

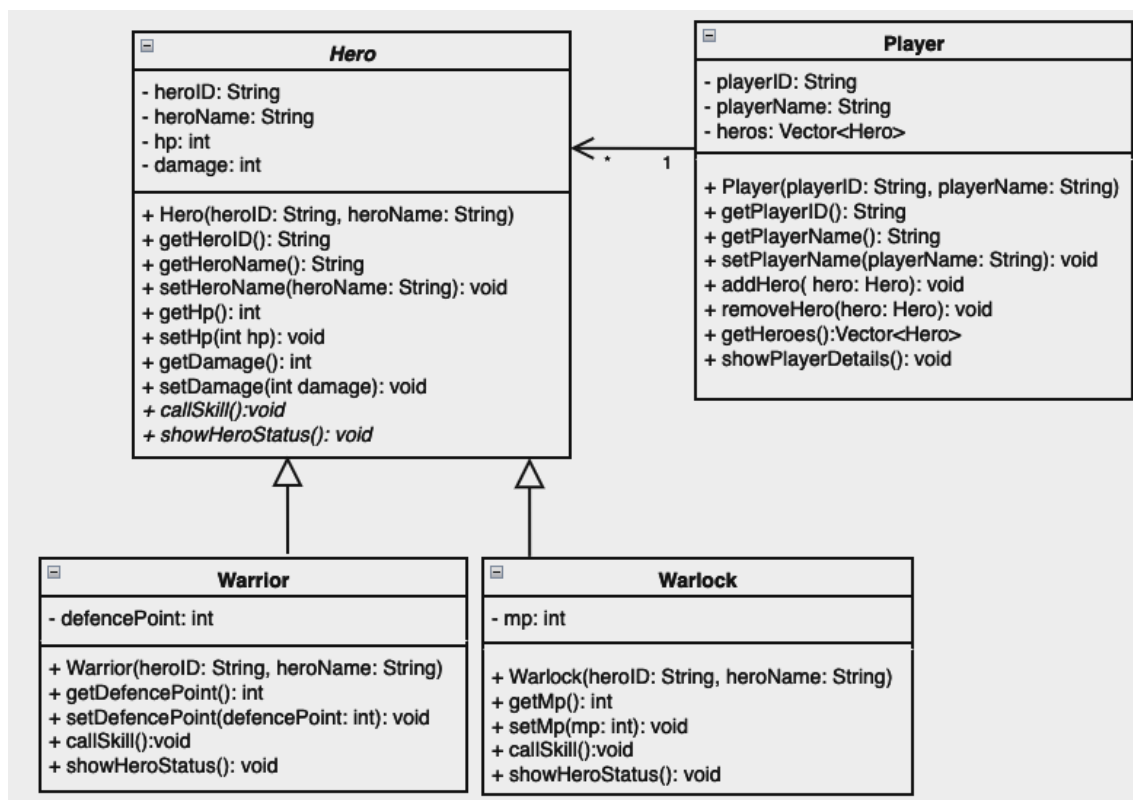
**HONG KONG INSTITUTE OF VOCATIONAL EDUCATION**  
**DEPARTMENT OF INFORMATION TECHNOLOGY**  
**HIGHER DIPLOMA IN SOFTWARE ENGINEERING (IT114105)**

Module Name: Contemporary Topics in Software Engineering  
Module Code: ITP4507  
Assignment Number: One  
Hand-in: **Friday 15 November, 2024** (On or before 4:30 PM to Moodle)  
Weighting of This Assignment: 66.67% of the End of Module Assessment

This assignment must be done by individual only. Plagiarism will be treated seriously.  
Any assignments that are found involved wholly or partly in plagiarism  
(no matter the assignments are from the original authors or from the plagiarists)  
will score Zero mark. **Late submission will NOT be accepted.**

### Task Specification

Snow Storm Company develops an RPG game "Fantastic World (FW)" on the PC. The major characters in this game are known as HERO and they have various kinds of characteristic. For example, Warrior focus on defence and Warlock target on magic damage. Each player in this game can play more than one hero. Currently, this game only has Warrior and Warlock. In the coming future, this game will be extended to support more kinds of hero such as healer. The following is the simplified class diagram of existing data maintained by FW.



