ArchDuke - Developer Guide

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Preface

About ArchDuke

Team leaders often face problems managing multiple projects, especially software development projects where the usage of a Kanban board is common.

Having to manage multiple Kanban boards for each individual project is a huge hassle for team leaders. As such, ArchDuke solves this issue by allowing team leaders to manage

1. Team members
    - ArchDuke allows users to assign tasks to team members, and track their workload, progress on tasks, and contributions.
2. Tasks in a group project
    - ArchDuke allows users to track multiple tasks within a project. Tasks can be created and assigned to members.
    - ArchDuke tracks the deadlines and priority levels of tasks, to help the user organise which tasks should be assigned and completed.
3. Multiple group projects
    - ArchDuke allows users to track multiple group projects. New group projects can be created and a default Kanban board will be created for users to start adding tasks.

Document Change History

Revision Date	**Summary of Changes**
23 October 2019	Version 1.0: Added implementation design for Assignment Controller and Project functions
22 October 2019	Version 0.9: Updated Architecture Design
15 October 2019	Version 0.8: Updated the name of project from Duke to ArchDuke
2 October 2019	Version 0.7: Updated Prerequisites and removed unwanted lines
30 September 2019	Version 0.6: Added table of contents, preface and document history
26 September 2019	Version 0.5: Updated use cases for a cleaner look
24 September 2019	Version 0.4: Added Non-functional Requirements to DeveloperGuide
23 September 2019	Version 0.3: Added user stories to DeveloperGuide
22 September 2019	Version 0.2: Added use cases to DeveloperGuide
18 September 2019	Version 0.1: Creation of DeveloperGuide based on template

1. Setting up

1.1. Prerequisites

1. **JDK** 11 or above is required
2. **IntelliJ** IDE is recommended

1.2. Setting up the project environment on your local machine.

1. Fork and clone the forked remote on your local machine.
2. Launch IntelliJ (If you’re not on the IntelliJ Welcome screen please close your existing project by going to `File` > `Close Project`.)
3. Set up the correct JDK version for Gradle
    a. Click `Configure` > `Structure for New Projects`
    b. Under `Project Settings` Click on `Project`
    c. Under `Project SDK` Click `New…` and point it to JDK 11 path.
    d. Click `OK` to save the configuration
4. Click `Import Project`
5. Locate the `build.gradle` file and select it. Click `Open`.
6. Open the IntelliJ console/terminal and run the gradle command `gradlew processResource` on **Windows** or `./gradlew processResource` on **Mac/Linux** (If you are encountered a permission error: `./gradlew: Permission denied` add the executable permission to the the shell script by running `chmod 744 gradlew` in your terminal) It should finish with the `BUILD SUCCESSFUL` message. This will generate the resources required by the application and tests.

1.3. Verifying the setup

1. Run Duke to verify and try a few commands. (Refer here {insert link to the command page} the commands)
2. Run the JUNIT Test/gradlew test command to ensure that all the test case passes.

2. Design

Architecture Design

ArchDuke was implemented using the N-tier architecture approach. Having a N-tier application architecture helped s to flexibly create the application by segregating the application into tiers. Hence instead of reworking the entire application when the application is modified, we only had to rework the specific layer dealing with the modification. This approach also helped us in logically structuring the elements which made up ArchDuke. The Architecture Diagram given below explains the high-level design of ArchDuke.

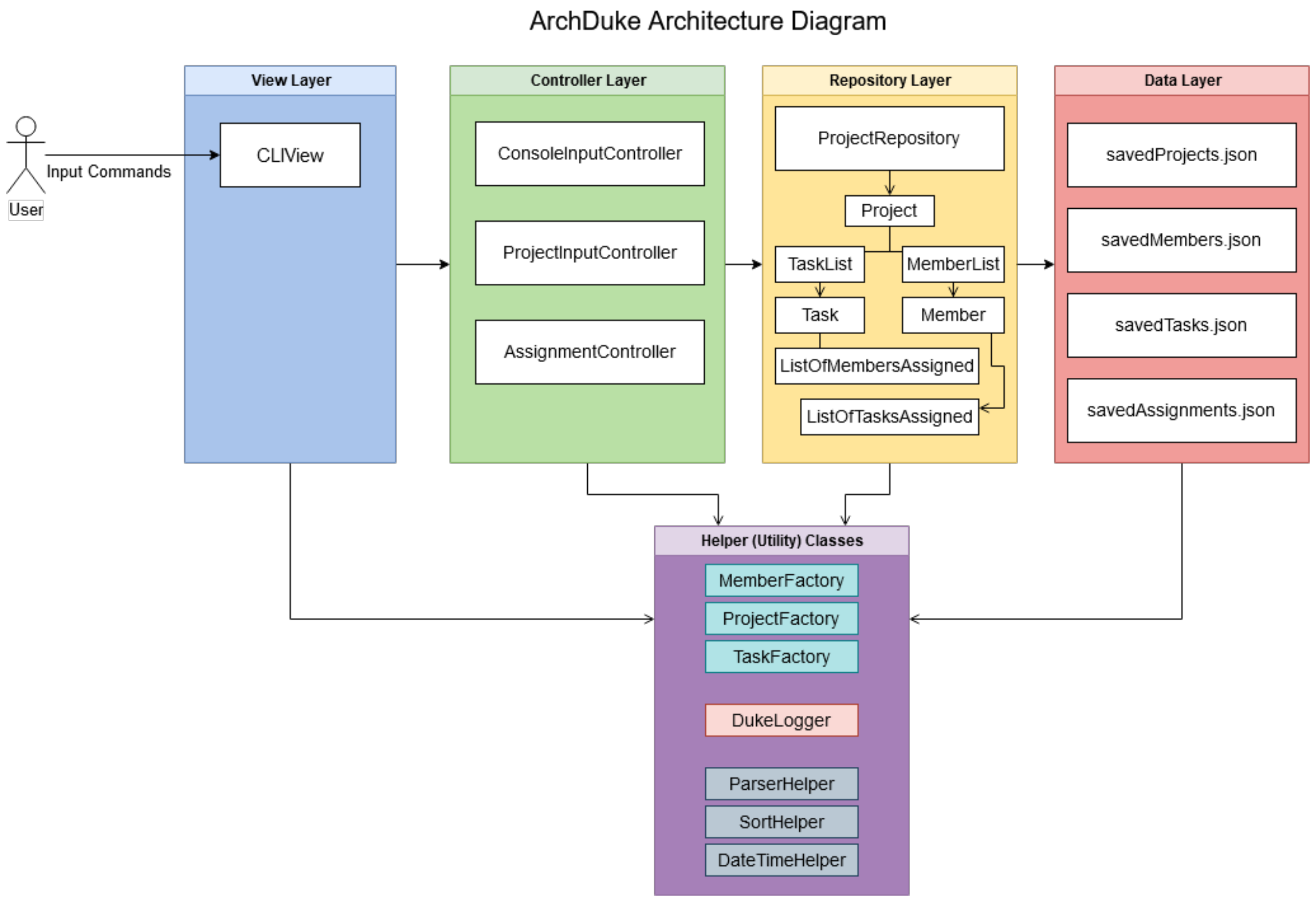


Figure 1. Architecture Diagram

Below is a quick overview of each component based on our Architecture.

