Marcus Ong - Project Portfolio

PROJECT: TimeBook

Overview

TimeBook is a desktop application that is morphed from AddressBook Level 3 (AB3). TimeBook is a scheduling application that aims to help busy NUS undergraduates keep track of the schedules of you and your friends. It also can find the common free time and venues among you and your friends. TimeBook will have the following features:

1. A graphical user interface (GUI) but most of the interactions with the application would happen using command line interface (CLI).
2. Allows users to add the schedules of his or her friends and organise them into groups.
3. Deconflict different schedules of different people and different groups to find the common free time among them.
4. Integration with NUSmods API to allow users to enter their NUSmods timetable link to add it to their schedule.
5. Integration with Google Maps API to allow the application to evaluate the best venue for the group to meet up during the free time in their schedules.

This document summarizes my contributions to the TimeBook project in terms of the code, user guide and developer guide.

Summary of contributions

This section documents a summary of the major and minor contributions I have made to this project.

- **Major enhancement**: implemented **the ability to add NUSMods timetables to schedules**
    - What it does: This feature allows the user to add their own NUSMods timetables by providing their NUSMods link or by adding individual modules.
    - Justification: This feature improves the product significantly given our target user of busy NUS undergraduates as they can quickly setup their timetable just by using pre-existing data from NUSMods rather than creating their own schedule from scratch.
    - Highlights: This implementation was challenging as it required the development of a new API component to query, transform and store external data. Extensive checks have to be done to make sure the data is correctly handled. It also required an analysis of multiple design alternatives in order to find a balance between the complexity of the implementation and robust offline support. A caching mechanism to store query results and a pre-processing program was written to store all relevant NUSMods data for offline support.
    - Credits: The NUSMods API was used for retrieving NUSMods data. The JSON.simple library

was used to encode and decode the JSON data that was retrieved from the NUSMods API.

- **Minor enhancement**: added a `showmod` command that allows the user to open up the https://nusmods.com/MODULE page on the browser, so that the user can view a module's details on NUSMods.
- **Code contributed**: See on Reposense
- **Other contributions**:
  - Project management:
    - Managed releases `v1.1` - `v1.4` (4 releases) on GitHub
  - Enhancements to existing features:
    - Wrote tests for features I implemented (#189)
  - Documentation:
    - Added documentation for the Developer Guide and User Guide, for the sections related to NUSMods and External API that I implemented. (#135, #137, #144, #172, #174)
    - Updated documentation for the Developer Guide for the Design → Architecture, Design → Model component and Design → Api component. (#278)
  - Community:
    - Reported bugs and suggestions for other teams in the class during the practical exam dry run.
  - Tools:
    - Integrated a Github plugin (Coveralls) to the team repo
    - Integrated a Github plugin (Travis CI) to the team repo
    - Set up a Telegram Bot to notify team members of Travis build statuses on success or failure (#45)

Contributions to the User Guide

Given below are sections I contributed to the User Guide, namely the `addmod`, `addmods` and `showmod` commands. They showcase my ability to write documentation targeting end-users.

Add Module to Schedule: `addmod`

Want to add an NUS module to you or your friend's schedule on TimeBook? You can do so with the `addmod` command! If you already have your timetable on NUSMods, check out the `addmods` command!

Format: `addmod [n/NAME] m/MODULE_CODE cl/CLASS_1_TYPE:CLASS_1_NUMBER,CLASS_2_TYPE:CLASS_2_NUMBER,`