As a system analyst of the Company, you are required to design and develop FW. You can get the source codes of above classes from Moodle.

FW should provide the following functions:

1. Create a Player.
2. Add a hero (Warrior or Warlock) to the current player.
3. Remove a hero from the current player.
4. Select a player by using a player ID.
5. Call a hero's skill by a hero ID.
6. Show the detail information of current player.
7. Change the player's name of the current player.
8. Show all players.
9. Set current player.
10. Undo last command.
11. Redo the last undone command.
12. Show undo/redo list.
13. Exit System.

Your system design should conform to the Open Closed Principle so that your design should easily be extended to support new heroes (for examples, healers, rangers etc..).

You **MUST** apply the following design patterns for your new system

- **Command pattern** to provide the “create player”, “set current player”, “add hero”, “call hero skill”, “delete hero”, “show current player”, “display all players”, “change player’s name”. “undo”, “redo” and “show undo/redo list” functions
- **Factory pattern or Abstract Factory Pattern** to create different kinds of Command objects and different kinds of Player/Hero objects (e.g., Warrior object, Warlock object, Player object, etc.)
- **Memento pattern** to provide “Undo” and “Redo” functions on the “call hero skill” and “change player’s name” functions.

## Assignment Report

In addition to the system development, you are required to write up a **Short Report** covers the following sections:

1. Assumptions regarding the problem context
2. Application design with class diagram
3. Discussion and explanation on each of the design patterns applied to the application
4. Test Plan and Test Cases
5. Well documented Source Code

## Mark Allocation

Your assignment work will be marked according to the following criteria.

Work	Mark Allocated
System Coding and Implementation	
a) Implementation of the system and coding style <b>(Hard-coded output will result in zero mark.)</b>	30%
b) Correctness of system functions * <b>(Hard-coded output will result in zero mark.)</b>	15%
c) Test Plan and Test Cases (Will be used in testing your own application.)	10%
System Analysis and Design, and Discussion	
d) Design of your system and correct use of design patterns	20%
e) Application design with class diagram	10%
f) Discussion and explanation on each of the design patterns applied to the application	15%
Total	<b>100%</b>

Note: \* Please note that your source code will be recompiled and tested for the correctness of the system functions. Your implementation is required to support the 'Copy and Paste' method for testing which is described in page 16.

## Submission of Assignment Work

- The front page of your submission should include the **programme title(code), module title(code), and student number and student name.**
- Submit your Java source code and your report to <https://moodle.vtc.edu.hk> .
  - Well documented Source Code of your program.
  - Report for analysis, design, discussion, user guide, test plan and test cases of your following work.
    - The assumption made during analysis and design of the application
    - System design on your application with class diagram
    - Discussion on the design patterns that applied on your program
    - Test Plan with Test Cases (Design your own test plan and corresponding test cases for each function. For each test case, you should provide a SCREEN CAPTURE for test result).
- Submit according to the guideline on the top part of cover page. **Late submission will NOT be accepted.**

## Extra Reference: Sample Test

### Testing Method

This sample run is served for reference only. You are free to design your own user interface. But to make the testing environment simple and to apply the "Copy and Paste" testing method described on **page 16** easily, you are advised to accept user input at the command prompt as shown in the sample run below.

### Sample Run of assignment

You may follow the design of user interface shown in this sample run in DOS command prompt.

For following examples, character(s) with underline is user's input.

---

#### 1. Create player

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-c

Player ID:- P001

Player Name:- Thomas Yiu

Player Thomas Yiu is created.

Current player is changed to P001.

#### 2. Add heroes to the player

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P001 Thomas Yiu.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-a

Please input hero information (id, name):- H001, peter pang

Hero Type (1 = Warrior | 2 = Warlock ):- 1

Hero is added.

