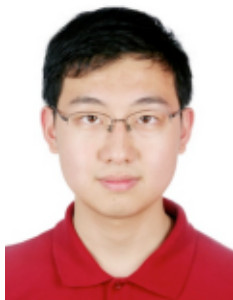


CS2103 PROJECT MANUAL

Command line task manager

```
c:\Documents and Settings\u0909122\My Documents\Visual Studio 2008\Projects\TaskM... Task Manager V0.2
< Ctrl-c >: exit < H >: show help
-----
9  -----default-----
    Number:      9      Deadline:    Wed Oct 27 10:45:00 2010
    Priority:     0      Status:      Finished
    Details:
        export bug: cannot export to replace existing file
-----
10  f default  Add a input module to handle user interaction. enabl...
11  f default  Enable pipe e.g ls -k Parser* | edit -g Parser, this...
12  f default  Enable export -html
13  f default  Use XML standard entity references to cope with symb...
14  f default  Configuration reader.
15  f default  Enable args e.g. ./taskM
19  f default  Refractor the code: sepe
-----
                                Oct 2010
Week  | Su Mo Tu We Th Fr Sa
39    | 26 27 28 29 30  1  2
40    |  3  4  5  6  7  8  9
41    | 10 11 12 13 14 15 16
42    | 17 18 19 20 21 22 23
43    | 24 25 26 27 28 29 30
44    | 31  1  2  3  4  5  6
-----
+--Today is 6 Nov 2010----- 16 of 16 Tasks --+
ls
```



He Haocong

U099121H



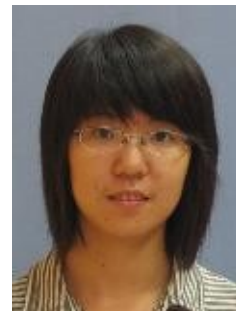
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November 7, 2010

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1 Introduction

This is the manual for a command-line utility (referred to as taskManager) that manages one's to-do's.

2 User Guide

2.1 Quick Start

This section introduces you the minimum amount of commands to get started.

1. Start taskManager shell:

On Mac OS and GNU Linux (referred to as “*nix” later), taskManager can be started from shell by commands:

```
$ cd the/folder/containing/taskManager
$ ./taskManager1
```

On Microsoft Windows, taskManager can be launched in command prompt as well, or simply by double clicking “taskManager.exe”.

Once taskManager is launched, you will see a prompt like ">_", and you will start typing commands!

2. Add some tasks:

```
$ ./taskManager
> add "Sample task 1"
> add "Sample task 2"
TaskManager: This task is highly similiar to some existing task,
do you really want to add it? y
```

To add a task, simply use `add` command followed by the description of the task in a pair of quotation marks.

If no error messages are shown, the task is successfully added. TaskManager may prompt for confirmation if the task to be added is highly similar to some existing task(s) to help prevent people forget adding tasks, which is the case in the example above.

3. List the existing tasks:

```
> ls
1      Sample task 1
2      Sample task 2
```

To see the existing tasks, use `ls` command. By default, the taskManager shows the serial numbers and the descriptions of the tasks.

4. Mark a task as finished:

```
> finish 2
> ls
1      Sample task 1
2 f    Sample task 2
```

¹ *nix version can be run at any directory after installing taskManager – “`make install`”. See details in section “Compilation and Installation”.

To finish an existing task, use `finish` command followed by the serial number of the task to finish. Notice that for finished task, an 'f' is shown between serial number and task description.

5. Remove task(s):

```
> ls
1      Sample task 1
2 f    Sample task 2
> rm 1
TaskManager: Do you really want to remove this task permanently? y
> ls
2 f    Sample task 2
```

To remove an existing task, use `rm` command followed by the serial number of the task to remove. TaskManager will prompt for confirmation when removing tasks.

6. Exit from taskManager:

```
> exit
```

To quit from taskManager, use `exit` command. All changes to the existing tasks will be automatically saved.

2.2 More commands

2.2.1 read, import and export

TaskManager stores the tasks in an XML file which is by default `~/record.xml` on *nix, and `%USERPROFILE%\record.xml` on Windows.

TaskManager also supports importing/exporting the existing tasks from/to XML and HTML files. This is done by `read`, `import` and `export` commands.

`read` reads an XML file, list all the tasks it contains without affecting the current task list.

This is helpful when you only want to peek the content of an xml file without really importing it.

```
> ls
1      Sample task 2
> read midterms.xml2
1 f    CS2103 midTerm Sep 29 06:30 - 07:30 pm MPSH 1B
2 f    CS3230 midTerm Oct 15 06:00 pm
3 f    CS3241 midTerm Oct 07 lecture
4 f    CS3244 midTerm Oct 04 lecture
5 f    ST2132 midTerm Oct 08 LT33 12:15 - 1:30 pm
> ls
1      Sample task 2
```

`import` is similar to `read` command. It reads the content of the XML file and appends all the tasks in it to current task list.

```
> ls
1    Sample task 2
> import mytasks.xml
1    Sample task 2 3
2 f  CS2103 midTerm Sep 29 06:30 - 07:30 pm MPSH 1B
3 f  CS3230 midTerm Oct 15 06:00 pm
4 f  CS3241 midTerm Oct 07 lecture
5 f  CS3244 midTerm Oct 04 lecture
6 f  ST2132 midTerm Oct 08 LT33 12:15 - 1:30 pm
```

`export` exports the current task list to an XML or HTML file.

```
> export sampletasks.xml4
> exit
$ cat sampletasks.xml
<taskList>
<task>
<serialNumber> 1 </serialNumber>
<deadline> 1288473083 </deadline>
<priority> 0 </priority>
<description> Sample task 2 </description>
<group> default </group>
<isFinished> 0 </isFinished>
</task>
</taskList>
```

`export` can also be used to generate an HTML file which is more visually pleasant in your favourite browser.