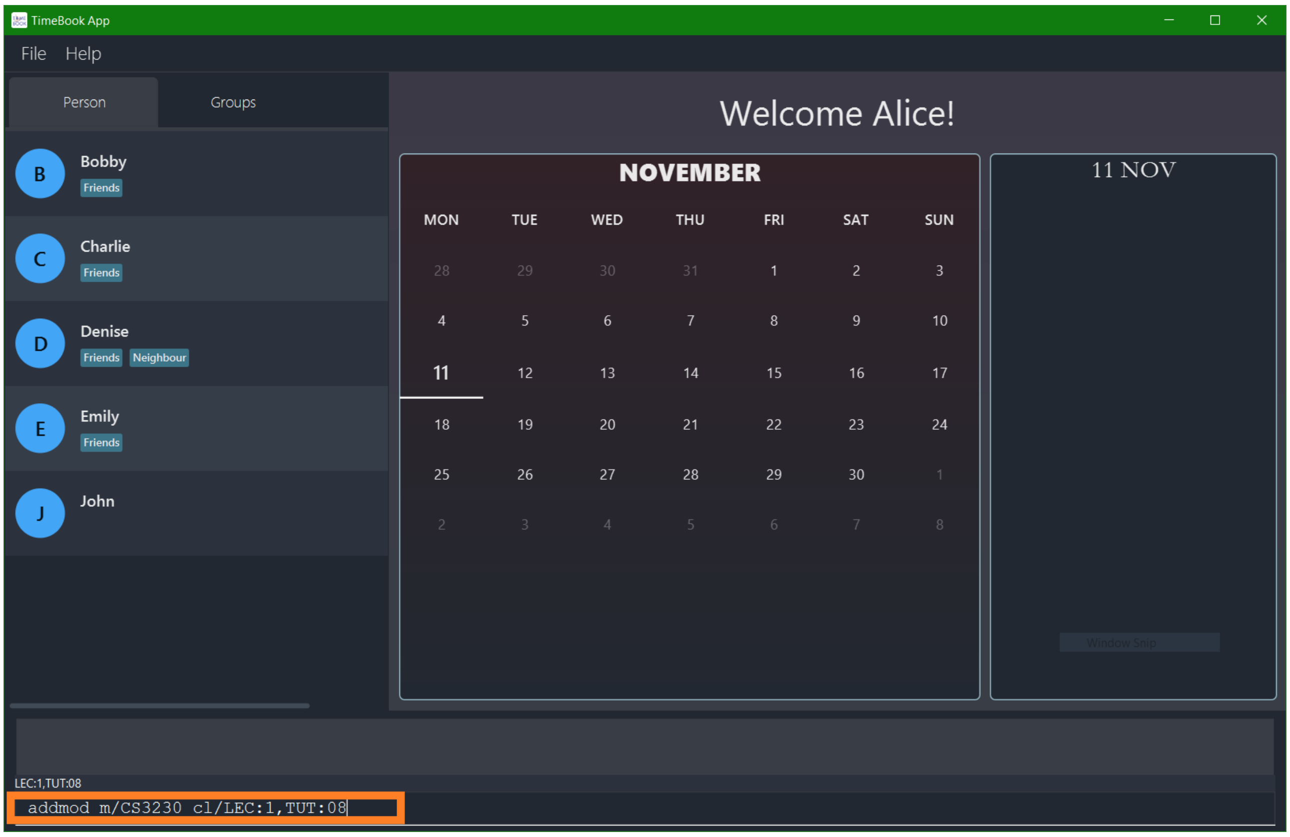
- Currently supports academic year 2019/2020 and semester 1 only.
- If the NAME is not provided, then the modules will be added to the default user, which is you!
- : Just like adding a normal event via `addevent`, the module will only be added if the specified classes does not clash with any events in the person's schedule.

Examples:

- `addmod m/CS2103T cl/LEC:G01`
  This adds CS2103T lecture G01 to your schedule.
- `addmod n/John m/CS3230 cl/LEC:1,TUT:08`
  This adds CS3230 lecture 1 and tutorial 08 to John's schedule.
- `addmod n/John m/CS2100 cl/LEC:1,TUT:01,LAB:08`
  This adds CS2100 lecture 1, tutorial 01 and lab 08 to John's schedule.

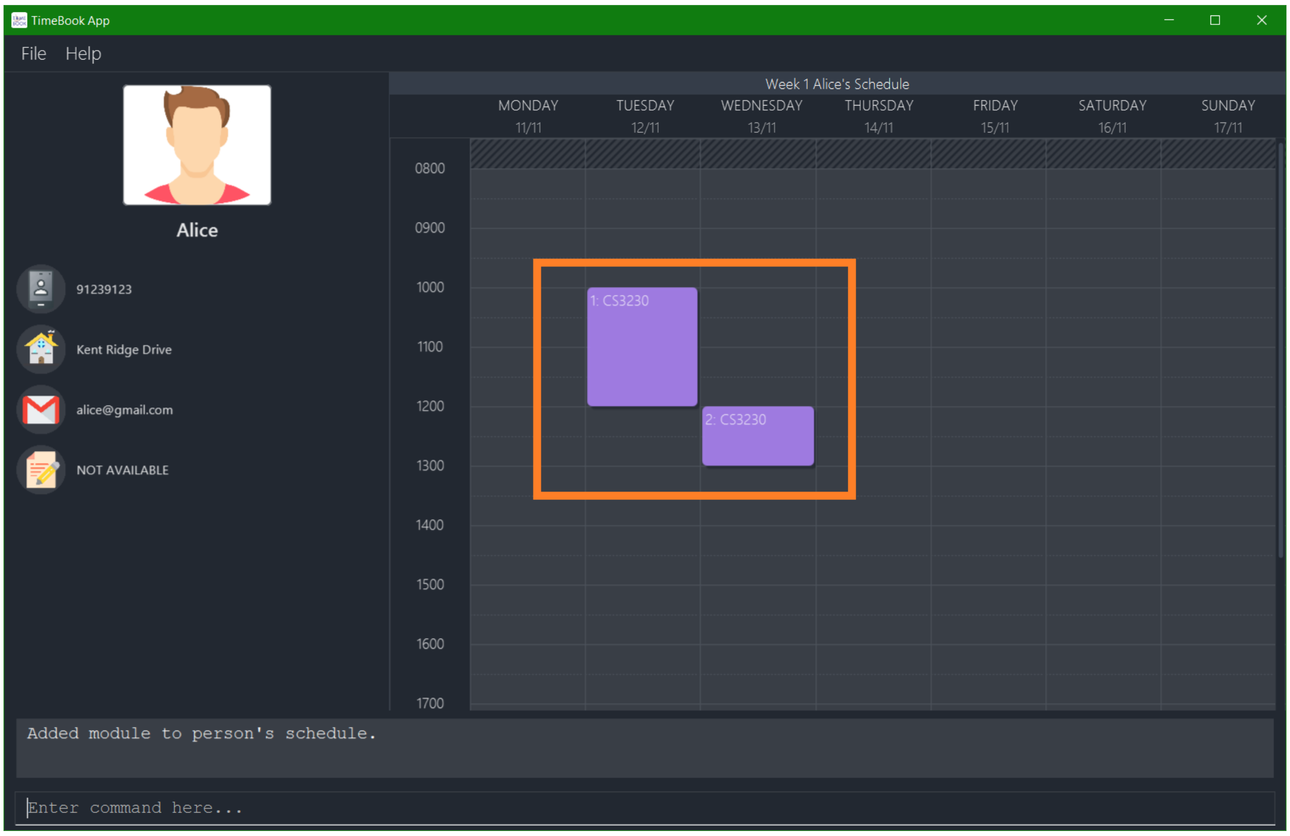
How do I add an NUS module to my schedule?