Not included in the diagram is the `Main` program in the folder ***launcher***. The Main program is responsible for initializing the `View` layer.

- In our case, as ArchDuke is a command line program, `Main` will initialize `CLIView`.

`Utility` represents a collection of classes used by multiple other components and can be accessed by all layers.

- `Factory` classes : Used mainly by `Repositories` and `Controllers` to create objects based on user input.
- `Logger` classes: Used by all classes to write log messages to ArchDuke's log file.
- `ParserHelper` class: Used by all classes for user input parsing
- `SortHelper` class: Used primarily by `Repositories` and `Controllers` for sorting objects based on description before a Response model is generated for the `View` layer.
- `DateTimeHelper` class: Used for handling anything that is related to Date objects or parsing inputs for Date objects

The rest of the App consists of four main layers.

- `View` layer: The UI of ArchDuke. Responsible for printing everything that the user will see and reading inputs from the user.
- `Controller` layer: Responsible for handling user inputs and sending them to the respective

classes for parsing, cleaning, or object creation.

- `Repository` layer: Responsible for holding data in-memory
- `Data` layer: Responsible for saving and loading persistent data from hard disk.

Each layer will be discussed in detail below.

2.1. View Layer

Our main UI Component is a class called CLIView. It is mainly responsible for reading the user input and displaying formatted messages to the user.

When ArchDuke is running, CLIView repeatedly reads the user input line by line, and sends it to the parsing components (Controllers) to make sense of the input. Eventually, the controllers will retrieve the relevant messages and information for CLIView to display. Currently, the main CLIView is being called directly by the controllers to execute the commands by coordinating all other components.

2.3. Controller Layer

2.2.1 ConsoleInputController

`ConsoleInputController` is the class which deals with the CRUD functionalities for all the projects of the user.

Rationale for implementation

2.2.2 ProjectInputController

`ProjectInputController` is the class which deals with the management of a specific project.

Rationale for implementation

We realized that the commands related to managing a project are extremely complex. Hence we had to segregate the methods related to managing a project from the `ConsoleInputController` and this resulted in the creation of the `ProjectInputController`.

When the project is being managed, all the commands input by the user are directly handled by the `ProjectInputController`. Hence, `ProjectInputController` acts like a parser for commands dealing with the CRUD functionalities for Members, Tasks, Task Assignments and Reminders.

2.2.3 AssignmentController

`AssignmentController` is a class which manages the assignment of tasks to group members.

Rationale for implementation

Before the implementation of `AssignmentController`, the parsing of assign commands was planned to be done within the ProjectInputController class. However, we realised that parsing for assignment commands would be extremely complex due to the potentially high number of arguments.

- Example command: `assign task -i 1 2 -to 1 2 3 -rm 4 5`

The task index numbers (1, 2) , assignee indexes (1, 2, 3) and unassigned indexes (4, 5) must be parsed. They should also be validated to ensure that the index numbers exist, and do not cause errors/exceptions such as IndexOutOfBoundException. From the parsed input, task assignments can then be managed. Therefore, the `AssignmentController` was created for the following reasons:

1. To ensure that these 3 parts of the input can be easily managed
2. To isolate the assignment commands to avoid making the code in projectInputController too long

2.3. Repository layer

2.4. Data Layer

3. Implementation

This section describes in detail on how certain features of ArchDuke are implemented. Most features are based on Create, Read, Update, Delete, also known as **CRUD** functions

3.1. CRUD functionality for Projects

Implementation

CRUD functions are facilitated by `ConsoleInputController`, `ProjectRepository` and `ProjectFactory`. It allows ArchDuke to be able to do some basic CRUD functions for a Project, namely only Creation, Reading and Deletion. `ConsoleInputController` will read the relevant commands from the `View` layer and call the relevant methods in `ProjectRepository`.

It implements the following commands:

- `create PROJECT_NAME` — Creation of a new Project
- `list` — Viewing all Projects that have been created
- `delete PROJECT_INDEX` — Delete a Project that has been created previously

These operations are exposed in the `IRepository` interface as `addToRepo()`, `getAll()` and `deleteItem()`.

NOTE However, in order to create a object, inputs sent to the `Repository` layer must be sent to a `Factory` class as the `Repository` layer is not responsible for the creation of Objects.

The example usage scenario below will explain in detail the data flow and how the program behaves at each step of CRUD functions with regards to a Project object.

Step 1) ArchDuke is launched for the first time by the user. A new `CLIView()` and `ConsoleInputController` is created upon initialization. Immediately after initialization, `CLIView.start()` will be called which prints a welcome message to the user and awaits for user input.

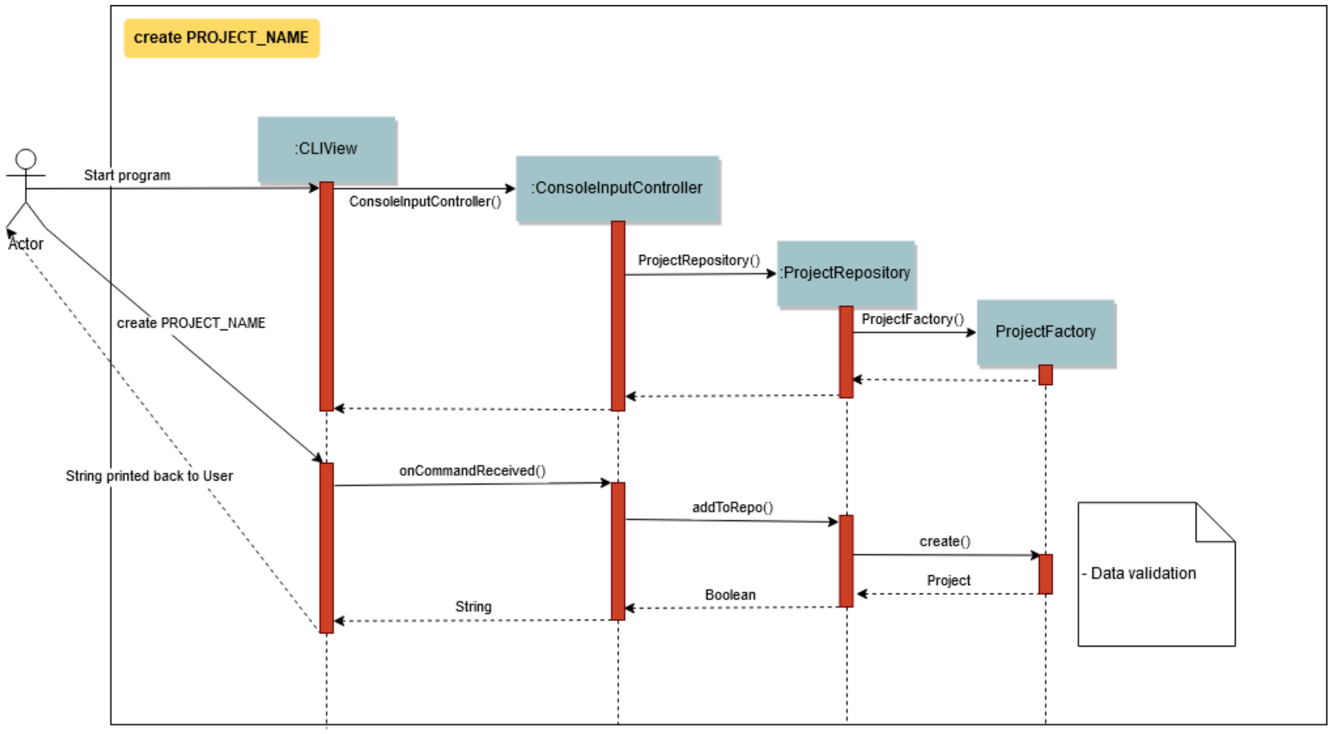
Step 2) The user executes the command `create Avengers Assemble!` to create a new Project with the description "Avengers Assemble!". User input is fed from `CLIView` to `ConsoleInputController`, where simple parsing will be done to determine the type of command that the user has executed.