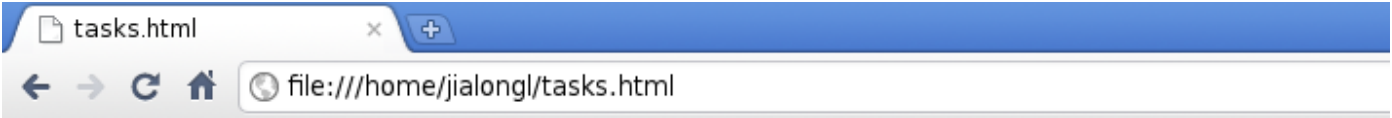
```
> export -html sampletasks.html5
> exit
```

² The file name is not quoted. If the file name contains space, please quote it with a pair of quotation marks.

³ Task 1 is still in task list. Importing tasks will not erase existing tasks.

⁴ Currently `export` does not support environmental variables in path. i.e. `export ~/abc.xml` will not export the file to user's home directory `/home/username/`.

⁵ If the name of the HTML file to export is not specified, the default file name "`record.html`" is used.



NUMBER	PRIORITY	GROUP	STATUS	DEADLINE	DETAILS
1	0	default	Doing	Wed Oct 27 10:41:24 2010	Enable Help/Man
2	0	default	Finished	Thu Oct 28 19:16:18 2010	Enable shell style auto-completion
3	0	default	Doing	Wed Oct 27 10:41:56 2010	Test and strengthen Parser to str
4	0	default	Finished	Wed Oct 27 10:42:12 2010	Parser strip double quote from tok
5	0	default	Doing	Wed Oct 27 10:42:58 2010	Parser enable slash double quote t
6	0	default	Finished	Wed Oct 27 10:43:28 2010	Parser enable single token to be w
7	0	default	Doing	Wed Oct 27 10:43:50 2010	Resolve memory leak and security
8	0	default	Doing	Wed Oct 27 10:44:55 2010	Enable man taskManager for linux
9	0	default	Doing	Wed Oct 27 10:45:18 2010	Fix export bug: cannot export to r
10	0	default	Doing	Wed Oct 27 10:45:33 2010	Add a input module to handle user

Figure 1: tasks exported as webpage ⁶

2.2.2 task

```
> task 1
  Number: 1   Deadline: Sun Oct 31 05:11:23 2010
  Priority: 0   Status:   Doing
  Group:   default
  Details:
    Sample task 2 7
```

To show detail information of a task, use `task` command followed by serial number of the task.

2.2.3 pri

```
> pri 1 10
> task 1
  Number: 1   Deadline: Sun Oct 31 05:11:23 2010
  Priority: 10   Status:   Doing
  Group:   default
```

⁶ Page may not render correctly in IE 6 or its earlier versions.

⁷ Adding tasks with detailed information is covered in section 2.3.1. In this example, default values are shown.

Details:

Sample task 2

To change the priority of a task, use `pri` command followed by the serial number of a task and its new priority. Priority is typically a number between -20 and 20. By default, the priority of a newly added task is 0.

2.2.4 edit

```
> edit 1 -d "Sample task 3" -p 12 -t 1d8 -g SampleGroup -f yes
> task 1
Number:    1    Deadline:  Mon Nov 1 05:47:59 2010
Priority: 12    Status:    Finished
Group:     SampleGroup
Details:
Sample task 3
```

To edit a task, `edit` command which has the form: `edit taskSerialNumber -d newDescription -p newPriority -t newDeadline -g newGroup -f finished_or_not`. Only `taskSerialNumber` is compulsory. Besides, to finish a task, `finish 1` is equivalent to `edit 1 -f yes`.

2.2.5 undo and redo

```
> undo
```

would undo the last command. Note that it has no effect on commands like `ls`, `export`, `tui` and `undo`.

```
> redo
```

re-does the last undo. It can be executed until all the undo's are re-done.

2.3 Using Options

Like `edit`, some of the commands come with options to support more functionality. In this section they are introduced in great detail.

2.3.1 add

`add` has three flags: `-t` to specify deadline, `-p` to set priority and `-g` to put the group name for a task.

`-t` adds a task with a deadline:

⁸ `-t 1d` means setting the deadline to be 1 day later. Time formats that `taskManager` accept are discussed in section 2.3.1.


```
> add "74 hours from now" -t 3d2h
> add "Tomorrow 2359" -t b2d
> add "due at Jan 2, 1970 00:00 UTC" -t 86400
```

TaskManager support 3 types of time format:

"plus" format "Plus" format specifies the how much time left for the task, and it has form `?w?d?h?m`⁹, where each question mark stands for a number (not a digit). For example, `3d2h` means the task will due after 3 days 2 hours the moment the command is executed – you have 3 days and 2 hours to finish it.