1. Suppose you want to add CS3230 lecture 1 and tutorial 08 to your schedule. You can add the classes to your schedule easily by first typing `addmod m/CS3230 cl/LEC:1,TUT:08` into the command box, then pressing btn:[Enter] to execute it!



```
LEC:1,TUT:08
addmod m/CS3230 cl/LEC:1,TUT:08
```

2. If you manage to successfully add the module and its classes into the person's schedule, you will see the person's schedule appearing with the newly added timeslots:



```
Added module to person's schedule.
```

Add Modules via NUSMods Link: `addmods`

Already have your modules timetable on NUSMods? Great, you can easily add your modules timetable into TimeBook with the `addmods` command!

Format: `addmods [n/NAME] link/NUSMODS_SHARE_LINK`

- Reads the specified `NUSMODS_SHARE_LINK` to get the modules and classes, then adds the classes into the person's schedule.
- If the NAME is not provided, then the modules will be added to the default user, which is you!
- Currently supports academic year 2019/2020 and semester 1 only.
- ⚠: Just like adding a normal event via `addevent`, the module will only be added if the specified classes does not clash with any events in the person's schedule.

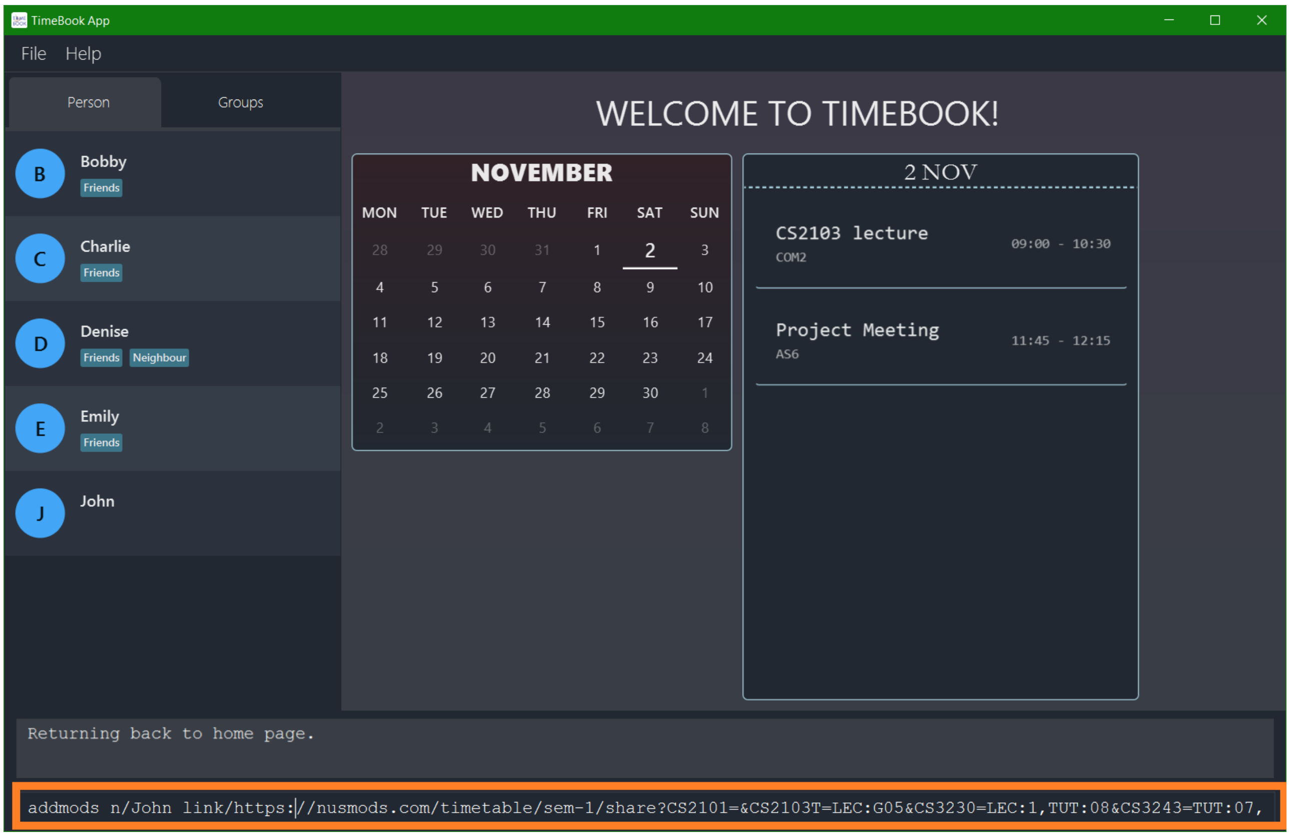
Examples:

- `addmods link/https://nusmods.com/timetable/sem-1/share?CS2101=&CS2103T=LEC:G05&CS3230=LEC:1,TUT:08&CS3243=TUT:07,LEC:1&GEQ1000=TUT:D17` This will add the modules in the NUSMods link to your schedule.
- `addmods n/John link/https://nusmods.com/timetable/sem-1/share?CS2101=&CS2103T=LEC:G05&CS3230=LEC:1,TUT:08&CS3243=TUT:07,LEC:1&GEQ1000=TUT:D17` This will add the modules in the NUSMods link to John's schedule.
- `addmods n/Bob link/https://nusmods.com/timetable/sem-`

`1/share?CS2101=&CS2103T=LEC:G05&CS3230=LEC:1,TUT:08&CS3243=TUT:07,LEC:1&GEQ1000=TUT:D17`
This will add the modules in the NUSMods link to Bob's schedule.

How do I add my team member John's NUSMods timetable to TimeBook?

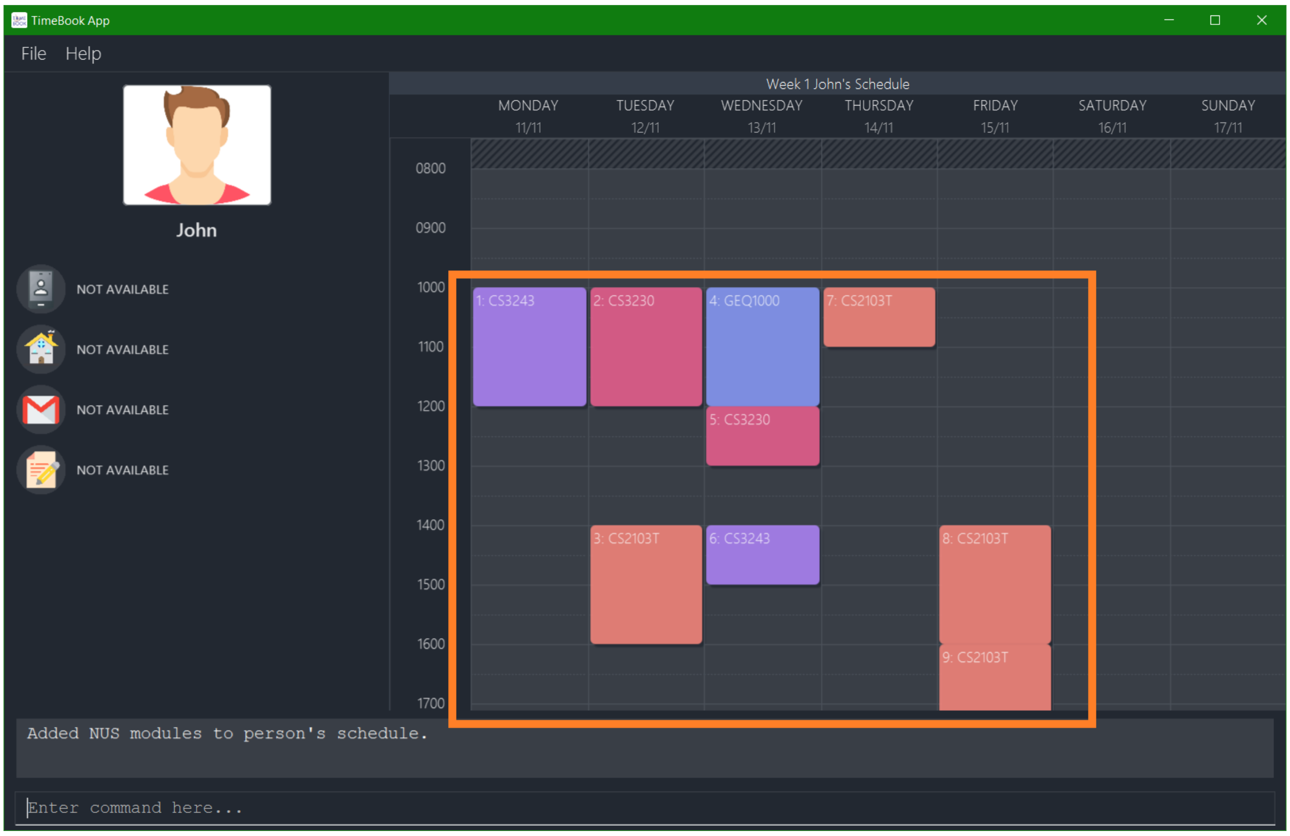
1. Well that is simple, add John's NUSMods timetable by first typing `addmods n/John link/` into the command box, then copy and paste his NUSMods link. Finally, press btn:[Enter] to execute it.



```
Returning back to home page.
```

```
addmods n/John link/https://nusmods.com/timetable/sem-1/share?CS2101=&CS2103T=LEC:G05&CS3230=LEC:1,TUT:08&CS3243=TUT:07,
```