Step 3) User input will be understood as a command to create a new project and thus sent to `ProjectRepository` where it will call on `ProjectFactory` for the creation of a new Project object.

Step 4) `ProjectRepository` will check if `ProjectFactory` managed to create an object successfully. Any unsuccessful creation will be due to wrong user commands or a bug during data validation in `ProjectFactory`.

Step 5) Assuming Project creation was a success, `ProjectRepository` will store it in an ArrayList and return `True` back to `ConsoleInputController` to signify the successful creation of a new Project object. `ConsoleInputController` will call `CLIView` to print appropriate messages to the user based on whether a new Project object was created successfully or not.

The following sequence diagram shows how the `create PROJECT_NAME` operation works.



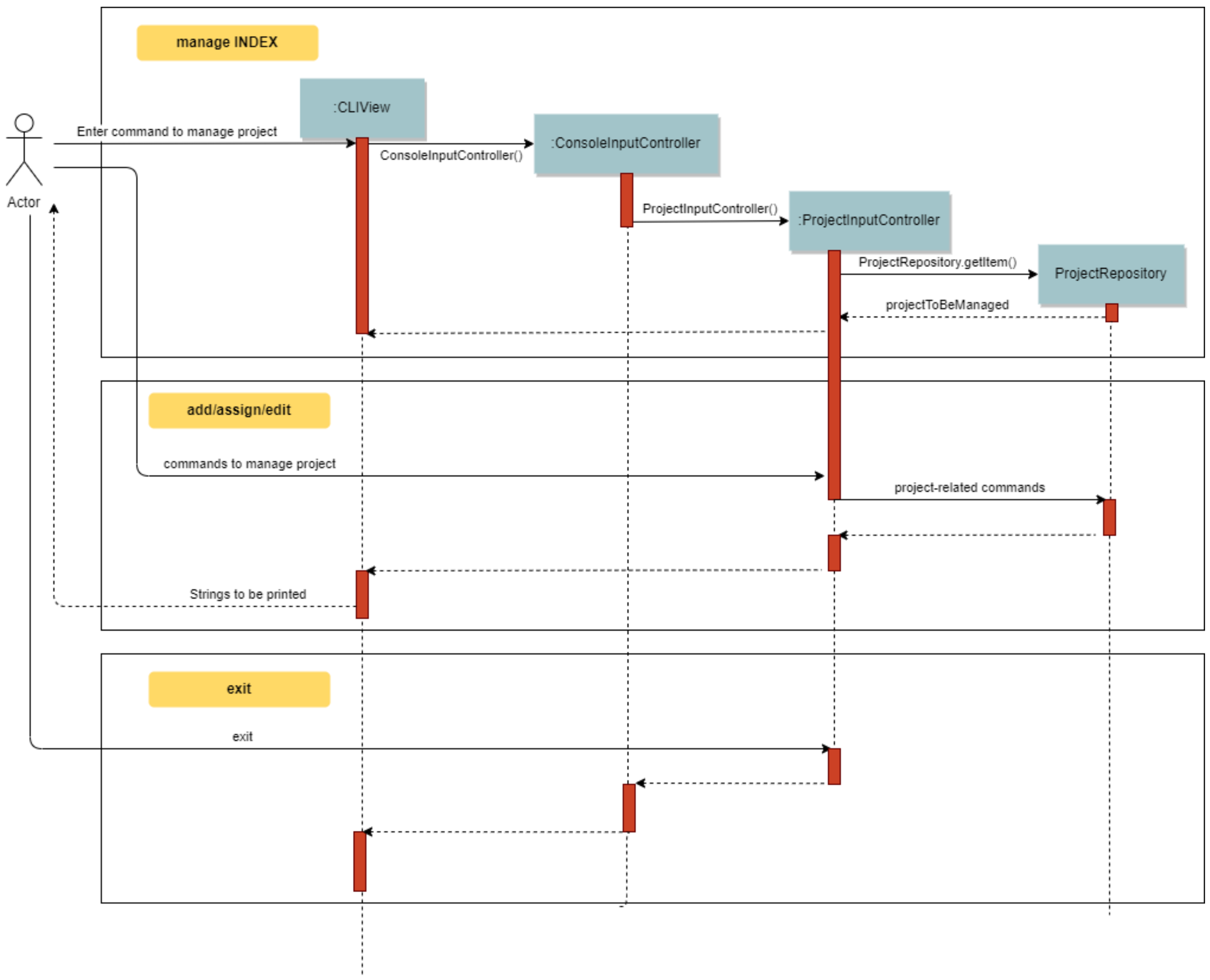
The `delete PROJECT_INDEX` command works similarly to `create PROJECT_NAME`. Both commands will result in a `Boolean` of either `True` or `False` to indicate whether command was executed successfully. There are minor differences, listed below:

- Instead of creating a new Project object, the `delete PROJECT_INDEX` command will call `deleteItem()` in `ProjectRepository` instead of `addToRepo()`.

- Deletion of Project works by Project Index instead of Project Name.

Manage project

ArchDuke allows users to manage each individual project in the `ProjectRepository`.



3.2 CRUD functionality for Members

Implementation

CRUD Member functions are handled by Member, MemberList, MemberFactory, Project and ProjectInputController. It allows ArchDuke to perform simple CRUD function for Member in the Project, these simple functions include Create, Read, Update and Delete. ProjectInputController will read the relevant command related to the member function and call the relevant methods in ParserHelper.

It implements the following commands:

- `add member -n MEMBER_NAME [-i MEMBER_PHONE_NUMBER] [-e MEMBER_EMAIL]` — Creates a new Member with the member name, phone number (optional) and email address (optional).
- `edit member MEMBER_INDEX [-n MEMBER_NAME] [-i PHONE_NUMBER] [-e MEMBER_EMAIL]` — Updates an

existing member details based on the member index with the new attributes specified.