"by" format "By" format has a similar form of "plus" format. It is in the form of `b?w?d?h?m`¹⁰, where each question mark stands for a number (not a digit). For example:

<code>b0d22h</code>		by 10:00pm today.
<code>b2d</code>		by 23:59 tomorrow.
<code>b1w</code>		by the end of this week. i.e. 23:59 of the Saturday ¹¹ of this week.
<code>b0w5d</code>		by 23:59 on Friday of this week.
<code>b2w3d8h</code>		by 8:00am on the Wednesday of the next next week.

Unix timestamp "Unix timestamp" means the number of seconds elapsed since Jan 1, 1970 00:00:00. It is not recommended for users, but rather used as a lower-order procedure for developers.

-p adds a task with a priority:

```
> add "some important task" -p 20
```

-g specifies a group for a task:

```
> add "the task with group"12 -g SampleGroup
```

Options are not compulsory. Different options can be used together. For example:

```
> add "CS2103 final exam" -p 10 -g "finals" -t b3w2d
```

would add a task "CS2103 final exam" which has a priority of 10, belongs to group "finals" and is held on the Tuesday 3 weeks from now.

2.3.2 ls

ls has four flags: **-s** to sort tasks, **-k** to search tasks, **-f** to view only (un)finished tasks and **-g** to filter tasks by group name.

-s sorts the existing tasks:

```
> ls -s "deadline priority"
```

⁹ At least one of letters w/d/h/m should be specified.

¹⁰ At least one of letters w/d/h/m should be specified.

¹¹ Sunday is the first day of a week.

¹² If group name contains spaces, use a pair of quotation marks to quote it.

A more general format is: `ls -s "keyword1 keyword2" ...`

The listed tasks will be sorted by keyword1 and then keyword2 ...

Available columns are: deadline, priority and serialnumber. Prefix of a keyword is also acceptable. e.g. `ls -s "p"` will sort the tasks by their priorities.

Examples:

```
> ls -s "p d"
1      task 1 highest priority.    3 Sun Oct 31 06:49:09 2010
2      task 2 high priority.       2 Mon Nov 1 06:54:42 2010
3      task 3 default priority.    0 Tue Nov 2 06:54:37 2010
```

- k filters tasks with a keyword¹³ where ? means any single character, * means a string of any length (including 0 length).

Take command `ls -k *Sam?le*task` as an example, "This is a sample with an important task" will match `*Sam?le*task` as the first * matches "This is a ", ? matches 'p' and the second * matches " with an important ".

"sampleTask" will also match `*sam?le*task` as both * maps empty string and ? to be 'q'.

- f shows finished/unfinished tasks:

```
ls -f yes shows only finished tasks.
ls -f no shows only unfinished tasks.
```

- g shows tasks of a specific group: `ls -g SampleTask` makes tasks only from SampleTask group shown.

Important:

As said, different options can be used together when issuing commands. When more then one restrictive options are present, *conjunction* of these restrictions are used. e.g.

```
ls -g SampleTask -f y
```

will show tasks that are finished AND from "SampleTask" group.

2.3.3 rm

`rm` has basically two usages: remove tasks by a group name or serial number.

Use `-g` option to remove a group of tasks: `rm -g SampleTask` removes the entire SampleTask group.

`rm` can be used remove several tasks once as well. e.g. `rm 1 2 3` removes tasks 1, 2 and 3.

¹³ keyword is case insensitive.

2.4 Getting inTUItive – The Text User Interface

The text-based user interface (referred to as TUI later) makes interaction more intuitive by visualizing the deadlines, groups and simplifying manipulation from issuing commands to moving cursors and pressing keys.

TUI can be launched using command `tui` in command-line mode:

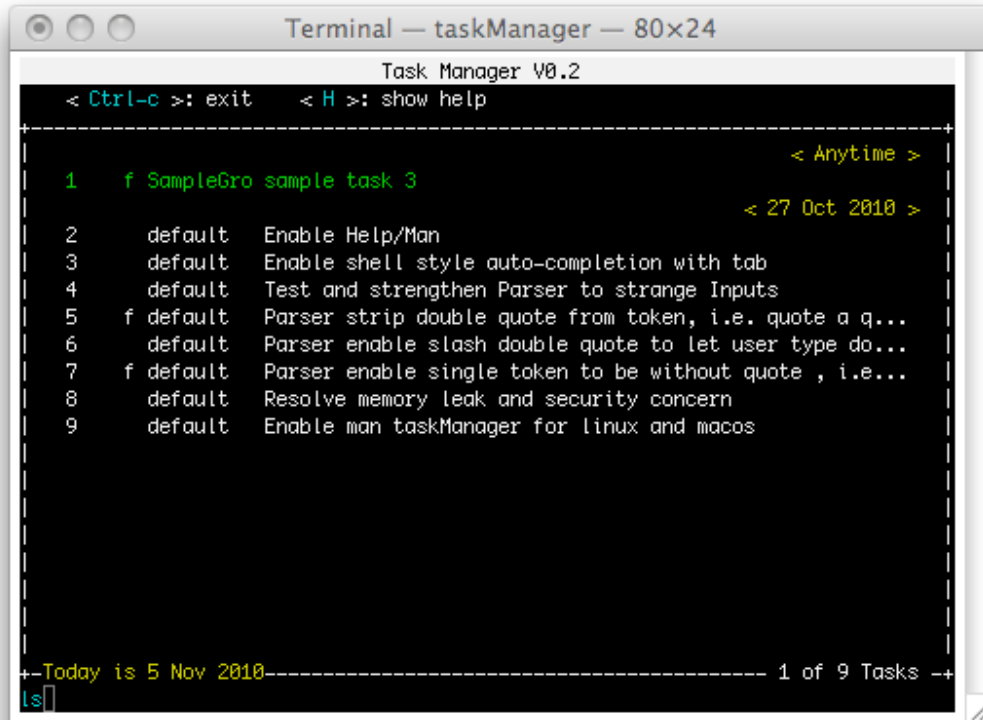


Figure 2: The first screen of TUI

As seen, the tasks are grouped according to deadlines. If a task's deadline is "Any-time", it means the task has no specific deadline – you can finish it at ease.