2. If the command succeeds, you will see John's schedule update with the newly added timeslots from his NUSMods timetable:



```
Added NUS modules to person's schedule.
```

Show Module: `showmod`

Want to know more information about an NUS module? Use `showmod` to quickly open up the NUSMods page for a specific module on your browser!

Format: `showmod m/MODULE_CODE`

- ⚠: This command requires internet connection.

Examples:

- `showmod m/CS2103T`
  Opens up https://nusmods.com/modules/CS2103T on your default browser.
- `showmod m/CS2101`
  Opens up https://nusmods.com/modules/CS2101 on your default browser.

Contributions to the Developer Guide

*Given below are the **Add NUSMods To Schedule** section and the **External APIs** section that I contributed to the Developer Guide. They showcase my ability to write technical documentation and the technical depth of my contributions to the project.*

Add NUSMods To Schedule

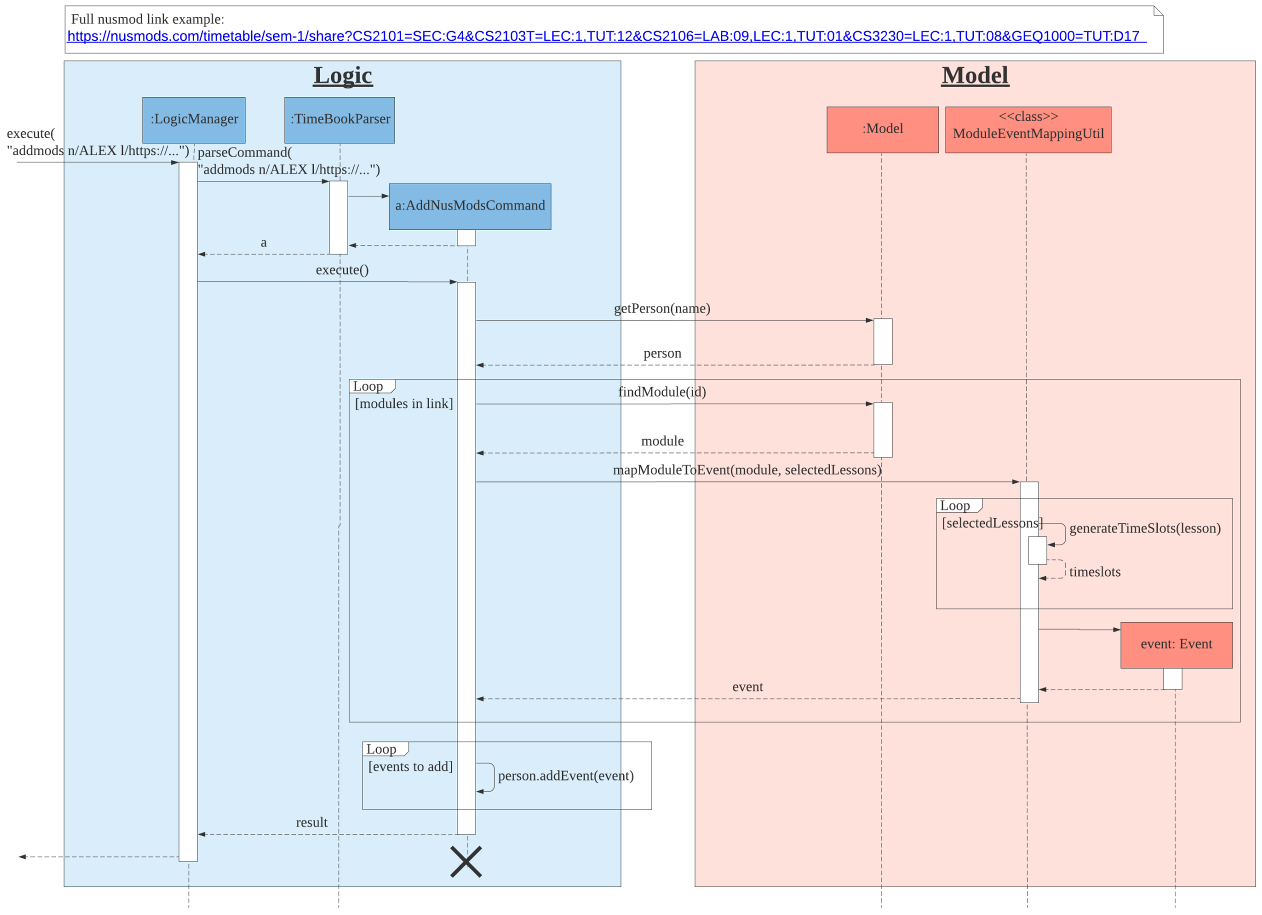
Implementation

This feature allows users to add their NUSMods timetable (using the `AddNusModsCommand` or `AddNusModCommand`) to their TimeBook schedules.

The `AddNusModsCommand` can be executed by the user through the CLI with the following syntax `addmods n/NAME link/NUSMODS_SHARE_LINK`. The share link contains semester number, module codes, class types and class numbers, which are used for creating and adding events to the person's schedule.

The `AddNusModCommand` can be executed by the user through the CLI with the following syntax `addmod n/NAME m/MODULE_CODE cl/CLASS_TYPE_1:CLASS_NUMBER_1,CLASS_TYPE_2:CLASS_NUMBER_2,…`. This allows the user to add individual modules but requires the user to manually specify the class type and class numbers.

Since the `AddNusModsCommand` is less complex than `AddNusModsCommand` as it only adds 1 module at a time and does not require URL validation and parsing, we will walk through the implementation of the latter instead. The following sequence diagram shows what happens when `AddNusModsCommand` is executed:



Full nusmod link example:
https://nusmods.com/timetable/sem-1/share?CS2101=SEC:G4&CS2103T=LEC:1,TUT:12&CS2106=LAB:09,LEC:1,TUT:01&CS3230=LEC:1,TUT:08&GEQ1000=TUT:D17
Logic
Model
:LogicManager
:TimeBookParser
:Model