- `view members`-- Displays all the members in the current project.
- `view credits`-- Displays the compiled credits of all members from their individually assigned tasks.
- `role INDEX -n MEMBER_NAME`-- Assigns roles to specific members using their names.
- `delete member MEMBER_INDEX`--Deletes a member from the current project using the member index.

The example usage scenario will explain in detail the data flow and how the program behaves at each step of CRUD functions with regards to a `Member` object.

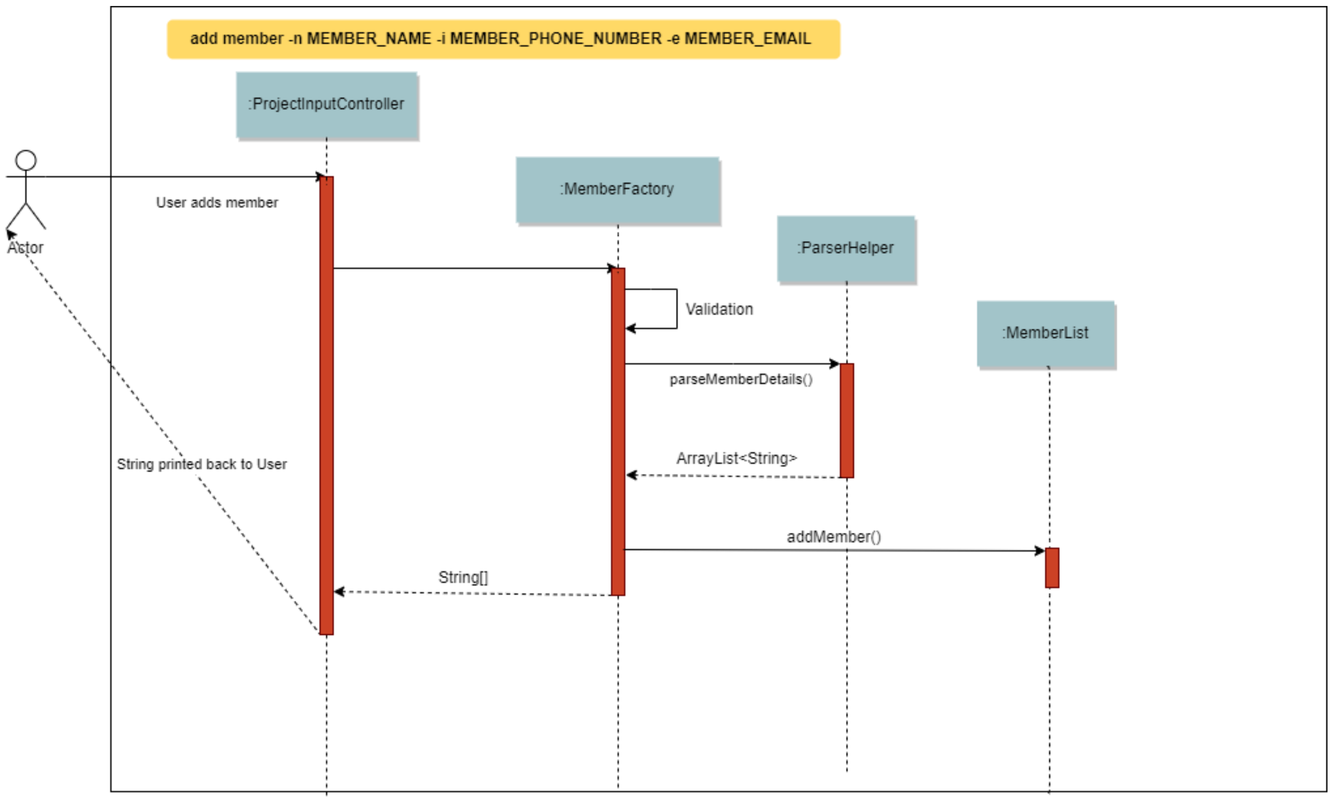
Step 1) The user creates a new project and chooses to manage it.

Step 2) The user executes the command `add member -n Charles Wong -i 95674325 -e charles@gmail.com` to create a new member with the name "Charles Wong" whose phone number is "95674325" and whose email address is "charles@gmail.com".

Step 3) The `ProjectInputController.manageProject()` method triggers the `MemberFactory` which does the validation of the input.

Step 4) `MemberFactory` then goes on to call `parser.parseMemberDetails()` to do a simple parsing which will clean up the flags and will return an `ArrayList<String>` for MemberFactory to create the member.

Step 5) `MemberFactory` will create the member based on the information provided by the user. The created member will subsequently be added into `memberList` which holds all the members in the current project. Upon doing successfully or unsuccessfully doing so, a String message will be returned.



3.3. CRUD functionality for Tasks

Implementation

CRUD Task functions are handled by `Task`, `TaskList`, `TaskFactory`, `Project` and `ProjectInputController`. It allows ArchDuke to perform simple CRUD function for Task in the Project, these simple functions include Create, Read, Update and Delete. `TaskFactory` will create the relevant task with the appropriate input from the user which will then be added into the `TaskList` managed by the `Project`. `ProjectInputController` will read the relevant command related to task function and call the relevant methods in `TaskFactory` And `ParserHelper`.

It implements the following commands:

- `add task -t TASK_NAME -p TASK_PRIORITY -c TASK_CREDIT [-d TASK_DUE_DATE] [-s TASK_STATE] [-r TASK_REQUIREMENTS]` — Creates a new Task with the task name, priority, credit, due date (optional), state(optional) and additional requirements (if any).
- `edit task TASK_INDEX -t TASK_NAME -p TASK_PRIORITY -c TASK_CREDIT [-d TASK_DUE_DATE] [-s TASK_STATE]` — Updates existing task attributes with the new input values.
- `view tasks` — Displays all tasks in current project.
- `view tasks /MODIFIER` — Displays tasks sorted based on the attribute specified by the user.
- `view task requirements TASK_INDEX` — Displays all additional requirements of a specified task.
- `edit task requirements TASK_INDEX rm/TASK_INDEXES r/TASK_REQUIREMENT1` — Updates task requirements of specified task by removing unwanted requirements and adding new ones.
- `delete task TASK_INDEX` — Deletes task with stated index.

The example usage scenario below will explain in detail the data flow and how the program behaves at each step of CRUD functions with regards to a `Task` object.

Step 1) Assuming Project have been created and the user is currently managing a specific project.

