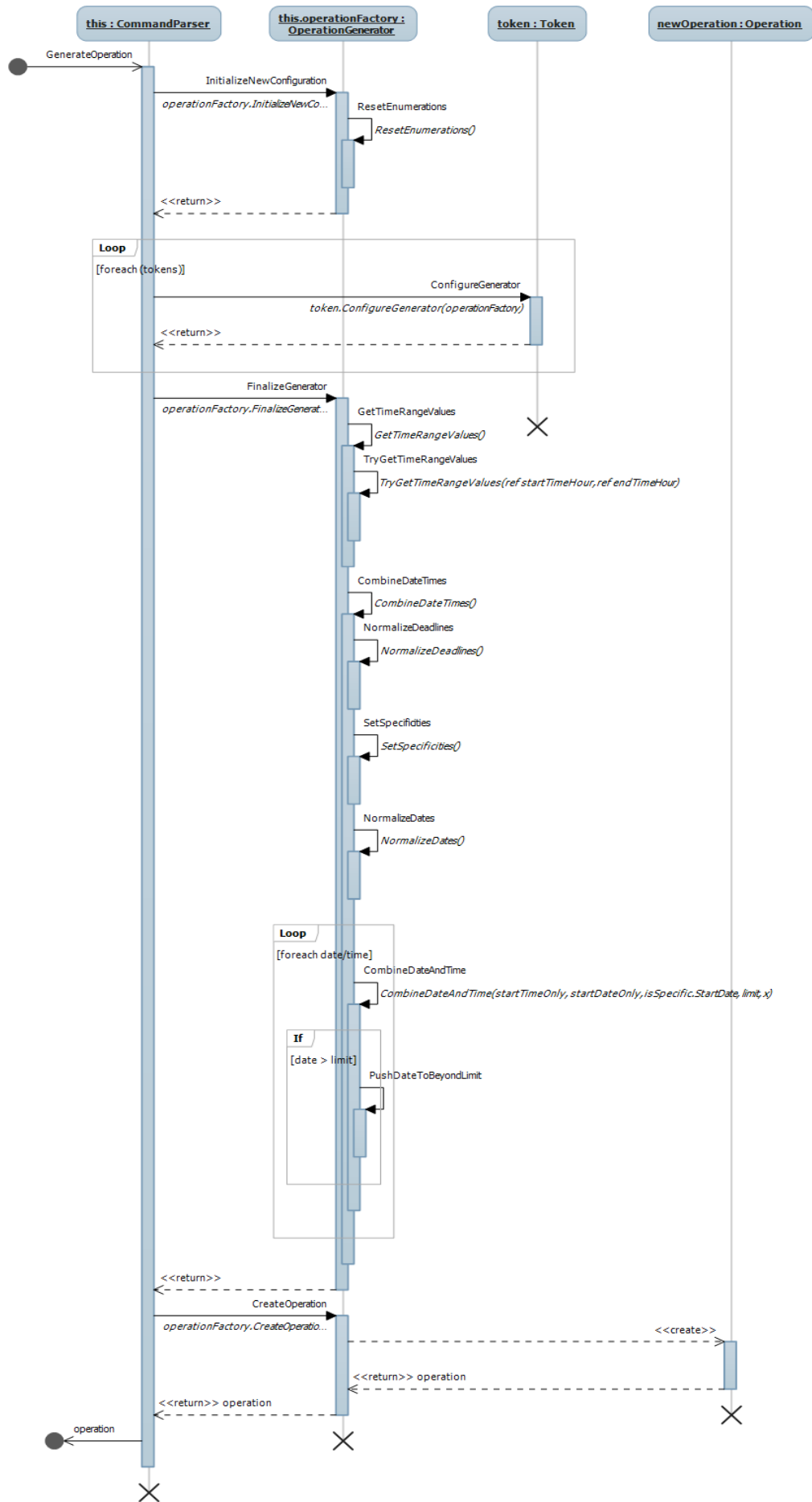
Setter methods: **sortType**, **searchType**, **rangeIsAll**

Public method                      **CreateOperation**

Internal methods                  **SetConditionalEndTime**, **SetConditionalEndDate**

Private methods                  **ResetEnumerations**, **CommandIsSearchableType**,  
**FinalizeSearchTime**, **IsOnlyStartTimeSet**, **IsOnlyStartDateSet**,  
**ExtendEndSearchDate**, **ExtendEndMonthOrYear**,  
**ExtendEndDay**, **FinalizeSchedulingTime**,  
**FinalizeScheduleStartDate**, **GetTimeRangeValues**,  
**TryGetTimeRangeValues**, **IsSpecificTimeSupplied**,  
**RetrieveFinalStartAndEndTimes**, **IsStartTimeWithinTimeRange**,  
**IsStartAndEndTimeWithinTimeRange**, **CombineDateTimes**,  
**NormalizeDates**, **NormalizeDeadlines**, **SetSpecificities**,  
**CombineDateAndTime**, **PushDateToBeyondLimit**,  
**DateIsAmbiguous**, **IsDayOfWeekSet**

sd Generate Operation



## Test History

Both exploratory and automated unit testing have been employed since the inception of this class.

The final test cases are found in *OperationUnitTest*. 8 test cases are employed currently.