<<class>> ModuleEventMappingUtil
execute("addmods n/ALEX l/https://...")
parseCommand("addmods n/ALEX l/https://...")
a:AddNusModsCommand
a
execute()
getPerson(name)
person
Loop [modules in link]
findModule(id)
module
mapModuleToEvent(module, selectedLessons)
Loop [selectedLessons]
generateTimeSlots(lesson)
timeslots
event: Event
event
Loop [events to add]
person.addEvent(event)
result

Figure 1. Sequence diagram of executing the AddNusModsCommand

1. User enters `addmods n/NAME link/https//nusmods.com/…`. The command string will be passed to `LogicManager` which calls `TimeBookParser` for parsing into an `AddNusModsCommand` object.

2. The `TimeBookParser` delegates the parsing to `AddNusModsCommandParser`. The name parameter will be parsed into a `Name` object, while the link parameter will be passed `NusModsShareLink#parseLink`, which validates and parses the link to create an `NusModsShareLink` object containing the `SemesterNo`, each module's `ModuleCode`, and their corresponding lessons' `LessonType` and `LessonNo`. The `AddNusModsCommandParser` then creates an `AddNusModsCommand`, which takes in the `Name` and `NusModsShareLink` objects, and passes the command back to `LogicManager`.
3. The `AddNusModsCommand#execute` is then called by the `LogicManager`. In the `AddNusModsCommand#execute` method,
    a. `AddNusModsCommand#getPerson` is called to get from the model the `Person` whose schedule will be added with the modules.
    b. `AddNusModsCommand#mapModulesToEvents` is then called to map each module to an event. Each `Module`-`LessonType`-`LessonNo` entry in the `NusModsShareLink` is iterated through and the following is executed,
        i. Call `model#findModule` to get the `Module` with the given module code.
        ii. Pass the `Module` and pairs of `LessonType`-`LessonNo` to `ModuleEventMappingUtil#mapModuleToEvent` to generate an `Event` based on the module and lesson type-number pair. One `Module` is mapped to one `Event`, and each `Lesson` in the module is used to generate multiple `Timeslots` for an event.
    c. The created events will then be iterated through and executed with `person#addEvent` to add the events to the person's schedule.
4. The command result is returned to `LogicManager` and feedback is displayed to user.