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P001 Thomas Yiu.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-a

Please input hero information (id, name):- H002, john wick

Hero Type (1 = Warrior | 2 = Warlock ):- 2

Hero is added.

### 3. Show the current player

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P001 Thomas Yiu.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-s

Player Thomas Yiu (P001)

Heroes:

H001, peter pang, Warrior, Hp: 500, Damage: 0, Defence Point: 500

H002, john wick, Warlock, Hp: 100, Damage: 200, Mp: 500

### 4. Create another player and display all players

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P001 Thomas Yiu.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-c

Player ID:- P002

Player Name:- Stan Lee

Player Stan Lee is created.

Current player is changed to P002.

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P002 Stan Lee.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-p

Player Thomas Yiu (P001)

Player Stan Lee (P002)

## 5. Add heroes to the player P002

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P002 Stan Lee.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-a

Please input hero information (id, name):- H003, scarlet witch

Hero Type (1 = Warrior | 2 = Warlock ):- 2

Hero is added.

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P002 Stan Lee

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-a

Please input hero information (id, name):- H004, tony stark

Hero Type (1 = Warrior | 2 = Warlock ):- 1

Hero is added.

## 6. Show the current player

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P002 Stan Lee.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-s

Player Stan Lee (P002)

Heroes:

H003, scarlet witch, Warlock, Hp: 100, Damage: 200, Mp: 500

H004, tony stark, Warrior, Hp: 500, Damage: 0, Defence Point: 500

## 7. Set the current player by Player ID

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P002 Stan Lee.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-**g**

Please input player ID:- **P001**

Changed current player to P001.

## 8. Call hero skill

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P001 Thomas Yiu.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-**m**

Please input hero ID:- **H001**

H001 peter pang's attributes are changed to:

H001, peter pang, Hp: 500, Damage: 250, Defence Point: 400

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P001 Thomas Yiu.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-**s**

Player Thomas Yiu (P001)

Heroes:

H001, peter pang, Warrior, Hp: 500, Damage: 250, Defence Point: 400

H002, john wick, Warlock, Hp: 100, Damage: 200, Mp: 500

## 9. Delete hero

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P001 Thomas Yiu.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-**d**

Please input hero ID:- **H002**

H002 john wick is deleted.

## 10. Change the name of the current player

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P001 Thomas Yiu.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-t

Please input new name of the current player:- Russo Brothers

Player's name is updated.

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P001 Russo Brothers.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-s

Player Russo Brothers (P001)

Heroes:

H001, peter pang, Warrior, Hp: 500, Damage: 250, Defence Point: 400

## 11. Show undo/redo list

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P001 Russo Brothers.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-l

Undo List

Change player's name, P001, Russo Brothers

Delete hero, H002

Call hero skill, H001, peter pang, Warrior, Hp: 500, Damage: 250, Defence Point: 400

Add hero, H004, tony stark, Warrior

Add hero, H003, scarlet witch, Warlock

Create player, P002, Stan Lee

Add hero, H002, john wick, Warlock

Add hero, H001, peter pang, Warrior



Create player, P001, Thomas Yiu

-- End of undo list --

Redo List

-- End of redo list -

## 12. UNDO actions in UNDO list

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P001 Russo Brothers.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] : -u

Command (Change player's name, P001, Russo Brothers) is undone.

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P001 Thomas Yiu.

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P001 Thomas Yiu.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] : -u

Command (Delete hero, H002) is undone.

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P001 Thomas Yiu.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] : -u

Command (Call hero skill, H001, peter pang, Warrior, Hp: 500, Damage: 250, Defence Point: 400) is undone.

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P001 Thomas Yiu.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] : s

Player Thomas Yiu (P001)

Heroes:

H001, peter pang, Warrior, Hp: 500, Damage: 0, Defence Point: 500

H002, john wick, Warlock, Hp: 100, Damage: 200, Mp: 500

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P001 Thomas Yiu.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] : u

Command (Add hero, H004, tony stark, Warrior) is undone.