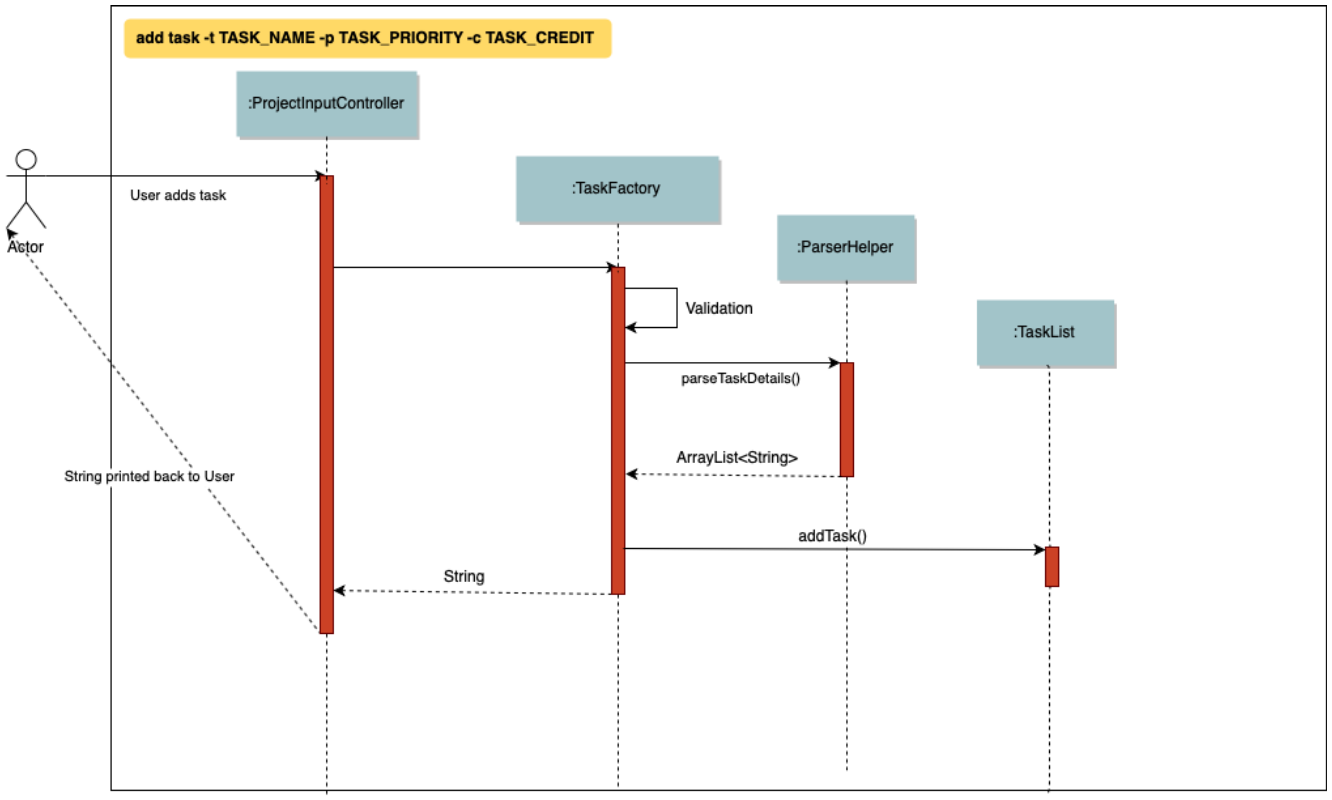
Step 2) The user execute the command `add task -t kill thanos! -p 100 -c 100` to create a new task with the task name “kill thanos!”, priority value “100” and a credit of “100”. These input will be consumed by `ProjectInputController.manageProject()`

Step 3) The `ProjectInputController.manageProject()` will trigger the `TaskFactory` which will do a validation to ensure the required input are given.

Step 4) `TaskFactory` will then call parserHelper.parseTaskDetails() to do a simple parsing which will clean up the flags and return `ArrayList<String>` for `TaskFactory` to create the task.

Step 5) `TaskFactory` will create the task based on the information given by the user. The created task will subsequently be added into `taskList` managed by the project and a successfully or unsuccessfully a message in String[] will be returned.

The following sequence diagram show how `add task` operation works.



3.4. CRUD functionality for Reminder [Plan to do]

Implementation

CRUD Reminder functions are handled by `Reminder`, `ReminderList` and `ReminderFactory`,`Project` and `ProjectInputController`. It allows ArchDuke to perform simple CRUD function for Reminder in the Project, these simple functions include Create, Read, Update and Delete. `TaskFactory` will create the relevant task with the apporatied input from the user which will then be added into the `TaskList` managed by the `Project`. `ProjectInputController` will read the relevant command related to task function and call the relevant methods in `ReminderFactory` And `ParserHelper`.

Reminder function implements the following commands:

- `add reminder -n REMINDER_NAME -d REMINDER_DUEDATE -Tag REMINDER_TAG` — Creation of a new Reminder with the reminder name and due date (optional)
- `edit reminder TASK_INDEX -n REMINDER_NAME -d REMINDER_DUEDATE` — Edits existing task with the new input values
- `view reminder` — Viewing of all reminders in current project

The following sequence diagram show how `add reminder` operation works.

The example usage scenario below will explain in detail the data flow and how the program behaves at each step of CRUD functions with regards to a `Reminder` object.

Step 1) Assuming Project have been created and the user is currently managing a specific project.

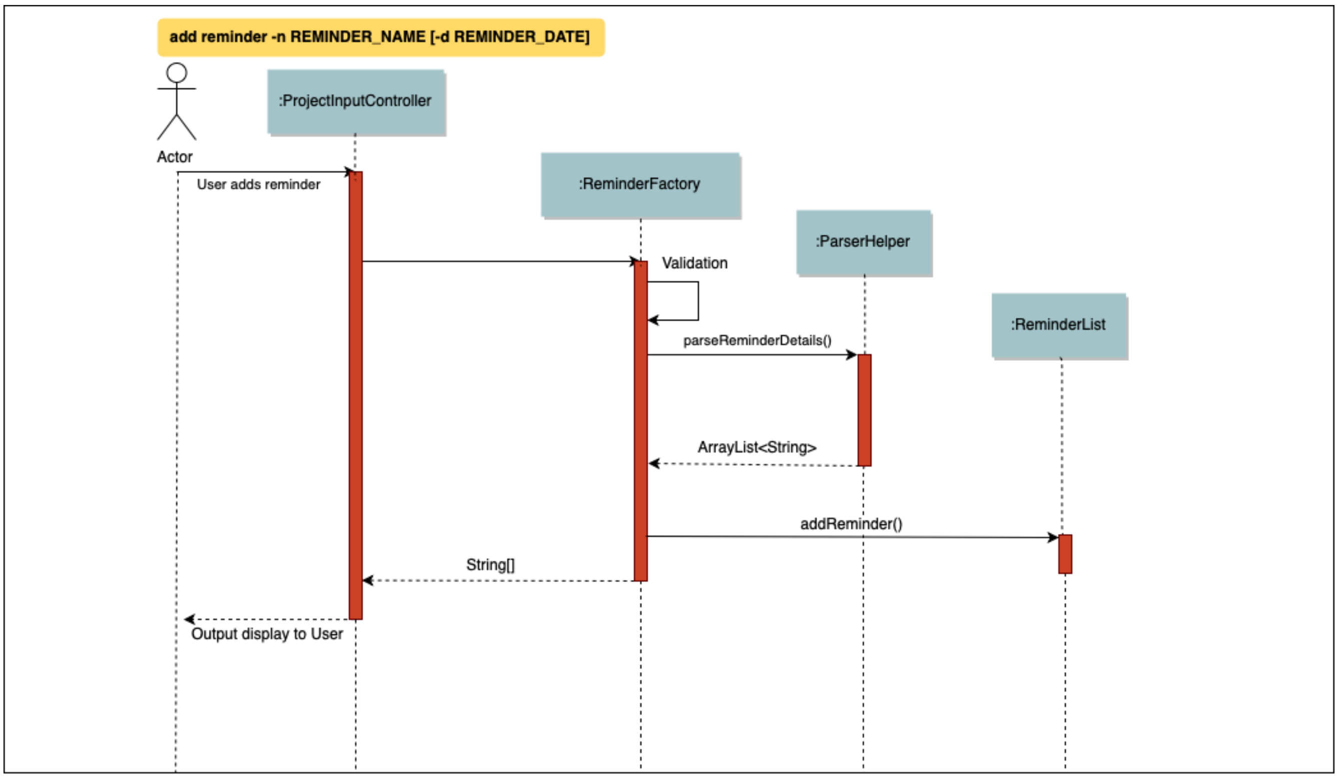
Step 2) The user execute the command `add Reminder -n Do System integration -d 31/10/2019` to create a new reminder with the reminder name “Do System integration” on a specific date