Besides, TUI provides some features that are not available in the command line mode:

1. auto-completion using TAB key.
2. summary of tasks in a calendar a small calendar at the bottom right corner with the dates that has tasks due highlighted
3. incremental search of tasks by keyword.

This is a summary of the key bindings:

SPACE or ENTER	show details of the selected task
↓ or j	select the task below
↑ or k	select the task above
g	select the first task
G	select the last task
number selectionKey ¹⁴	select number tasks above/below
p	previous page/page up
n	next page/page down
u	undo
R	redo
c	show the small calendar
C	issue a command without leaving TUI
a	add a task
e	edit a task
d	remove a task
f	finish a task
s	search tasks by keywords

You can always press H to read the key bindings.

2.5 Advanced Usages

2.5.1 command piping

```
> ls | rm
```

TaskManager supports command piping for most commands though it is a bit different from traditional Unix pipe. Piping means if one command selects some tasks, then the selected tasks will be passed to the next command as input. The tasks after the last command will be shown as output. Piping in taskManager is done with symbol `|`. When a pipe signs appear in a command, the broken-up commands (separated by pipes) are executed one by one from left to right. For example:

1. finish all tasks:

```
> ls | finish
```

2. remove all finished tasks:

```
> ls -f yes | rm
```

3. import from a file and replace current task list:

```
> ls | rm | import newTasks.xml
```

4. import all CS2103 group tasks from a file:

```
> read newTasks.xml | ls -g CS2103 | add
```

¹⁴ It means pressing a number key and then press `↑/↓/j/k` key.

5. export all CS2103 related tasks to a html file:

```
> ls -k *CS2103* | export -html cs2103tasks.html
```

6. show details of CS2103 tasks, sort by priority:

```
> ls -g CS2103 | sort "pri" | task
```

2.5.2 command mapping

```
> map "ls" "ls -f no"
```

TaskManager supports custom command mapping/aliasing so you can alias the taskManager commands to the format you are more comfortable with.

General format of `map` is: `map "new command" "original command"`

A simple mapping is like the previous example, which maps `ls` to `ls -f no`, which effectively hides finished tasks when doing `ls`. To retain the original `ls` command, use `.`. The command that `ls` maps to will not be executed then.

When several `map` commands are executed in sequence :

```
> map "lsa" "ls"
> map "ls" "ls -f no"
```

Then `ls` will show the unfinished tasks only, while `lsa` lists all the tasks.

The order of mapping matters as commands are executed one by one. Thus reversing the order of `map` commands MIGHT NOT work.

More complex mapping makes use of symbol `$`. There are two kinds of `$` symbols:

`$0` matches all characters from the current position.

`$1`, `$2`, `$3` ... matches one token (i.e. a word or several words).

Examples:

1.

```
> map "tomorrow $1" "add $1 -t 1d"
> tomorrow "Finish user guide"
```

The latter command will be parsed as `add "Finish user guide" -t 1d`, and a new task “Finish user guide” will be added with the deadline of 24 hours.

2.

```
> map "do $1 at $2" "add $1 -t $2"
> do "Laundry" at 4h
```

The latter command will be parsed as `add "Laundry" -t 4h`, and a new task called “Laundry” will be added with the deadline of 4hours.

3.

```
> map "ls $0" "ls -f no $0" > ls > ls -g cs2103
```

The second command will be parsed as `ls -f no`, and will list out all unfinished tasks. The third command will be parsed as `ls -f no -g cs2103`, and will list out all unfinished cs2103 tasks.

Important: TUI uses `ls` to retrieve tasks. Mapping `ls` to something else will affect behaviour of TUI, which may or may not be the case you want.

2.5.3 taskManager script

Task manager commands can be saved in a text file and be executed using `run` command.

```
$ cat tmscript
ls
map "ls" "ls -f no"
ls
$ ./taskManager
Task Manager V 0.2
type " exit" to quit, "help" for more instructions
=====
> run tmscript
1 f   Sample task 1.   This also has high priority
2     Sample task 2.   This has high priority
3     Sample task 3.   This is the latest

2     Sample task 2.   This has high priority
3     Sample task 3.   This is the latest
```

The first 3 tasks are the result of the first `ls` in the script. The last 2 tasks are the result of the second `ls` in the script. Because `ls` is mapped to `ls -f no`, finished tasks are not shown by the second `ls`.

2.5.4 startup script

By default, taskManager executes a special script everytime when it is started. This script is `~/.tmrc` on *nix and `%USERPROFILE%\tmrc.txt` on Windows. This file can be edited to include customized settings.