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P001 Thomas Yiu.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] : u

Command (Add hero, H003, scarlet witch, Warlock) is undone.

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P001 Thomas Yiu.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] : g

Please input player ID:- P002

Changed current player to P002.

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P002 Stan Lee.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-s

Player Stan Lee (P002)

Heroes:

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P002 Stan Lee.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-u

Command (Create player, P002, Stan Lee) is undone.

Current player is changed to P001.

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P001 Thomas Yiu.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-g

Please input player ID:- P002

Player P002 is not found!!

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P001 Thomas Yiu.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-l

Undo List

Add hero, H002, john wick, Warlock

Add hero, H001, peter pang, Warrior

Create player, P001, Thomas Yiu

-- End of undo list --

Redo List

Create player, P002, Stan Lee

Add hero, H003, scarlet witch, Warlock

Add hero, H004, tony stark, Warrior

Call hero skill, H001, peter pang, Warrior, Hp: 500, Damage: 250, Defence Point: 400

Delete hero, H002

Change player's name, P001, Russo Brothers

-- End of redo list -

### 13. REDO actions in REDO list

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P001 Thomas Yiu.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-r

Command (Create player, P002, Stan Lee) is redone.

The current player is changed to P002.

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P002 Stan Lee.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-r

Command (Add hero, H003, scarlet witch, Warlock) is redone.

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P002 Stan Lee.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-r

Command (Add hero, H004, tony stark, Warrior) is redone.

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P002 Stan Lee.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-s

Player Stan Lee (P002)

Heroes:

H003, scarlet witch, Warlock, Hp: 100, Damage: 200, Mp: 500

H004, tony stark, Warrior, Hp: 500, Damage: 0, Defence Point: 500

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P002 Stan Lee.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-r

Command (Call hero skill, H001, peter pang, Warrior, Hp: 500, Damage: 250, Defence Point: 400) is redone.

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P002 Stan Lee.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-g

Please input player ID:- P001

Changed current player to P001.

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P001 Thomas Yiu.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-s

Player Thomas Yiu (P001)

Heroes:

H001, peter pang, Warrior, Hp: 500, Damage: 250, Defence Point: 400

H002, john wick, Warlock, Hp: 100, Damage: 200, Mp: 500

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P002 Stan Lee.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-l

Undo List

Call hero skill, H001, peter pang, Warrior, Hp: 500, Damage: 250, Defence Point: 400

Add hero, H004, tony stark, Warrior

Add hero, H003, scarlet witch, Warlock

Create player, P002, Stan Lee

Add hero, H002, john wick, Warlock

Add hero, H001, peter pang, Warrior

Create player, P001, Thomas Yiu

-- End of undo list --

Redo List

Delete hero, H002

Change player's name, P001, Russo Brothers

-- End of redo list -

- **END OF SAMPLE TEST** -

You can ease the testing by using the '**Copy and Paste**' method rather than inputting data manually. Prepare a text file, which includes all user inputs in a test run. By using the '**Copy and Paste**' method, you can automatically input in the command prompt window and then get the result automatically (without the input data echoed). The following is an example of the text file for user inputs.

***Sample User Inputs for a Test Run***

```
c
P001
Thomas Yiu
a
H001, peter pang
1
a
H002, john wick
2
s
c
P002
Stan Lee
p
a
H003, scarlet witch
2
a
H004, tony stark
1
s
g
P001
m
H001
s
d
H002
t
Russo Brothers
s
l
u
u
u
s
u
u
g
P002
s
u
g
P002
l
r
r
r
```

```
s
r
g
P001
s
l
x
```

### ***Expected Output of the Test Run***

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :Player ID:- Player Name:-

Player Thomas Yiu is created.

Current player is changed to P001.

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P001 Thomas Yiu.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-

Please input hero information (id, name):- Hero Type (1 = Warrior | 2 = Warlock ):-

Hero is added.