"31.10/2019". These input will be consumed by `ProjectInputController.manageProject()`

Step 3) The `ProjectInputController.manageProject()` will trigger the `ReminderFactory` which will do a validation to ensure the required input are given.

Step 4) `ReminderFactory` will then call parserHelper.parseReminderDetails() to do a simple parsing which will clean up the flags and return a `ArrayList<String>` with the relevant details for `ReminderFactory` to create the task.

Step 5) `ReminderFactory` will create the reminder based on the information given by the user. The created Reminder will subsequently be added into `ReminderList` managed by the project and a successfully or unsuccessfully a message in String[] will be returned.



3.4. CRUD functionality for Task Assignments

Implementation

CRUD Assignment functions are handled by `ProjectInputController`, `ParserHelper`, `AssignmentController` and `Project`.

ArchDuke allows users to track tasks and their assignments to members in a project. Assignments establish a relationship between a task and a member. When a member is assigned a task, they are expected to complete it, and will be given the stipulated credit upon completion. The degree of each member's contributions are measured by task credit.

Assignments are tracked in the `Project` class using 2 Java HashMaps.

- `taskAndListOfMembersAssigned`
  - Key: `Task`

    - Value: ArrayList of assigned `Member` objects (List of members assigned to task)
- `memberAndIndividualListOfTasks`
    - Key: `Member`
    - Value: ArrayList of `Task` objects (List of each member's individual tasks)

The following steps show how task assignments are made in ArchDuke.

Step 1) Assume Project has been created and the user is currently managing a specific project.

Step 2) User enters the command `assign task -i 1 2 -to 1 2 3 -rm 4`. This indicates the user would like to assign tasks with index number 1 and 2 to members 1, 2 and 3, and also unassign/remove the task from member 4.

Step 3) The `ProjectInputController.manageProject()` will call `AssignmentController.assignAndUnassign` to manage the assignment.

Step 4) Within the method call in `AssignmentController`, the command by the user will be parsed by the `ParserHelper` to split the input into 3 parts: the task index numbers, the assignee index numbers, and the unassignees index numbers. The index numbers will be checked to ensure that they are valid (non-negative integers, and exist within the project) with the help of `ParserHelper.parseMembersIndexes()` and `ParserHelper.parseTasksIndexes()`.

`AssignmentController.checkForSameMemberIndexes()` checks if the list of assignees and unassignees contain any identical index numbers, and remove them to avoid redundant work.

Step 5) All valid index numbers are stored in AssignmentController. Using these index numbers `AssignmentController.assignAndUnassign` manages the assigning of tasks, followed by the unassigning of tasks. A for loop is used to iterate through the tasks, and 2 separate nested for loops iterate through the assignees and unassignees.

Step 6) In each loop, `Project.containsAssignment()` is used to check if an assignment between a task and member already exists to avoid any errors (for example, duplicating assignments or trying to remove an assignment which does not exist). The errors are noted down by adding error messages to the ArrayList `errorMessages` which will be displayed to the user later.

Step 7) If the input is valid, the assignment is created by calling `Project.createAssignment()` or removed by calling `Project.removeAssignment()`. The HashMaps are manipulated accordingly to note down the assignment between the specified task and member. Success messages are stored in `successMessages` and are also displayed to the user later.

Design Considerations

Aspect: How to keep track of Assignments

- **Alternative 1 (current choice):** Use 2 HashMaps in Project class
    - `taskAndListOfMembersAssigned`
        - Key: `Task`
        - Value: ArrayList of assigned `Member` objects (List of members assigned to task)

        - `memberAndIndividualListOfTasks`
            - Key: `Member`
            - Value: ArrayList of `Task` objects (List of each member's individual tasks)
    - Pros: Allows fast and easy writing and retrieval of data. Task and Member objects to not need to be aware of each other in order to maintain the assignment. Assignments can just be managed by a project.
    - Cons: Need a hashcode for Task and Member objects to properly hash.
- **Alternative 2:** Each `Task` maintains ArrayList of assigned members. Each `Member` maintains ArrayList of assigned tasks.
    - Pros: More intuitive.
    - Cons: Cyclic dependencies will exist between task and member, making it difficult to edit and change assignments.

3.6. UI functionality for displaying information

Implementation

UI functions are handled by `CLIView`, `ViewHelper`, and the data layer which stores the details of projects, members and tasks. It allows ArchDuke to present useful information to the user in an easily readable format when requested. The information will be presented in a table form with a clear header that describes the content and has the information in bullet point form.

The UI display uses the following methods to produce a table:

- `consolePrintTable()` — Main method that constructs the table. Returns a String array with each element representing one row of the table
- `consolePrintTableHoriBorder()` — Returns a String containing the horizontal border of the table
- `getRemainingSpaces()` — Returns a String containing the remaining number of spaces required to fill up the rest of the line
- `getArrayOfSplitStrings()` — When a String that is meant to be in one row in the table is too long, it is passed into this method to split the string up into an array of Strings of suitable length to fit into one row of the table

The following steps show how the UI table display are made in ArchDuke.

Step 1) User enters a command that requires information to be presented in a clear format such as `list`, `view members`, `view tasks` etc.

Step 2) Assume the command `list` is entered. The user is requesting an overview of all the projects that he is currently doing. This would call the method `getAllProjectDetailsForTable()` in `ProjectRepository`.

Step 3) The method `getAllProjectDetailsForTable()` would return an ArrayList containing multiple ArrayLists of String, with each ArrayList of String containing all the details of each project which will be stored in one table. The parent ArrayList would then contain information to be printed in different tables. In this case, each project will fill one table.

Step 4) The ArrayList of ArrayLists would then be passed into the `consolePrintTable()` method, which will pack each individual ArrayList of Strings into a formatted table. Each String in the ArrayList of Strings is an entry that is meant to be presented in one line of the table.