## Important Attributes

### Private Variables

```

CommandType commandType
string taskName
DateTimeSpecificity isSpecific
TimeRangeType timeRangeType
TimeRangeKeywordsType timeRangeOne
TimeRangeKeywordsType timeRangeTwo
SortType sortType
SearchType searchType
int[] taskRangeIndex
int timeRangeIndex
bool rangelsAll
TimeSpan? startTimeOnly, endTimeOnly
DateTime? startDateOnly, endDateOnly
bool startDayOfWeekSet, endDayOfWeekSet
ContextType currentSpecifier
ContextType currentMode
DateTime? startDateTime, endDateTime
bool crossDayBoundary

```

## Constructor

OperationGenerator();	Constructor for the generator which initializes it's settings to the default values.
-----------------------	--

## Important API (Public Methods)

Method	Description
void FinalizeGenerator ();	Finalizes the generator so that it can begin generating operations with the correct time ranges.
Operation CreateOperation ();	This operation generates an operation based on how this generator has been configured. Returns the generated operation object.

## Important API (Internal Methods)

Method	Description
void SetConditionalEndTime (TimeSpan Value, bool IsSpecific);	Sets the configured end time to the specified time and specificity. Moves the end time to the start time if necessary.

<code>void SetConditionalEndDate (TimeSpan Value, bool IsSpecific);</code>	<p>Sets the configured end date to the specified date and specificity.</p> <p>Moves the end date to the start date if necessary.</p>
--	--

### 3.3.5. TokenGenerator

#### Summary

This class is a factory class for creating **Tokens**. It can operate on a list of strings, each of them representing words and create a list of the requested type of **Token**, or all **Tokens** using the **GenerateAllTokens** method. The words must have a well-defined meaning set by the **CustomDictionary**; otherwise they will act as a “literal” string and be converted as such.

#### Detailed Description

The **TokenGenerator** class requires a static **CustomDictionary** class to process the meaning of the input words. It can generate all appropriate **Tokens** regardless the **Tokens** order or the order of execution of its *Generate* calls. However, some **Tokens** require a list of already generated **Tokens** (such as **GenerateLiteralTokens**) in order to not generate **Tokens** where they will not be meaningful.

#### Test History

Unit testing has been employed on this class. The tests can be found within the **TokenGeneratorTest** class. There are 9 test cases in this test class.

#### Important API (Public Methods)

Method	Description
<b>List&lt;Token&gt; GenerateAllTokens</b> (List<string> input);	This method searches an input list of strings and generates the relevant tokens representing the meaning of each string. Returns the list of matched phrases as tokens.
<b>List&lt;TokenCommand&gt; GenerateCommandTokens</b> (List<string> input);	This method searches an input list of strings against the set list of command keywords and returns a list of tokens corresponding to the matched command keywords. Returns a list of the generated command tokens.
<b>List&lt;Token&gt; GenerateCommandTokens</b> (List<string> input, List<TokenCommand> commandTokens);	This method checks an input list of strings for index range words and generates a list of tokens based on the found index range words. Returns a list of the generated index raommanng tokens.mandp
<b>List&lt;Token&gt; GenerateSortTypeTokens</b> (List<string> input, List<TokenCommand> commandTokens);	This method checks an input list of strings for sort type keywords (name or date) and generates a list of tokens based on the found sort type keywords. Returns a list of the generated sort type tokens.
<b>List&lt;Token&gt; GenerateTimeRangeTokens</b> (List<string> input, List<TokenCommand> commandTokens);	This method checks an input list of strings for time range words and generates a list of tokens based on the found time range words. Returns a list of the generated time range tokens.
<b>List&lt;Token&gt; GenerateDayTokens</b> (List<string> input);	This method searches an input list of strings against the set list of day keywords and returns a list of tokens corresponding to the matched day keywords

	Returns a list of the generated day tokens.
List<Token> GenerateDateTokens (List<string> input);	<p>This method searches an input list of strings for all valid dates and generates a list of date tokens corresponding to all the found matched date strings using regexes.</p> <p>Returns a list of the generated date tokens.</p>
List<Token> GenerateTimeTokens (List<string> input);	<p>This method searches an input list of strings for all valid times and generates a list of time tokens corresponding to all the found matched time strings using regexes.</p> <p>Returns a list of the generated time tokens.</p>
List<Token> GenerateContextTokens (List<string> input, List<Token> parsedTokens);	<p>This method searches an input list of strings against the set list of context keywords and returns a list of tokens corresponding to the matched context keywords.</p> <p>Returns a list of the generated context tokens.</p>
List<Token> GenerateLiteralTokens (List<string> input, List<Token> parsedTokens);	<p>This method compares an input list of strings against a list of parsed Tokens, and returns a list of Tokens representing all strings which have not been been parsed as Tokens. The purpose of this method is to assign all unparsed strings as LiteralTokens.</p> <p>Returns a list of the generated literal tokens.</p>



### 3.3.6. CustomDictionary

#### Summary

Contains the bulk of all keywords found in the Appendix of the user manual.

#### Detailed Description

This class is a dictionary containing all the keywords available and their meanings. The keywords can be modified using an `UpdateSettings` method.

Getter methods: `commandKeywords`, `contextKeywords`, `timeRangeKeywords`, `timeRangeType`, `sortTypeKeywords`, `timeRangeKeywordsStartTime`, `timeRangeKeywordsEndTime`

Private initialization methods     `InitializeCommandKeywords`, `InitializeContextKeywords`, `InitializeMonthKeywords`, `InitializeDateTimeKeywords`, `InitializeTimeRangeKeywords`, `InitializeSortTypeKeywords`

Public comparison methods     `IsToday`, `IsTomorrow`, `IsValidDate`, `IsValidTime`, `IsValidNumericDate`, `IsValidAlphabeticDate`, `IsValidMonthWord`, `IsTimeRange`, `CheckIfWordIsTimeSuffix`, `IsTimeRangeOverDayBoundary`

Public method for Flexi-Command:     `UpdateDictionary`

#### Test History

This class was originally part of the `StringParser` class, and TDD was originally employed to write the methods of this class. However, as the API for the classes changed, most tests have been deprecated. The original tests can be found in the repository at rev. 122. The currently used unit tests are found in `CustomDictionaryTest` test class.