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P001 Thomas Yiu.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-Please input hero information (id, name):- Hero Type (1 = Warrior | 2 = Warlock ):-

Hero is added.

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P001 Thomas Yiu.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-Player Thomas Yiu (P001)

Heroes:

H001, peter pang, Warrior, Hp: 500, Damage: 0, Defence Point: 500

H002, john wick, Warlock, Hp: 100, Damage: 200, Mp: 500

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P001 Thomas Yiu.



Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-Player ID:- Player Name:-  
 Player Stan Lee is created.  
 Current player is changed to P002.

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P002 Stan Lee.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-Player Thomas Yiu (P001)  
 Player Stan Lee (P002)

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P002 Stan Lee.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-Please input hero information (id, name):- H003, scarlet witch  
 Hero Type (1 = Warrior | 2 = Warlock ):- 2  
 Hero is added.

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P002 Silent Hill.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-aPlease input hero information (id, name):- H004, tony stark  
 Hero Type (1 = Warrior | 2 = Warlock ):- 1  
 Hero is added.

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P002 Stan Lee.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-Player Stan Lee (P002)

Heroes:

H003, scarlet witch, Warlock, Hp: 100, Damage: 200, Mp: 500

H004, tony stark, Warrior, Hp: 500, Damage: 0, Defence Point: 500

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P002 Stan Lee.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-Please input player ID:- P001  
 Changed current player to P001.

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P001 Thomas Yiu.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-Please input hero ID:- H001

H001 peter pang's attributes are changed to:

H001, peter pang, Hp: 500, Damage: 250, Defence Point: 400

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P001 Thomas Yiu.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-Player Thomas Yiu (P001)

Heroes:

H001, peter pang, Warrior, Hp: 500, Damage: 250, Defence Point: 400

H002, john wick, Warlock, Hp: 100, Damage: 200, Mp: 500

#### 11. Delete hero

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P001 Thomas Yiu.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-Please input hero ID:- H002

H002 john wick is deleted.

#### 12. Change the name of the current player

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P001 Thomas Yiu.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-Please input new name of the current player:- Russo Brothers

Player's name is updated.

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P001 Russo Brothers.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-Player Russo Brothers (P001)

Heroes:

H001, peter pang, Warrior, Hp: 500, Damage: 250, Defence Point: 400

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P001 Russo Brothers.  
Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-Undo  
List  
Change player's name, P001, Russo Brothers  
Delete hero, H002  
Call hero skill, H001, peter pang, Warrior, Hp: 500, Damage: 250, Defence  
Point: 400  
Add hero, H004, tony stark, Warrior  
Add hero, H003, scarlet witch, Warlock  
Create player, P002, Stan Lee  
Add hero, H002, john wick, Warlock  
Add hero, H001, peter pang, Warrior  
Create player, P001, Thomas Yiu  
-- End of undo list --  
Redo List  
-- End of redo list -

Fantastic World (FW)  
c = create player, g = set current player, a = add hero, m = call hero skill, d  
= delete hero, s = show player, p = display all players, t = change player's  
name, u = undo, r = redo, l = list undo/redo, x = exit system  
The current player is P001 Russo Brothers.  
Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :Command  
(Change player's name, P001, Russo Brothers) is undone.

Fantastic World (FW)  
c = create player, g = set current player, a = add hero, m = call hero skill, d  
= delete hero, s = show player, p = display all players, t = change player's  
name, u = undo, r = redo, l = list undo/redo, x = exit system  
The current player is P001 Thomas Yiu.

Fantastic World (FW)  
c = create player, g = set current player, a = add hero, m = call hero skill, d  
= delete hero, s = show player, p = display all players, t = change player's  
name, u = undo, r = redo, l = list undo/redo, x = exit system  
The current player is P001 Thomas Yiu.  
Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-  
Command (Delete hero, H002) is undone.