The following class diagram shows the `Module` class and its associated classes. The structure follows closely to the data retrieved from NUSMods API with some changes to suit the needs of our application.

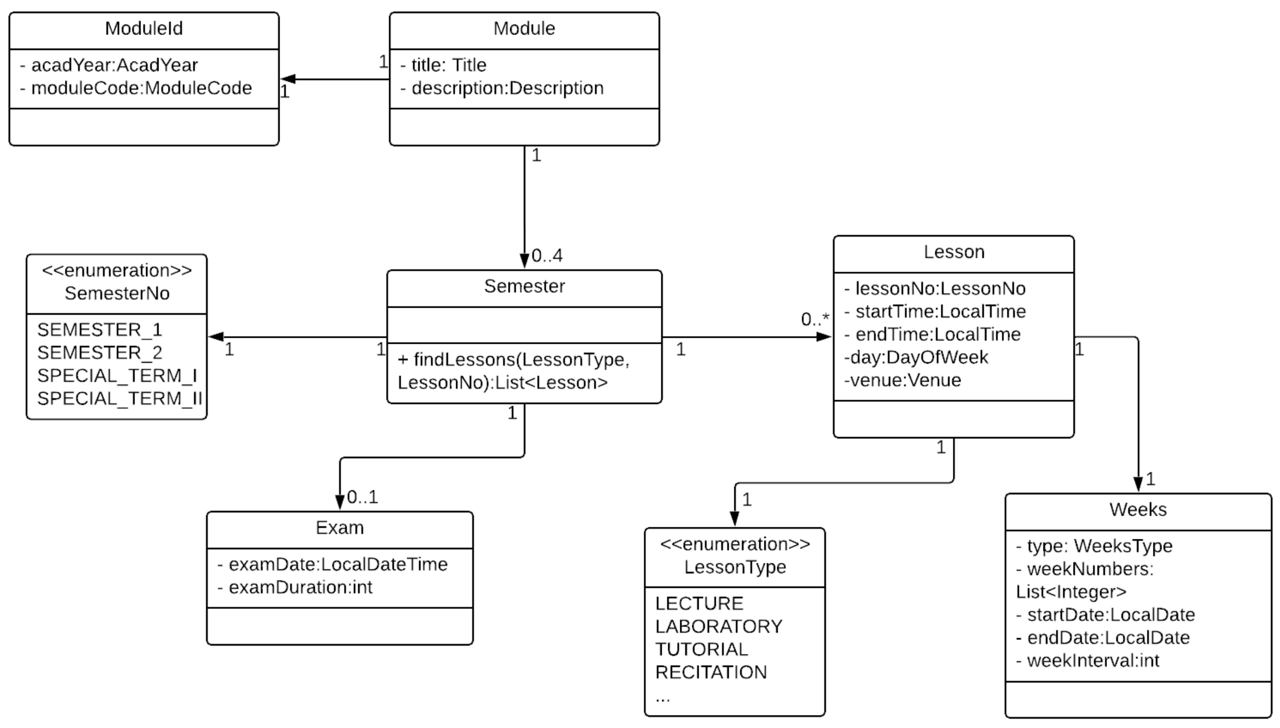


Figure 2. Class diagram of `Module` and associated classes

The following class diagram shows the `Event` class and its associated classes relevant in the context of this feature.

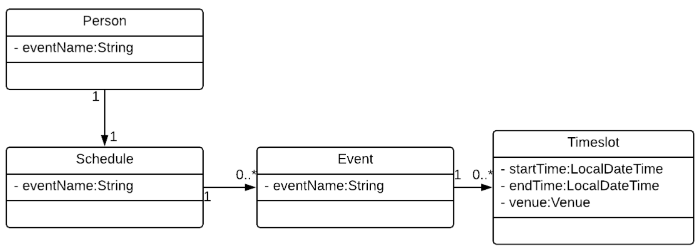


Figure 3. Class diagram of `Event` and associated classes

Design Considerations

Aspect:	Choice	Pros	Cons

Ease of use	1. Allow user to add modules individually	Easier to implement.	Tedious for user, as user has to specify the module code, lesson types and lesson numbers in the command.
	2. Allow user to add modules via NUSMods share link **(current choice)**	User can easily get the NUSMods share link of his/her existing NUSMods timetable and copy/paste the link into the command.	Require implementation of complex URL validation and parsing.
	3. Allow user to import the downloaded iCalendar file from NUSMods	Opens up the possibility of importing generic iCalendar files.	Harder to implement, need to deal with file IO and .ics file format parsing. Also, user is unlikely to get the iCalendar files of his/her group members (due to tediousness)
We chose to implement choice 2 as it is the most user-friendly one. The bonus is that choice 1 has been implemented as well as it is easy to adapt what we have already implemented for choice 2 to make choice 1 work.			