#### Constructor

<code>CustomDictionary();</code>	Calls all private initialization methods to initialize class attributes
----------------------------------	---

#### Important Attributes

Variable	Description
<code>int defaultScheduleTimeLength</code>	Specifies the default schedule time length
<code>TimeRangeType defaultScheduleTimeLengthType</code>	Specifies the default schedule time length type i.e.hour, day, week etc.
<code>int defaultPostponeDurationLength</code>	Specifies the default postpone time length
<code>int defaultPostponeDurationType</code>	Specifies the default postpone time length type i.e.hour, day, week etc.
<code>Dictionary&lt;string, CommandType&gt; commandKeywords</code>	Specifies the relevant strings to be the keys for various relevant <code>CommandType</code> i.e. add, delete etc.
<code>Dictionary&lt;string, ContextType&gt; contextKeywords</code>	Specifies the relevant strings to be the keys for the various <code>ContextType</code> i.e. by, on, from etc.
<code>Dictionary&lt;string,</code>	Specifies the relevant strings to be the keys for the

TimeRangeKeywordsType > timeRangeKeywords	various TimeRangeKeywordsType i.e. morning, afternoon etc.
Dictionary< string, TimeRangeType> timeRangeType	Specifies the relevant strings to be the keys for the various TimeRangeType i.e. hour, day etc.
Dictionary< TimeRangeKeywordsType, int> timeRangeKeywordsStartTime	Specifies the relevant starting hours to be the keys for the various TimeRangeType i.e. hour, day etc.
Dictionary< TimeRangeKeywordsType, int> timeRangeKeywordsEndTime	Specifies the relevant ending hours to be the keys for the various TimeRangeType i.e. hour, day etc.
Dictionary< string, int> timeSpecificKeywords	Specifies the relevant strings to be the keys for the various time specific keywords i.e. noon, midnight etc.
Dictionary<string, Month> monthKeywords	Specifies the relevant strings to be the keys for the various Month i.e. jan, january, feb, february etc.
Dictionary<string, DayOfWeek> dayKeywords	Specifies the relevant strings to be the keys for the various DayOfWeek i.e. mon, monday, tues, weekend etc.
Dictionary<string, SortType> sortTypeKeywords	Specifies the relevant strings to be the keys for the various SortType i.e. name, date_type etc.
List<string > timeSuffixes	Specifies the various time suffixes i.e. am, pm, hr
List<string > todayKeywords	Specifies the various today keywords i.e. today
List<string > tomorrowKeywords	Specifies the various tomorrow keywords i.e. tmr, tomorrow etc.
List<string > rangeAllKeywords	Specifies the various all keywords i.e. all
Regex time_24HourFormat	Find all time inputs in the 24 hour format
Regex time_12HourFormat	Find all time inputs in the 12 hour format
Regex date_numericFormat	Find all date inputs in the numeric format i.e. DD/MM/YYYY, MM/DD/YYYY
Regex date_alphabeticFormat	Find all date inputs in the numeric format i.e. DD/MMM/YYYY, MMM/DD/YYYY
Regex date_daysWithSuffixes	Find all date inputs that only consist of days with suffixes
Regex date_alphabeticMonth	Find all spelled out month inputs
Regex isNumericalRange	Find all index and indexes pair inputs
Regex isTimeRange	Find all time range inputs that consist of an index/amount and/or type

**Important API (Public Methods)**

Method	Description
<code>bool IsWordTimeSuffix (string word);</code>	Checks if a word is a time keyword and returns a boolean indicating whether it is. Returns true if the word is a time keyword, false if otherwise.
<code>bool IsTimeRangeOverDayBoundary (string word);</code>	Checks if a time range crosses the day boundary and returns a boolean indicating whether it does. Returns true if positive; false if otherwise.
<code>void UpdateDictionary();</code>	Updates the CustomDictionary keywords with new Dictionaries (for when user updates the settings).

## 3.4. Token Classes

### 3.4.1. Token

#### Summary

A Token is a representation of a word that is part of a user's input command. It contains the derived meaning and position within the input string, among other information.

The base class is an abstract class that cannot be instantiated. It must be derived.

Subclasses: TokenCommand, TokenDate, TokenTime, TokenDay, TokenContext, TokenLiteral

The various token objects from the different subclasses are differentiated with the attribute type.

#### Detailed Description

Enumerates the various token types, which have differing storage details information of tokens according to the type. All subclasses inherit the attributes position and type.

Each subclass object stores the details of a relevant task.

For example, a TokenCommand object stores the details pertaining to the command information of a task an operation is to execute.

#### Test History

No testing has been done for the Token class and subclasses as yet.

#### Important API (Internal Methods)

Method	Description
<code>abstract void ConfigureGenerator (OperationGenerator attrb);</code>	The base method which should be overridden by derived classes. It allows the token to configure an OperationGenerator to create an appropriate Operation.
<code>virtual bool AcceptsContext ();</code>	Gets a flag indicating if the token accepts a context token at the position before it. Returns true if it uses a context token; false if otherwise. Returns false by default.