Examples:

1. To switch to the interactive user interface by default, add this line into `tmrc`:

```
tui
```

2. To save a backup file when taskManager is started:

```
export /tmp/backupTasklist.xml
```

3. To show tasks when taskManager is started:

```
ls
```

4. To remove finished tasks when taskManager is started:

```
ls -f yes | rm
```

5. To run a script with all self-defined mappings when taskManager is started:

```
run /home/myusername/mymappings
```

2.5.5 talk to taskManager

For all inputs that cannot be recognized by taskManager as a command, it will be treated as natural language sentence. TaskManager will try its best to recognize it and give correct response. For example:

```
> what do I do today?
```

will list all the tasks due today.

2.6 Compilation and Installation

This section discusses compilation and installation of taskManager. One thing to note is that the TUI is build by default, which requires PDcurses library. It is free and can be downloaded here: <http://sourceforge.net/projects/pdcurses/files/>.

Unix-like Operating Systems are likely to have curses (its cross-platform version is PD-curses) library installed already. For Windows' users convenience, the necessary library files for compilation are included in the zip.

2.6.1 Microsoft Windows

On Windows, taskManager can be built with Visual Studio 2008[®] ¹⁵ in the following steps:

1. Start Visual Studio with "C++ Development Settings".
2. Create an *empty win32 console project* called "taskManager".
3. Drag all the .h and .cpp files (including those in the subdirectories) into the solution folder. Files should be automatically categorized into header files and source files.
4. Press **Alt + F7** to edit the project properties. Under "Configuration Properties" => "General", set "Character Set" to be "Use Multi-Byte Character Set"; Under "Linker" => "Input", add pdcurses.lib to "Additional Dependencies" and add the folder containing pdcurses.lib to "Additional Library Directories".
5. Copy pdcurses.dll to %WINDIR%\system32\ or the directory your executable will be generated (which would be the "Debug" folder).

6. Build the solution.
7. Copy the `tmrc` to your home directory (e.g. `C:\Documents and Settings\John Doe\` on Windows XP) and rename it to `tmrc.txt` in order to use the commands we pre-customized. This step is optional.

2.6.2 Unix-like Operating Systems

On Unix-like operating systems such as GNU Linux and Mac OS X: start a shell; unzip the zip archive; change directory properly and type:

```
$ make
$ sudo make install
```

“make install” is optional. It just makes `taskManager` available system wide by copying the executable and man page to cooresponding directories.

Another option is to copy the `tmrc` to your home directory and rename it to `.tmrc` in order to use the commands we pre-customized.

The curses library should ship with most Linux distributions and Mac OS. If not, it can be installed with the package manager (`apt-get`, `yum`, `pacman` on various Linux distributions and `port` on Mac).

¹⁵ Menu names mentioned below may vary among different versions of Visual Studio.

3 Developer Guide

This part of the manual is mainly meant for developers. Users who are interested in finding out the actual structure behind are also welcome to read this part.

3.1 Development Process

3.1.1 Overview

We strictly followed a top-down approach designing the software. Regarding the software development life cycle (SDLC), our team is following the iterative approach on the whole. In each iteration, we are following the waterfall approach so that every version of our software is a complete and working product that satisfies our target users.

3.1.2 Domain Analysis

1. Requirements

This project aims to build up a task manager program that helps user to keep track of his /her to-dos. This program should provide the user with a CLI (command line interface). For example a user is able to type `add "write developer's guide" -t 1d` to add a new task “write developer’s guide” which has a deadline of 1 day.

We did some surveys to find out what are the common features that existing products already have. By doing this, we also brainstorm together to come up with new features that could fill the blanks of existing products and provide users with software of better quality.

As the product should cater Windows users, we have also decided to make a TUI (text user interface) in order to create a more user friendly environment after conducting interviews with typical Windows users. (user guide for TUI is given in section 2.4)

2. OO Domain Model

A condensed object-oriented domain model is given as follows. This model is an overview of the problem domain and ignores most of the details. Basically, the problem is modeled by a user interacting with a task manager that could manage his/her tasks. More detailed descriptions of sub-problems will be discussed later in this manual.



Figure 3: A condensed OO domain model

3.1.3 Architecture

We have chosen to use a multi-tier architecture. And we have chosen the most widely used three-tier architecture to implement the program. Figure 3 shows a diagram representation of the architecture. The user can interact with the software through either command line interface or TUI. The user interfaces will pass whatever command it receives from the user to the logic part. The logic unit of the program will then perform its tasks accordingly and manipulate the storage files which store all the user data.