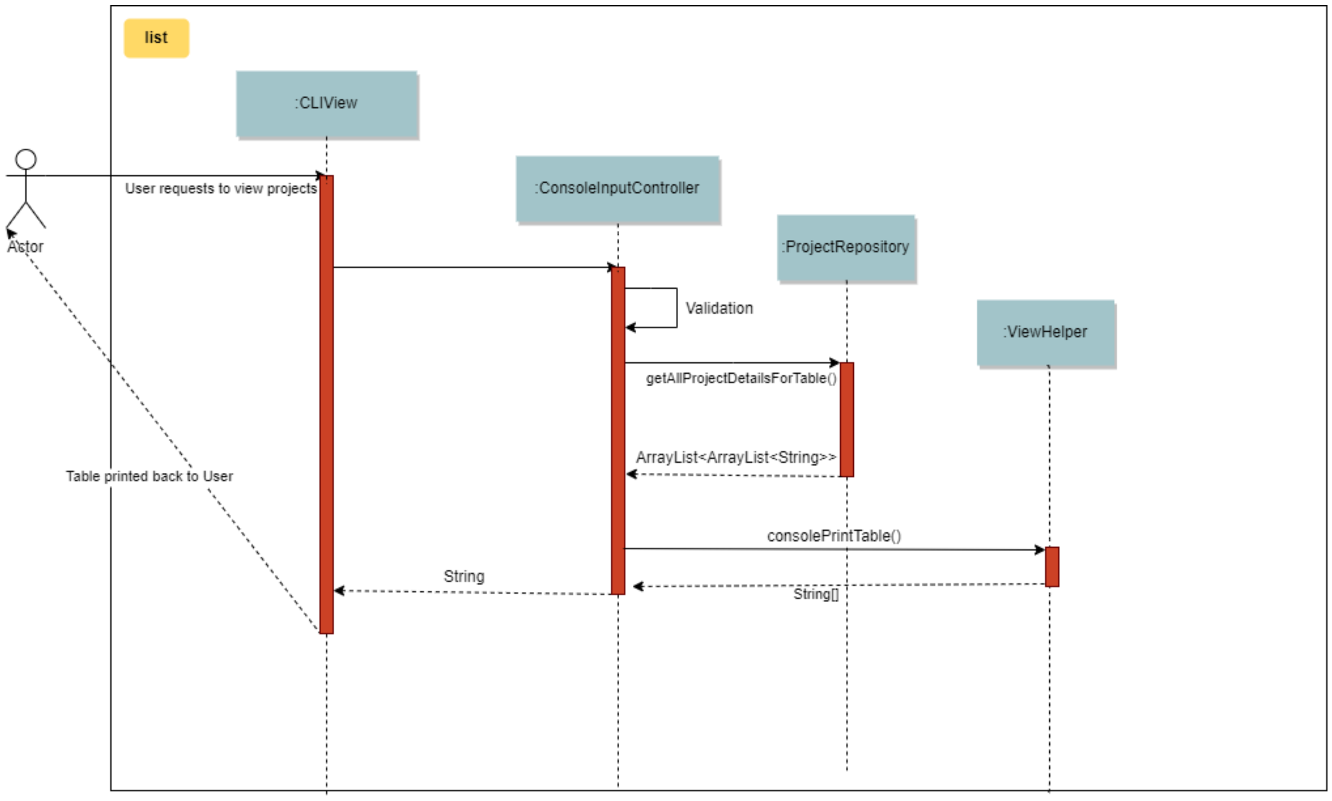
Step 5) When the String is shorter that the full table width, there are spaces that need to be added to maintain the visual implementation of the table. Hence, the `getRemainingSpaces()` method is called to fill up the remaining spaces.

Step 6) When the String is longer than the full table width, it needs to be split into multiple lines in order to fit it within the table. Hence, the `getArrayOfSplitStrings()` method is called to split the string up nicely to fit the table width. It will ensure that the String is split at the spaces so that the words remain intact. The only exception is when the length of a word is longer than the table width. the method would append a hyphen '-' at the point of the word where it exceeds table width and push the remainder to the next line.

Step 7) The `consolePrintTableHoriBorder()` method is called at any point where the horizontal border of the table is required.

Step 8) The `consolePrintTable()` method would then store the entire series of tables to be displayed into a String array with each element containing a line to be printed to be passed into `consolePrint()` where it will be printed with indentation and horizontal borders on the top and bottom.

The following sequence diagram show how `list` operation works.


list
:CLIView
Actor
User requests to view projects
:ConsoleInputController
:ProjectRepository
Validation
:ViewHelper
getAllProjectDetailsForTable()
ArrayList<ArrayList<String>>
Table printed back to User
consolePrintTable()
String
String[]

3.7. Logging

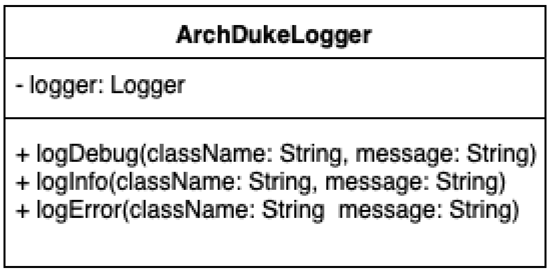
We are using `org.apache.logging.log4j` package for logging. The `ArchDukeLogger` class under `Utility` layer is used for logging every step that ArchDuke takes so that debugging will be easier.

- The logging level is controlled by property name `rootLogger.level` in `log4j2.properties`. Currently the level is set to all. (Show all log level message)
- The `ArchDukeLogger` call by using ArchDukeLogger.logInfo(className, Message); function which will log the message according to the specified logging level method called.
- Currently all the log messages are store in the log file located in the logs directory

The `log4j2.properties` file in the resource folder is used configure the following:

- RootLogger level - The level root logger to be shown in the log file. Currently it is set to `all`
- File Appender - The file direction and log file name. The log file can be found in the logs folder.
- PatternLayout - The output format message displayed in the log file

The following shows the class diagram of ArchDukeLogger


ArchDukeLogger
- logger: Logger
+ logDebug(className: String, message: String)
+ logInfo(className: String, message: String)
+ logError(className: String message: String)

NOTE If any bugs or errors encountered during the testing, please do create an issue on this repo and upload the logs file located is the `logs` directory.

4. Documentation

We chose to use AsciiDoc to write the documentation. This is because Ascii syntax is consistent and there is a flexibility offered for essential syntax unlike MarkDown.