### 3.4.2. TokenCommand : Token

#### Summary

Token representing a command such as add, delete, etc.

#### Detailed Description

Internal overriding methods	ConfigureGenerator,
Other internal methods	RequiresIndexRange, RequiresTimeRange

#### Constructor

TokenCommand(int position, CommandType val) : base(position)	Sets the command type and token index within the input string.
--	--

#### Important API (Internal Methods)

Method	Description
override void ConfigureGenerator (OperationGenerator attrb);	Overriding method of the base class's base method (see above)
bool RequiresIndexRange();	This method checks if the command is of a type that accepts index ranges i.e. delete Returns true if positive; false if otherwise.
bool RequiresTimeRange();	This method checks if the command is of a type that accepts time ranges i.e. schedule Returns true if positive; false if otherwise.

### 3.4.3. TokenContext : Token

#### Summary

Token representing a context keyword such as by, to, etc.

#### Detailed Description

Internal overriding methods      ConfigureGenerator, AcceptsContext

#### Constructor

TokenContext(int position, ContextType val) : base(position)	Sets the context type and token index within the input string.
--	--

#### Important API (Internal Methods)

Method	Description
override void ConfigureGenerator (OperationGenerator attrb);	Overriding method of the base class's base method (see above)
override bool AcceptsContext ();	Overriding method of the base class's base method (see above). Returns true by default.

### 3.4.4. TokenDate : Token

#### Summary

Token representing a date.

#### Detailed Description

Internal overriding methods

ConfigureGenerator, AcceptsContext

#### Constructor

TokenDate(int position, DateTime date, Specificity isSpecific) : base(position)	Sets the date value, information regarding the date specificity and token index within the input string.
---	--

#### Important API (Internal Methods)

Method	Description
override void ConfigureGenerator (OperationGenerator attrb);	Overriding method of the base class's base method (see above)
override bool AcceptsContext ();	Overriding method of the base class's base method (see above). Returns true by default.

### 3.4.5. TokenDay : Token

#### Summary

Token representing a day of the week.

#### Detailed Description

Internal overriding methods	ConfigureGenerator, AcceptsContext
Private methods	GetDateFromDay, GetDaysToAdd

#### Constructor

TokenDay(int position, DayOfWeek val) : base(position)	Sets the day value and token index within the input string.
--	---

#### Important API (Internal Methods)

Method	Description
override void ConfigureGenerator (OperationGenerator attrb);	Overriding method of the base class's base method (see above)
override bool AcceptsContext ();	Overriding method of the base class's base method (see above). Returns true by default.



### 3.4.6. TokenIndexRange : Token

#### Summary

Token representing an index range.

#### Detailed Description

Internal overriding methods

ConfigureGenerator

#### Constructor

TokenIndexRange(int position, int[] val, bool isAll) : base(position)	Sets the indexes pair value, information regarding whether the keyword 'all' was detected and token index within the input string.
---	--

#### Important API (Internal Methods)

Method	Description
override void ConfigureGenerator (OperationGenerator attrb);	Overriding method of the base class's base method (see above)

### 3.4.7. TokenLiteral : Token

#### Summary

Token representing a literal string.

#### Detailed Description

Internal overriding methods      ConfigureGenerator

#### Constructor

TokenLiteral(int position, string val) : base(position)	Sets the literal string value and token index within the input string.
--	--

#### Important API (Internal Methods)

Method	Description
override void ConfigureGenerator (OperationGenerator attrb);	Overriding method of the base class's base method (see above)

### 3.4.8. TokenSortType : Token

#### Summary

Token representing a sort type.

#### Detailed Description

Internal overriding methods      ConfigureGenerator

#### Constructor

TokenLiteral(int position, SortType val) : base(position))	Sets the sort type value and token index within the input string.
---	---

#### Important API (Internal Methods)

Method	Description
override void ConfigureGenerator (OperationGenerator attrb);	Overriding method of the base class's base method (see above)

### 3.4.9. TokenTime : Token

#### Summary

Token representing a time.

#### Detailed Description

Internal overriding methods

ConfigureGenerator, AcceptsContext

#### Constructor

TokenTime(int position, TimeSpan val, Boolean specific_flag) : base(position)	Sets the time value, information regarding its specificity and token index within the input string.
---	---

#### Important API (Internal Methods)

Method	Description
override void ConfigureGenerator (OperationGenerator attrb);	Overriding method of the base class's base method (see above)
override bool AcceptsContext ();	Overriding method of the base class's base method (see above). Returns true by default.

### 3.4.10. TokenTimeRange : Token

#### Summary

Token representing a time range.

#### Detailed Description

Internal overriding methods

ConfigureGenerator

#### Constructor

TokenContext(int position, interval, TimeRangeType type) : base(position)	Sets the time range amount and type and token index within the input string i.e. 3 days. Time range keyword type is set to none.
TokenContext(int position, TimeRangeKeywordsType range) : base(position)	Sets the time range keyword type and token index within the input string i.e. morning. Time range amount and type are set to 0 and default.

#### Important API (Internal Methods)

Method	Description
override void ConfigureGenerator (OperationGenerator attrb);	Overriding method of the base class's base method (see above)

## 3.5. Task Classes

### 3.5.1. Task

A Task is an abstract representation of a user defined task containing details and information relevant to that task such as the task's name. Derived classes can inherit from the base class to represent a certain type of task that the user has created or wishes to create. The base class cannot be instantiated.