External APIs

The application requires data from the NUSMods API for the Add NUSMods To Schedule feature and data from the Google Maps API for the Closest Common Location feature. The following subsections describe the implementation of the Api component:

APIs

We have implemented an `Api` component to contain the logic of interfacing with external APIs, the architecture diagram of this component can be seen in Design → Api component.

The `websocket.NusModsApi` class contains methods for querying different endpoints of the NUSMods API and parsing the query results into `JSONObject` or `JSONArray` objects.

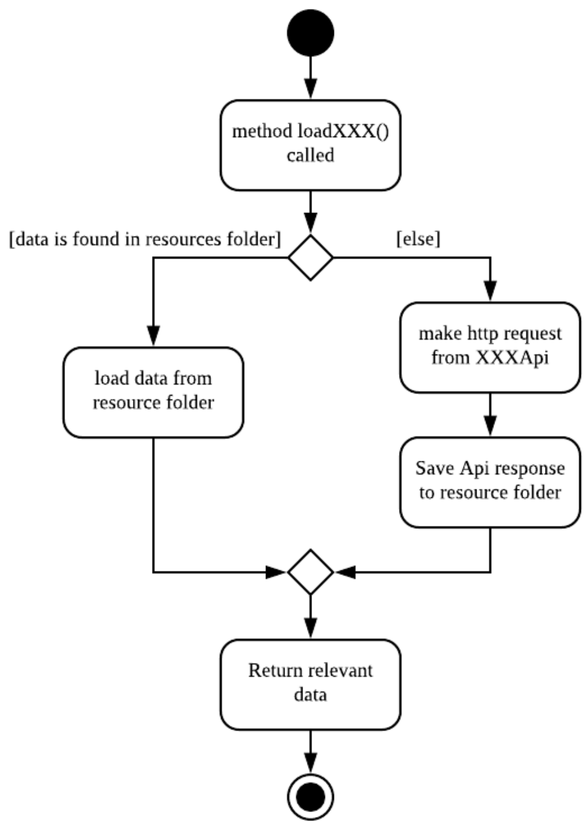
The `websocket.GmapsApi` class contains methods for querying different endpoints of the Google Maps API and parsing the query results into `JSONObject` or `JSONArray` objects.

The `websocket.Cache` class handles the saving and loading of cached API results in the resources folder.

The `websocket.util` folder contains various utility classes for querying external APIs.

Caching API Results

To support limited connectivity in our application, the results of all API queries are preprocessed and saved into the resources directory. This is managed by the `Cache` class. The following activity diagram shows how the caching feature works when external data is required for the execution of a certain command:



method loadXXX() called
[data is found in resources folder]
[else]
load data from resource folder
make http request from XXXApi
Save Api response to resource folder
Return relevant data

Figure 4. Activity diagram showing decision flow for `loadXXX` methods

Preprocessing NUSMods API

We preprocess the data collected from NUSMods API so that we can cache the data for offline usage and perform some early computation steps (e.g. validation, parsing) to reduce the computation cost during actual use in the application.

Notably, the key information that we require for each NUS module is the timetable information. However, there is no available API endpoint which provides the timetable information of all modules at once. Rather, there is only an endpoint which provides the timetable information of one module per query. Thus, we developed a small program in `logic.internal.nusmods.ImportMods`, which is executed prior to the main application itself, to query the timetable info for every module and save the data in the resources folder.

Design Considerations

Aspect:	Choice	Pros	Cons

Limited Connectivity Support	1. Preprocessing API results and storing it in resources folder.	Can achieve complete offline support, also avoids the issue of providing API keys in production **(current choice)**.	Have to run the preprocessing programs in `logic.internal` from time to time to update data files, e.g. for modules in new academic year or new locations else features will not work.
	2. Caching Query Results	Achieves limited connectivity support (call once and save result, then use saved result for future calls). Also, needs less work to support future data/API changes.	Not so useful in cases where a large number of queries is required to be preprocessed first in order to handle a single user command, e.g. finding common location requires building a `LocationGraph` after getting the locations data from Google Maps.
	3. Direct API queries	Easy to implement, minimal work to support future data/API changes.	No limited connectivity support.
The choice of implementation was progressive - it was initially choice 3 for prototyping, then enhanced to choice 2, and finally adapted to choice 1. Choice 1 suits our needs the best as it can achieve complete offline support and avoid handling API keys in production. Additionally, the cons of choice 1 is manageable. However, a mix of choice 1 and 2 will be required moving forward if we intend to support non-NUS locations or multiple academic semesters.			