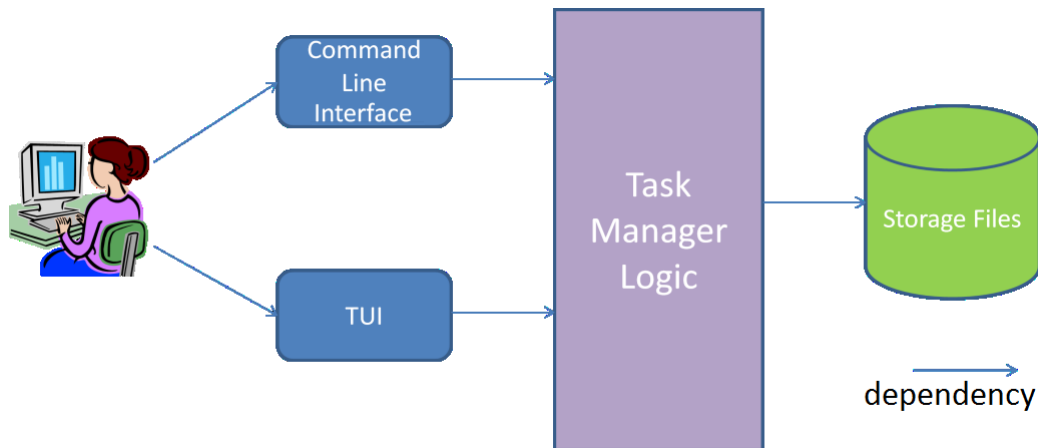


Figure 4: Three-tier Architecture

3.1.4 Implementation

1. Overview of the implementation structure

The user input is read into the IO Module. It then calls a parser to parse the text input to a command object and returns to the I/O module. The command object is then passed to the shell. The shell calls command executors and execute the command accordingly. The storage files are then manipulated to record the operation. The command executor will return a result object to the shell. I/O module will be called again to receive the result object and output to the screen. The class diagram of the main components is given below:

2. UI Implementation

(a) Command Line User Interface

This user interface basically reads in text input from the users and passes it to the task managers logic. When the user requires viewing the tasks, it will output the required fields to the user.

(b) Text-based User Interface

This user interface basically provides an interactive interface between the user and the program. It receives inputs from the user and immediately outputs the corresponding changes to the screen. The basic input and output is controlled by an IO Module. It takes the user inputs and passes it to logic. At the same

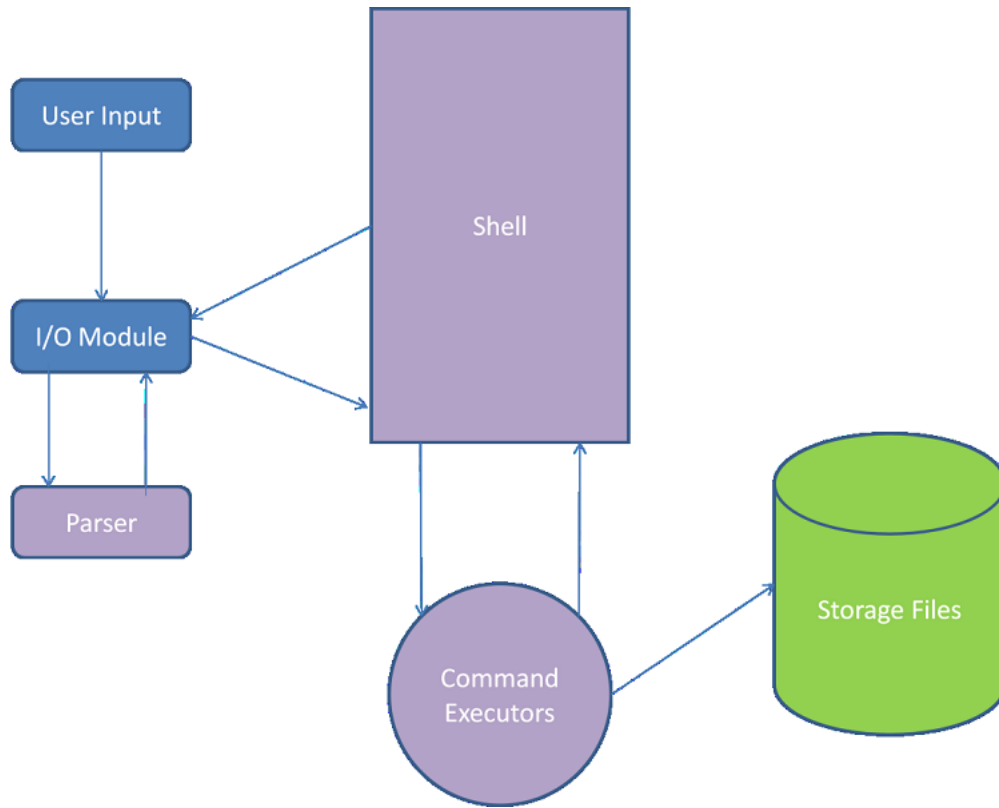


Figure 5: Architecture

time, it is also called by the logic with computed results and asked to output to the screen. The following codes are pasted from TM_IOModule.h. These are the interfaces of the IO Module. It shows how the IO Module interacts with other components inside the program. For example, showOutput () takes in a result object as an argument asks the parser to convert to text and prints out the result on the screen.

```
virtual void showOutput (Result* result); virtual void showWelcomMessage() {};
```

Figure 6. Code fragments from IO Module

3. Logic Implementation

(a) Shell

The core of this program is a shell that controls its behavior. It is initialized when the program starts. Shell does the work of calling command executors and IO Module. The shell takes in the command objects and calls the correct command executor to execute the command. The shell also deals with the results passed from command executors. It calls IO module with the result as an argument. The shell also controls some miscellaneous operations like redo (), undo (), backup (), etc.

For example, if the command input is an add task operation, the Shell will receive a command object with add operation and other details about the task. Then the shell will call add command executor to carry out the detailed work.

If the operation is successfully carried out, a result object will be returned to the shell. The shell will then call the IO module again with the result object to display the added task on the screen.