Subclasses: TaskFloating, TaskDeadline, TaskEvent

#### Detailed Description

All derived classes inherit the id, taskName and doneState attribute. Each derived class has to override all abstract methods and can contain additional information specific to that type of Task

For example, a TaskFloating object stores the details of a floating task that has no date and time specification while a TaskEvent stores

#### Test History

No testing has been done for the Task class and subclasses.

#### Important Attribute

Variable	Description
int id	The task's unique ID.
string taskName	Stores the name of the task
bool doneState	Flag indicating whether the task has been marked as done by the user or not

### 3.5.3. TaskFloating : Task

#### Summary

A task with no date or times attached to it. The simplest type of task.

#### Detailed Description

Public overriding methods      ToXElement, IsWithinTime, CopyDateTimes

#### Constructor

TaskFloating(string taskName, Boolean isDone = false, int forceID = -1) :	Constructor for floating tasks.
base(taskName, isDone, forceID)	The task's done state. Is set to false by default.
	The task's ID. Is set to -1 by default for the base constructor to generate a new ID.

#### Important API (Public Method)

override XElement ToXElement();	Overriding method of the base class's base method (see above)
override bool IsWithinTime(DateTime? start, DateTime? end);	Overriding method of the base class's base method (see above)
override void CopyDateTimes (ref DateTime? startTime, ref DateTime? endTime, ref DateTimeSpecificity specific);	Overriding method of the base class's base method (see above)

### 3.5.4. TaskDeadline : Task

#### Summary

A task with a single date and time representing the deadline of the task. Date and time may be ambiguous.

#### Detailed Description

Getter methods: isSpecific, endDateTime

Public overriding methods      ToXElement, IsWithinTime, CopyDateTimes

#### Constructor

<code>TaskDeadline(string taskName, DateTime endTime, Boolean isDone = false, int forceID = -1) :</code>	Constructor for deadline tasks.
<code>base(taskName, isDone, forceID)</code>	The task's done state. Is set to false by default.
	The task's ID. Is set to -1 by default for the base constructor to generate a new ID.

#### Important API (Public Method)

<code>override XElement ToXElement();</code>	Overriding method of the base class's base method (see above)
<code>override bool IsWithinTime(DateTime? start, DateTime? end);</code>	Overriding method of the base class's base method (see above)
<code>override void CopyDateTimes (ref DateTime? startTime, ref DateTime? endTime, ref DateTimeSpecificity specific);</code>	Overriding method of the base class's base method (see above).
<code>override string GetTimeString();</code>	Overriding method of the base class's base method (see above)
<code>override bool Postpone(TimeSpan postponeDuration);</code>	Overriding method of the base class's base method (see above)

#### Important API (Private Method)

<code>void ExtendStartSearchRange (ref DateTime startCompare);</code>	Extends the given start search time to the appropriate start of day/month/year depending on the specificity of this task.
<code>void ExtendEndSearchRange (ref DateTime startCompare);</code>	Extends the given end search time to the appropriate start of day/month/year depending on the specificity of this task.



### 3.5.5. TaskEvent : Task

#### Summary

A task with one or more date and times attached to it. Represents the start and end times of the task. If there is only one date/time, it means the task does not have an end time.

#### Detailed Description

Getter methods: `isSpecific`, `endDateTime`, `startDateTime`;

Public overriding methods      `ToXElement`, `IsWithinTime`, `CopyDateTimes`

#### Constructor

<code>TaskEvent(string taskName, DateTime startTime, DateTime endTime, Boolean isDone = false, int forceID = -1) : base(taskName, isDone, forceID)</code>	<p>Constructor for event tasks.</p> <p>The task's done state. Is set to false by default.</p> <p>The task's ID. Is set to -1 by default for the base constructor to generate a new ID.</p>
---	--

#### Important API (Public Method)

<code>override XElement ToXElement();</code>	Overriding method of the base class's base method (see above)
<code>override bool IsWithinTime(DateTime? start, DateTime? end);</code>	Overriding method of the base class's base method (see above)
<code>override void CopyDateTimes (ref DateTime? startTime, ref DateTime? endTime, ref DateTimeSpecificity specific);</code>	Overriding method of the base class's base method (see above).
<code>virtual bool CanBeScheduledOver();</code>	Overriding method of the base class's base method (see above).
<code>override string GetTimeString();</code>	Overriding method of the base class's base method (see above)
<code>override bool Postpone(TimeSpan postponeDuration);</code>	Overriding method of the base class's base method (see above)

#### Important API (Private Method)

<code>void ExtendStartSearchRange (ref DateTime startCompare);</code>	Extends the given start search time to the appropriate start of day/month/year depending on the specificity of this task.
<code>void ExtendEndSearchRange (ref DateTime startCompare);</code>	Extends the given end search time to the appropriate start of day/month/year depending on the specificity of this task.
<code>bool</code>	Checks for the specificity of the DateTimes and returns a

IsDateTimesSpecificEnough (ref TimeSpan postponeDuration));	boolean indicating if they are specific enough to postpone for the given timespan. Returns true if the task is specific enough; false if otherwise.
---	---

## 3.6. Operation Classes

### 3.6.1. Operation

#### Summary

Abstract class that cannot be instantiated

Subclasses: OperationAdd, OperationDelete, OperationDisplay, OperationSearch, OperationModify, OperationUndo

This class contains the necessary information representing a user's requested operation. It can be executed by providing a list of Tasks to execute the command on, as well as a Storage controller to store necessary data.

#### Detailed Description

Each subclass object stores the details of a relevant operation to be executed. For example, an OperationAdd object stores the details of the new task to be added in a Task object.