5. Testing

6. Dev Ops

Appendix A: Product Scope

Target user profile:

- Team leaders of group projects

- Group project team leaders who monitor contributions of team members
- Project managers who track progress for multiple projects
- Teachers who evaluate and act upon their students’ progress
- Technical professionals who keep track of task deadlines
- Project planners who plan out priority and assignment of roles

Appendix B: User Stories

Priorities: High (must have) - * * *, Medium (nice to have) - * *, Low (unlikely to have) - *

Priority	As a …	I want to …	So that I can…
* * *	project leader	be able to track deadlines for each project	prioritize which project to be completed earlier
* * *	project leader	be able to manage multiple projects and view all the task delegations of my team members in them	distribute my resources appropriately
* * *	project leader	be able to create projects	keep track of all my projects using a command line application
* * *	project leader	be able delete projects that are completed	have a cleaner working environment
* * *	project leader	view a progress bar for each project	have a clearer view of the total progress for each project
* * *	project leader	manage my team members	assign different roles to team members so that they are clear of their relevant roles
* * *	project leader	manage my team members	assign different tasks to team members so that they will be clear of the work that they are supposed to do
* * *	project leader	add team members to a specific group project	assign different roles and tasks to them based on the project they belong to
* * *	project leader	update the details of my team members	have up to date information about them whenever needed

Priority	As a …	I want to …	So that I can…
* * *	project leader	remove members from a particular project	remove unwanted or old members from a project that they are no longer contributing
* * *	project leader	keep track of each member’s progress and contributions	ensure all students contribute to their respective tasks sufficiently
* * *	project leader	find a person by name	locate details of persons without having to go through the entire list
* * *	project leader	generate a report of the contributions of the members	credit can be rightfully assigned to the respective members
* * *	project leader	indicate the credit of each task	track the level of contribution by each member
* * *	project leader	track the status of every task	track the progress of each project
* * *	project leader	indicate the priority of the tasks	ensure members know what order to be done
* * *	project leader	input the requirements of the tasks I have been assigned	ensure needs members are clear about what needs to be done
* * *	project leader	be able to track deadlines for each task	I will know if a group member is slacking.
* * *	project leader	assign one task to multiple students	more than one student can contribute to the task
* * *	project leader	delete erroneous tasks from the project I am managing	prevent any confusion and achieve a cleaner work space
* * *	project leader	view tasks sorted by name, index, date, priority, credit, assigned member names or Kanban board style	I can view all the tasks in a customised manner according to the required scenario.
* * *	project leader	import files from other sources	track all my projects from different workstations or work environments

Priority	As a …	I want to …	So that I can…
* * *	project leader	be able to edit and read the exported file	have other people can add in details as well into the file and send back
* * *	project leader	have a good overview of all the projects I am managing	I can distribute my resources appropriately
* * *	project leader	define a clear end goal/target for the project	that we stay on the right track
* * *	project leader	I can view the tasks and roles that I have assigned	ensure members can complete them
* * *	project leader	keep track of the contributions of members	ensure everyone does his/her fair share
* * *	project leader	create task dependencies	members can complete tasks in a certain order
* * *	project leader	calculate the total weightage of tasks done by each member	keep track of the amount of contributions done by each member
* *	project leader	schedule project meet-ups	group members can meet at a stipulated date and time
* *	project leader	be able to export the relevant details for each project	send it to other people for viewing
* *	project leader	be able to export the details for each project in different formats	avoid compatibility issues with a specific file format
* *	project leader	view a calendar with all tasks, milestones and deadlines	easily visualise the progress of the project
* *	project leader	have a more intuitive way to view the current task and role assigned to a particular team member	better manage their well being
* *	project leader	be able to track the technical and non-technical roles assigned to my team members	I can keep track of the overall progress of the project

Priority	As a …	I want to …	So that I can…
* *	project leader	define milestones to track the progress of the entire project	have users work towards each milestone sequentially
*	project leader	save time managing my team members from the manual way of tracking my group progress	make this group can be as efficient as possible
*	project leader	change the assignment of tasks halfway through the project	cater to different needs and schedules of team members

{To be edited}

Appendix C: Use Cases

(For all use cases below, the **System** is the `ArchDuke` and the **Actor** is the `user`, unless specified otherwise)

Use case: Create project (UC01)

MSS

1. User requests to create project with desired project name and number of members
2. ArchDuke creates a project named after desired project name and number of members

   Use case ends.

Extensions

1a. The given input is wrong.

- 1a1. ArchDuke shows an error message.

  Use case ends.

Use case: View all projects (UC02)

MSS

1. User requests to view all projects.
2. ArchDuke shows a list of all projects with their respective details.

   Use case ends.

Extensions

1a. The given input is wrong.

- 1a1. ArchDuke shows an error message.

  Use case ends.

Use case: Manage a project (UC03)

MSS

1. User requests to view all projects.
2. ArchDuke shows a list of all projects with their respective details.
3. User requests to manage a project specified in the list.
4. ArchDuke opens up the specified project.

   Use case ends.

Extensions

2a. The list is empty.

Use case ends.

3a. The given index is invalid.

- 3a1. ArchDuke shows an error message.

  Use case resumes at step 2.

Use case: Add members to a specific project (UC04)

MSS

1. User selects a specific project to manage (UC03).
2. User requests to add member specifying name, phone number and email address.
3. ArchDuke adds specified member into current project.

   Use case ends.

Extensions

2a. The given information is invalid.

- 2a1. ArchDuke shows an error message.

  Use case resumes at step 1.

Use case: Edit members in a specific project (UC05)

MSS

1. User selects a specific project to manage (UC03).
2. User requests to edit member specifying member index and fields that require editing.
3. ArchDuke edits specified fields of specified member in current project.

   Use case ends.

Extensions

2a. The given index is invalid.

- 2a1. ArchDuke shows an error message prompting user to check again and enter the correct index.

  Use case resumes at step 1.

Use case: Add task in a specific project (UC06)

MSS

1. User selects a specific project to manage (UC03).
2. User requests to add task.
3. ArchDuke adds task to current project.

   Use case ends.

Use case: Edit task in a specific project (UC07)

MSS

1. User selects a specific project to manage (UC03).
2. User requests to edit task specifying task index and fields that require editing
3. ArchDuke edits specified fields of specified task in current project.

   Use case ends.

Extensions

2a. The given index is invalid.

- 2a1. ArchDuke shows an error message.

  Use case resumes at step 1.

Use case: Assign tasks to members (UC08)

MSS

1. User selects a specific project to manage (UC03).
2. User requests to assign a specific task to one or several members.
3. ArchDuke assigns specified members to specified task in current project.

   Use case ends.

Use case: Complete tasks in a specific project (UC09)

MSS

1. User selects a specific project to manage (UC03).
2. User requests to mark a specific task as completed.
3. ArchDuke marks specified task in current project as completed.

   Use case ends.

Extensions

2a. The given index is invalid.

- 2a1. ArchDuke shows an error message.

  Use case resumes at step 1.

Use case: Generate report for a specific project (UC10)

MSS

1. User selects a specific project to manage (UC03).
2. User requests to generate a report of of the project and members' contributions.
3. ArchDuke gathers information from tasks, and presents it in a report.
4. ArchDuke saves a copy of the report in a readable format to the hard disk.

Appendix D: Non Functional Requirements

1. ArchDuke should be able to run on any machine with Java Development Kit (JDK 11) installed.
2. ArchDuke should be able to handle up to a thousand tasks and projects.
3. ArchDuke should be secure, to prevent unauthorised modification.
4. ArchDuke should not save passwords in plain text.

5. ArchDuke should be smooth and fast to view and edit.
6. ArchDuke output should be organised clearly with proper tabbing.