- (b) **Command Executors** The command executor class is a class that deals with underlying data structures, as its name implies. It is in fact an abstract class that is extended by `MainCommandExecutor` and `SubCommandExecutors`. `MainCommandExecutor` takes in a command object and figures out the type of the command and distributes the work to corresponding `SubCommandExecutor`, which does things to the underlying data structure and return a result object accordingly. For example, if the command object passed to main command executor has `ls` as its command field. The main command executor will infer this and invoke the `lsCommandExecutor` object and asks it to do the actual work. `lsCommandExecutor` will scan through all the tasks and then a result object containing all the tasks will be returned.
- (c) **Parser** Parser can perform the conversion from input to command, that is, deduce the input text and parse it to a command object. The command class attributes and operations are given as follows. Figure 8. Command class The parser is also able to convert a result object to text for output. The result class attributes and operations are given as follows.

The following class diagram shows the relationship between command executors.

4. **Filters** The filter classes are designed for selecting tasks with specific characteristics out from the task list which stores all the tasks.

The filter super class is basically an interface and the subclass filters are the filters that do the actual work. For example, a `GFilter` uses a string as its keyword. It will filter out the tasks that do not have this keyword as its group name.

5. **Auto-completion** Auto-completion function is available in the TUI. The implementation of auto-completion is through an auto-completion class. The auto-completion agent is a knowledge-based agent. Its knowledge base is initialized to be all tokens in existing task descriptions and group names. Tokens are automatically added when a word is typed (only in TUI) or when a task is added or edited. When querying the agent with a prefix of a token, the agent will answer with the smallest suffix such that [prefix — suffix] is a token in the knowledge base. If no such suffix exists, the agent will answer an empty string. The following diagram shows the details of the `AutoCompletionAgent` class. Figure . `AutoCompletionAgent` class

6. Underlying Data Structures

(a) Task

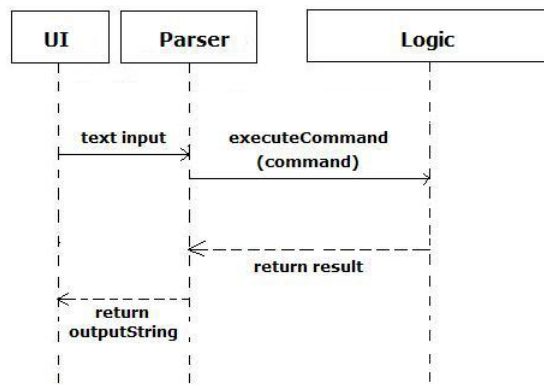
The **task** class is the main class that stores information for the user. The diagram describing task class is given below. Figure . Task class Just to emphasize one thing, there is a `clone()` function for Task objects. It is designed for the sake of security matters. In order to protect users data and privacy, the modification or passing of Task objects are all done by duplicating the Task objects.

(b) Task List

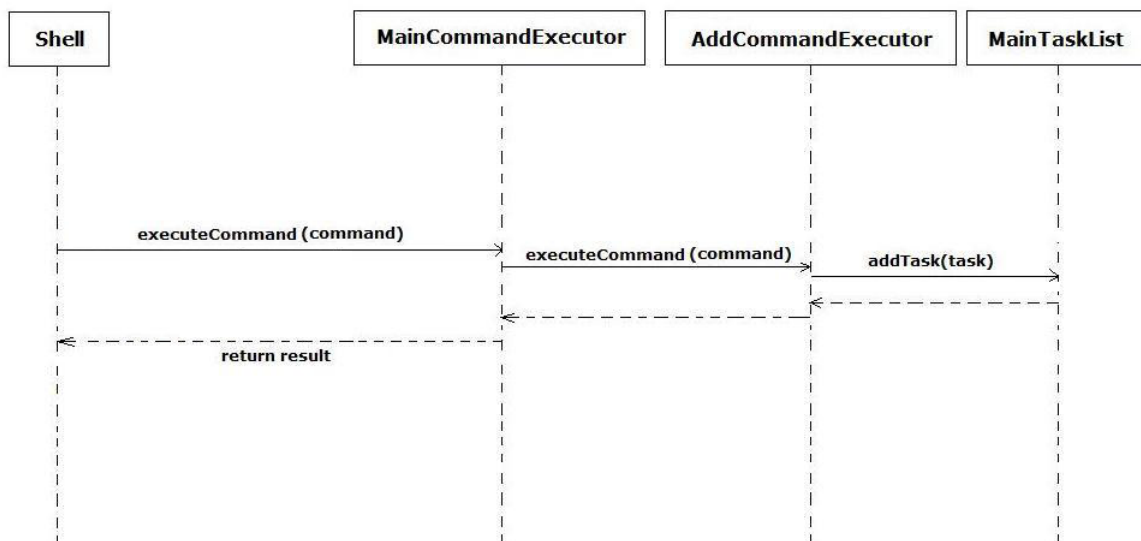
TaskList class is a class that is used as a container of **Task** for the ease of manipulation. The following diagram illustrates the structure of Task List class. For the same reason mentioned before, we specially designed a method called `clone()`. This method basically duplicates the task list object. All manipulations except for sort operation are all done on duplications of the task list object passed in. We want to make sure that the task list is safely prevented from being accidentally screwed up.