Getter and setter methods: StartDate, EndDate, StartTime, EndTime

Public method                      UpdateCurrentListedTasks, Execute, Undo, Redo, AllowSkipOver

Protected methods              SetMembers, AddToOperationHistory, AddTask, DeleteTask, MarkTaskAs, SearchForTasks, ExecuteBySearch, DisplaySearchResults, ExecuteByIndex, CheckIfIndexesAreValid, GenerateStandardSuccessResponse, GenerateXMLFailureResponse, SetArgumentsForSearchFeedbackString, IsValidString, HasValidTime

Private methods                  FilterByTaskTime, FilterByTaskName, FilterBySearchType, TaskIsInvalid, AddToOperationHistory, ExecuteAllBySearch, ExecuteOnAll, TrySearchNonExact, AddTaskToParameters, InvokeAction

#### Test History

The various operation subclasses have been validated by the verification of the ParseOperation method as auxilliary storage objects used in the testing methods.

#### Constructor

Operation();	Initializes the static variables used by all Operations.
Operation(SortType sortType);	Initializes the necessary variables for all Operation.

#### Important API (Public Method)

void UpdateCurrentListedTasks (List<Task> tasks);	Sets the currently displayed list of tasks shared by all Operations to the input list of tasks.
abstract Response Execute(List<Task> taskList,	Base method to execute this Operation. Must be overridden

<code>Storage storageIO);</code>	<p>by all derived Operations.</p> <p>Returns a Response object indicating the result of the operation execution.</p>
<code>virtual Response Undo (List&lt;Task&gt; taskList, Storage storageIO);</code>	<p>Base Undo method. All undoable operations must override this method.</p> <p>This base method will throw an assertion if called without being overridden and debug mode is on.</p> <p>Returns a Response object indicating the result of the undo operation.</p>
<code>virtual Response Redo (List&lt;Task&gt; taskList, Storage storageIO);</code>	<p>Base Redo method. All undoable operations must override this method.</p> <p>This base method will throw an assertion if called without being overridden and debug mode is on.</p> <p>Returns a Response object indicating the result of the redo operation.</p>
<code>virtual bool AllowSkipOver (Response response);</code>	<p>Indicates whether the Operation should allow a multiple-task execution to continue if one of the tasks execute unsuccessfully.</p> <p>This method can be overridden to specify when this condition should be allowed.</p> <p>If it is not overridden, it will return false by default.</p>

### 3.6.2. OperationAdd : Operation

#### Summary

Operation used to add a new task.

#### Detailed Description

Public overriding methods    Execute, Undo, Redo

#### Constructor

OperationAdd(Task addTask, SortType sortType) : base(sortType)	Derived constructor to create an Add Operation.
--	---

#### Important API (Public Method)

override Response Execute(List<Task> taskList, Storage storageIO);	Overriding method of the base class's base method (see above) Executes the operation and adds it to the global operation history.
override Response Undo (List<Task> taskList, Storage storageIO);	Overriding method of the base class's base method (see above)
override Response Redo (List<Task> taskList, Storage storageIO);	Overriding method of the base class's base method (see above)

### 3.6.3. OperationDelete : Operation

#### Summary

Operation used to delete one or more tasks.

#### Detailed Description

Public overriding methods      Execute, Undo, Redo

#### Constructor

<code>OperationDelete(string taskName, int[] indexRange, DateTime? startTime, DateTime? endTime, DateTimeSpecificity isSpecific, bool isAll, SearchType searchType, SortType sortType) : base(sortType)</code>	<p>This is the constructor for the Delete operation which accepts arguments to define the way this operation will be executed.</p> <p>If a valid index range is specified or the isAll set to true, the operation will be carried out those corresponding indices or all displayed tasks respectively.</p> <p>If search parameters are specified instead, a search operation will be carried out instead.</p> <p>The operation will be carried out on the search results if the isAll flag is true.</p>
--	---

#### Important API (Public Method)

<code>override Response Execute(List&lt;Task&gt; taskList, Storage storageIO);</code>	<p>Overriding method of the base class's base method (see above)</p> <p>Executes the operation and adds it to the operation history.</p> <p>This operation tries to delete one or more tasks using the given parameters.</p> <p>If an index exist, it will delete all tasks by index.</p> <p>If not, it will perform a search, deleting tasks immediately if the isAll flag is set.</p>
<code>override Response Undo (List&lt;Task&gt; taskList, Storage storageIO);</code>	<p>Overriding method of the base class's base method (see above)</p>
<code>override Response Redo (List&lt;Task&gt; taskList, Storage storageIO);</code>	<p>Overriding method of the base class's base method (see above)</p>

### 3.6.4.    **OperationDisplayDefault : Operation**

#### **Summary**

Operation used to show the default view.

#### **Detailed Description**

Public overriding method      Execute

#### **Constructor**

OperationDisplayDefault ();
OperationDisplayDefault (SortType sortType) : base(sortType)

#### **Important API (Public Method)**

override Response Execute(List<Task> taskList, Storage storageIO);	Overriding method of the base class's base method (see above)
--	--

### 3.6.5. OperationMarkAsDone : Operation

#### Summary

Operation used to mark one or more tasks as done.

#### Detailed Description

Public overriding methods    Execute, Undo, Redo, AllowSkipOver

#### Constructor

OperationMarkAsDone(string taskName, int[] indexRange, DateTime? startTime, DateTime? endTime, DateTimeSpecificity isSpecific, bool isAll, SearchType searchType, SortType sortType) : base(sortType)	<p>This is the constructor for the MarkAsDone operation which accepts arguments to define the way this operation will be executed.</p> <p>If a valid index range is specified or the isAll set to true, the operation will be carried out those corresponding indices or all displayed tasks respectively.</p> <p>If search parameters are specified instead, a search operation will be carried out instead.</p> <p>The operation will be carried out on the search results if the isAll flag is true.</p>
---	---

#### Important API (Public Method)

override Response Execute(List<Task> taskList, Storage storageIO);	<p>Overriding method of the base class's base method (see above)</p> <p>Executes the operation and adds it to the operation history.</p> <p>This operation tries to mark one or more tasks as done using the given parameters.</p> <p>If an index exist, it will mark all tasks by index.</p> <p>If not, it will perform a search, marking tasks immediately if the isAll flag is set.</p>
override Response Undo (List<Task> taskList, Storage storageIO);	Overriding method of the base class's base method (see above)
override Response Redo (List<Task> taskList, Storage storageIO);	Overriding method of the base class's base method (see above)
virtual bool AllowSkipOver (Response response);	<p>Indicates whether the Operation should allow a multiple-task execution to continue if one of the tasks execute unsuccessfully.</p> <p>This method can be overridden to specify when this condition should be allowed.</p> <p>If it is not overridden, it will return false by default.</p>



### 3.6.6. OperationMarkAsUndone : Operation

#### Summary

Operation used to mark one or more task as undone

#### Detailed Description

Public overriding methods      Execute, Undo, Redo, AllowSkipOver

#### Constructor

<b>OperationMarkAsUndone</b> (string taskName, int[] indexRange, DateTime? startTime, DateTime? endTime, DateTimeSpecificity isSpecific, bool isAll, SearchType searchType, SortType sortType) : base(sortType)	<p>This is the constructor for the MarkAsUndone operation which accepts arguments to define the way this operation will be executed.</p> <p>If a valid index range is specified or the isAll set to true, the operation will be carried out those corresponding indices or all displayed tasks respectively.</p> <p>If search parameters are specified instead, a search operation will be carried out instead.</p> <p>The operation will be carried out on the search results if the isAll flag is true.</p>
---	---

#### Important API (Public Method)

<b>override Response Execute</b> (List<Task> taskList, Storage storageIO);	<p>Overriding method of the base class's base method (see above)</p> <p>Executes the operation and adds it to the operation history.</p> <p>This operation tries to mark one or more tasks as undone using the given parameters.</p> <p>If an index exist, it will mark all tasks by index.</p> <p>If not, it will perform a search, marking tasks immediately if the isAll flag is set.</p>
<b>override Response Undo</b> (List<Task> taskList, Storage storageIO);	<p>Overriding method of the base class's base method (see above)</p>
<b>override Response Redo</b> (List<Task> taskList, Storage storageIO);	<p>Overriding method of the base class's base method (see above)</p>
<b>virtual bool AllowSkipOver</b> (Response response);	<p>Overriding method of the base class's base method (see above)</p>

### 3.6.7. OperationModify : Operation

#### Summary

Operation used to modify a task's name or date or both.

#### Detailed Description

Public overriding methods	Execute, Undo, Redo
Private methods	MultipleTasksSelected, ModifyTask

#### Constructor

OperationModify(string taskName, int[] indexRange, DateTime? startTime, DateTime? endTime, DateTimeSpecificity isSpecific, bool isAll, SearchType searchType, SortType sortType) : base(sortType)	This is the constructor for the Modify operation. It will modify the task indicated by the index range to the new parameters specified by the given arguments. If an argument is left empty or null, that parameter will remain unchanged.
---	--

#### Important API (Public Method)

override Response Execute(List<Task> taskList, Storage storageIO);	Overriding method of the base class's base method (see above) Executes the operation and adds it to the operation history. Modifies the task indicated by the index range to the new parameters in this operation. If a parameter is left empty or null, that parameter will remain unchanged in the new task.
override Response Undo (List<Task> taskList, Storage storageIO);	Overriding method of the base class's base method (see above)
override Response Redo (List<Task> taskList, Storage storageIO);	Overriding method of the base class's base method (see above)
virtual bool AllowSkipOver (Response response);	Indicates whether the Operation should allow a multiple-task execution to continue if one of the tasks execute unsuccessfully. This method can be overridden to specify when this condition should be allowed. If it is not overridden, it will return false by default.

### 3.6.8. OperationPostpone : Operation

#### Summary

Operation used to postpone one or more tasks by a certain duration.

#### Detailed Description

Public overriding methods	Execute, Undo, Redo, AllowSkipOver
Private methods	PostponeTask

#### Constructor

OperationPostpone(string taskName, int[] indexRange, DateTime? startTime, DateTime? endTime, DateTimeSpecificity isSpecific, bool isAll, SearchType searchType, TimeSpan postponeDuration, SortType sortType) : base(sortType)	<p>This is the constructor for the Postpone operation which accepts arguments to define the way this operation will be executed.</p> <p>If a valid index range is specified or the isAll set to true, the operation will be carried out those corresponding indices or all displayed tasks respectively.</p> <p>If search parameters are specified instead, a search operation will be carried out instead.</p> <p>The operation will be carried out on the search results if the isAll flag is true..</p>
--	--

#### Important API (Public Method)

override Response Execute(List<Task> taskList, Storage storageIO);	<p>Overriding method of the base class's base method (see above)</p> <p>Executes the operation and adds it to the operation history.</p>
override Response Undo (List<Task> taskList, Storage storageIO);	Overriding method of the base class's base method (see above)
override Response Redo (List<Task> taskList, Storage storageIO);	Overriding method of the base class's base method (see above)
virtual bool AllowSkipOver (Response response);	<p>Overriding method of the base class's base method (see above) unsuccessfully.</p> <p>This method can be overridden to specify when this condition should be allowed.</p> <p>If it is not overridden, it will return false by default.</p>

### 3.6.9. OperationRedo : Operation

#### Summary

Operation used to redo the last undone operation.