3.2 Typical Use Cases Explained

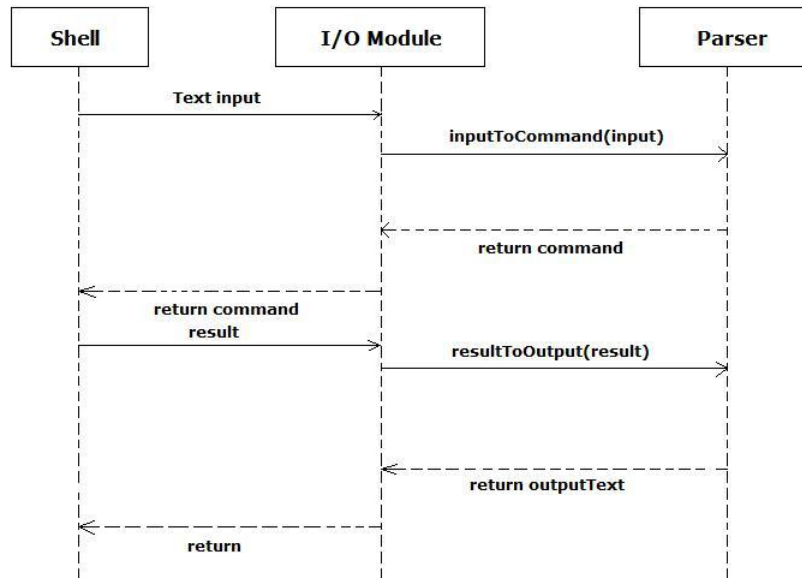
Assume we are adding a task “Write developers guide” with deadline “1d”:
The top level sequence diagram looks like:



A more detailed sequence diagram inside the Logic:



What happens inside the UI part:



3.3 Miscellaneous

1. Comparer.cpp

Comparer class is implemented so as to compare different tasks according to deadline/priority/serial number. . . In fact sorting the tasks is made possible by **Comparer**. When a new comparer object is initialized, the keywords will be given to the comparer as arguments. The comparer is then able to sort some given tasks residing inside a task list according to the keywords (e.g. sort according to group, priority, etc.).

```
vector<Task*> TaskList::sort(Comparer* comp){...};
```

The code fragment above shows that sorting TaskList objects requires the presence of comparer object. The following figure shows the structure of comparer class.

2. util.cpp

util.cpp is a file that implements some functions that are utilized in the program. These functions are ones that are not specifically related to certain classes but are very useful in modifying data. The functions are named in such a way that it clearly states what the function does. So there is no need to have further explanations here.

4 Milestones and Individual Work

1. Decide project topic and brainstorming.

Date: Sept 17 ¹⁶

Members attended: All

We picked task manager as the project topic. There were conflicts among opinions as some of us do not like the GUI board game as it probably means development on Windows, while others want to have a taste of GUI programming. We finally came to agreement on the point that we were more confident to build a useful task manager that ourselves will use even after the project than a game that we are addicted to.

So we chose task manager.

We then came up with “cool” features like `import`, `export` and `cron` (set a regular task) and ended the meet before agreeing to meet tomorrow.

2. Design detailed architecture and develop prototype.

Date: Sept 18

Members attended: All

We designed the Shell-Parser-CommandExecutor-TaskList architecture as we thought it was an intuitive design and easy to split up work.

We sat down together in a quiet lab and created the source files in to just print a welcome message, which is the very first (and rough) prototype. Then we added functions like adding, displaying, editing and removing tasks.

He Haocong was responsible for the command executors of `add` and `ls`.

Liu Jialong was doing the parsing methods for the above commands.

Wang Xiangyu did

Zhou Biyan was coding for

All members participated equally.

3. Adding more commands to “taskManager”.

Date: Sept 19

Members attended: All

We found nothing to do so we decided to meet again to further develop the prototype. This time we finished `import` and `export` commands. We decided to store the user’s tasks in an XML file. Immediately we came to the problem of storing tasks with characters like `<`, `>` and `/`. We learnt from the way web browsers handles HTML – store the special characters as “*entities*”.

He Haocong coded command executors `edit` and `rm`.

Wang Xiangyu did the `import` command executor.

Zhou Biyan was responsible for the `export` command executor.

Liu Jialong was doing the parsing methods for the above commands.

¹⁶ Yes, we started the final project only after submitting CE2. In fact, the initial of the meeting is to polish CE2. :p

4. Integrate v0.1

Date: Oct 7

Members attended:

5. After v0.1 demo...

Date: Oct 9

Methods attended: All

6. Refractor the code base for Windows Compilation (overnight session)

Date: Oct 22 - 23

Members attended: He Haocong, Liu Jialong

The purpose of this session is to extract the method declaration to .h and definition to .cpp files to make the code standard.

As we were developing on *nix, we realized that squeezing all the classes in the .h files will fail to compile on Windows using Visual Studio. After refactoring, we are able to compile taskManager on Windows and write a better Makefile by the way – the previous Makefile contains only one rule and one command, which is something like

```
g++ -o taskManager main.cpp Shell.h Parser.h MainCommandExecutor.h ...
```

We got to know better of C++ compilation process by writing the new Makefile and solving the linking problems and it was worth the stay-up.

7. At media lab ...

Date: Oct 29

Members attended: All

8. Feature close shop, testing and documenting. (overnight session)

Date: Nov 4 - 5

Members attended: He Haocong, Liu Jialong

9. Polishing the last bits for submission.

Date: Nov 6

Members attended: All

We met up to do the developer guide, compilation on Windows, usability testing and video.