#### Detailed Description

Public overriding methods	Execute
Private methods	GetLastRevertedOperation

#### Constructor

OperationRedo(SortType sortType) : base(sortType)	Derived constructor to create a Redo Operation.
--	---

#### Important API (Public Method)

override Response Execute(List<Task> taskList, Storage storageIO);	Overriding method of the base class's base method (see , Executes the operation and adds it to the operation history.
--	--

### 3.6.10. OperationSchedule : Operation

#### Summary

Operation used to schedule a task. Can accept a time range to schedule the task in, as well as a variable duration for the task length.

#### Detailed Description

Public overriding methods	Execute, Undo, Redo
Private methods	SetTimeRange, IsTaskDurationWithinRange, TryScheduleTask, GetNumberOfLoops, IsTimeSlotFreeOfTasks, ScheduleTaskAtSlot

#### Constructor

OperationSchedule (string taskName, DateTime startTime, DateTime? endTime, DateTimeSpecificity isSpecific, int timeRangeAmount,, TimeRangeType timeRangeType, SortType sortType) : base(sortType)	<p>This is the constructor for the Schedule operation.</p> <p>This operation accepts a time range and tries to schedule a task for the specified time period within the time range at the earliest possible point on execution.</p>
---	---

#### Important API (Public Method)

override Response Execute(List<Task> taskList, Storage storageIO);	<p>Overriding method of the base class's base method (see , Executes the operation and adds it to the operation history.</p> <p>This operation tries to schedule a task within the given parameters.</p>
override Response Undo (List<Task> taskList, Storage storageIO);	Overriding method of the base class's base method (see above)
override Response Redo (List<Task> taskList, Storage storageIO);	Overriding method of the base class's base method (see above)

### 3.6.11. OperationSearch : Operation

#### Summary

Operation used to search for tasks matching a given criteria.

#### Detailed Description

Public overriding methods      Execute

#### Constructor

OperationSearch (string searchString, DateTime? startTime, DateTime? endTime, DateTimeSpecificity isSpecific, SearchType searchType, SortType sortType) : base(sortType)	This is the constructor for the Search operation. This operation takes in the various parameters to define the search filters to be used when the operation is executed.
---	---

#### Important API (Public Method)

override Response Execute(List<Task> taskList, Storage storageIO);	Overriding method of the base class's base method (see above) Executes the operation according to this operation's parameters.
--	---

### 3.6.12. OperationSort : Operation

#### Summary

Operation used to sort the currently displayed list of tasks.

#### Detailed Description

Public overriding methods      Execute

#### Constructor

OperationSort (SortType sortType) : base(sortType)	This is the sonstructor for the Sort operation.
---	---

#### Important API (Public Method)

override Response Execute(List<Task> taskList, Storage storageIO);	Overriding method of the base class's base method (see above)  Executes the operation according to this operation's parameters.
--	---

### 3.6.13. OperationUndo : Operation

#### Summary

Operation used to Undo an operation.

#### Detailed Description

Public overriding methods	Execute
Private methods	GetLastOperation

#### Constructor

OperationUndo(SortType sortType) : base(sortType)	Derived constructor to create a Redo Operation.
--	---

#### Important API (Public Method)

override Response Execute(List<Task> taskList, Storage storageIO);	Overriding method of the base class's base method (see , Executes the operation and adds it to the operation history.
--	--



## 3.7. Storage Class

### Summary

Storage class which controls file creation, I/O. Maintains all necessary information on disk as XML files.

### Detailed Description

Public methods	LoadTasksFromFile
Internal methods	CreateNewTaskFile, LoadSettingsFromFile, WriteSettingsToFile, AddTaskToFile, RemoveTaskFromFile, UpdateTask, MarkTaskAs
Private methods	ValidateTaskFile

### Constructor

Storage(string taskStorageFile,, string settingsFile);	Constructs a Storage I/O handler class, creating two XML files for task storage and settings storage using the specified taskStorageFile and settingsFile as their respective filenames.
--	--

### Important API (Public Methods)

Method	Description
List<Task> LoadTasksFromFile ();	Loads all tasks from the task file into a list. Returns the loaded list of tasks.

### Important API (Internal Methods)

Method	Description
bool CreateNewTaskFile ();	Creates a new task XML file. Returns true if operation was successful; false if otherwise.
SettingInformation LoadSettingsFromFile ();	Load all settings from the settings file. Returns the settings information loaded from the file.
bool WriteSettingsToFile (SettingInformation settingInfo);	Write all settings to an XML file. Returns true if operation was successful; false if otherwise.
bool AddTaskToFile (Task taskToAdd);	Appends a task to the task file. Returns true if operation was successful; false if otherwise.
bool RemoveTaskFromFile (Task taskToDelete);	Deletes a task from the task file. Returns true if operation was successful; false if otherwise.
bool UpdateTask (Task taskToUpdate);	Updates a task from the task file. Returns true if operation was successful; false if otherwise.
bool MarkTaskAs (Task taskToMarkAsDone, bool done);	Marks a task from the task file. Returns true if operation was successful; false if otherwise.