Fantastic World (FW)  
c = create player, g = set current player, a = add hero, m = call hero skill, d  
= delete hero, s = show player, p = display all players, t = change player's  
name, u = undo, r = redo, l = list undo/redo, x = exit system  
The current player is P001 Thomas Yiu.  
Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-  
Command (Call hero skill, H001, peter pang, Warrior, Hp: 500, Damage: 250,  
Defence Point: 400) is undone.

Fantastic World (FW)  
c = create player, g = set current player, a = add hero, m = call hero skill, d  
= delete hero, s = show player, p = display all players, t = change player's  
name, u = undo, r = redo, l = list undo/redo, x = exit system  
The current player is P001 Thomas Yiu.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-Player Thomas Yiu (P001)

Heroes:

H001, peter pang, Warrior, Hp: 500, Damage: 0, Defence Point: 500

H002, john wick, Warlock, Hp: 100, Damage: 200, Mp: 500

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P001 Thomas Yiu.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-

Command (Add hero, H004, tony stark, Warrior) is undone.

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P001 Thomas Yiu.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-

Command (Add hero, H003, scarlet witch, Warlock) is undone.

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P001 Thomas Yiu.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-Please input player ID:- P002

Changed current player to P002.

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P002 Stan Lee.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-Player Stan Lee (P002)

Heroes:

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P002 Stan Lee.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-

Command (Create player, P002, Stan Lee) is undone.

Current player is changed to P001.

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P001 Thomas Yiu.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-Please  
input player ID:- P002  
Player P002 is not found!!

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d  
= delete hero, s = show player, p = display all players, t = change player's  
name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P001 Thomas Yiu.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-Undo  
List

Add hero, H002, john wick, Warlock

Add hero, H001, peter pang, Warrior

Create player, P001, Thomas Yiu

-- End of undo list --

Redo List

Create player, P002, Stan Lee

Add hero, H003, scarlet witch, Warlock

Add hero, H004, tony stark, Warrior

Call hero skill, H001, peter pang, Warrior, Hp: 500, Damage: 250, Defence  
Point: 400

Delete hero, H002

Change player's name, P001, Russo Brothers

-- End of redo list -

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d  
= delete hero, s = show player, p = display all players, t = change player's  
name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P001 Thomas Yiu.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-  
Command (Create player, P002, Stan Lee) is redone.

The current player is changed to P002.

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d  
= delete hero, s = show player, p = display all players, t = change player's  
name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P002 Stan Lee.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-  
Command (Add hero, H003, scarlet witch, Warlock) is redone.

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d  
= delete hero, s = show player, p = display all players, t = change player's  
name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P002 Stan Lee.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-  
Command (Add hero, H004, tony stark, Warrior) is redone.

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d  
= delete hero, s = show player, p = display all players, t = change player's  
name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P002 Stan Lee.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-

Player Stan Lee (P002)

Heroes:

H003, scarlet witch, Warlock, Hp: 100, Damage: 200, Mp: 500

H004, tony stark, Warrior, Hp: 500, Damage: 0, Defence Point: 500

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P002 Stan Lee.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-

Command (Call hero skill, H001, peter pang, Warrior, Hp: 500, Damage: 250, Defence Point: 400) is redone.

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P001 Thomas Yiu.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-Please input player ID:- P001

Changed current player to P001.

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P001 Thomas Yiu.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-Player Thomas Yiu (P001)

Heroes:

H001, peter pang, Warrior, Hp: 500, Damage: 250, Defence Point: 400

H002, john wick, Warlock, Hp: 100, Damage: 200, Mp: 500

Fantastic World (FW)

c = create player, g = set current player, a = add hero, m = call hero skill, d = delete hero, s = show player, p = display all players, t = change player's name, u = undo, r = redo, l = list undo/redo, x = exit system

The current player is P002 Stan Lee.

Please enter command [ c | g | a | m | d | s | p | t | u | r | l | x ] :-Undo List

Call hero skill, H001, peter pang, Warrior, Hp: 500, Damage: 250, Defence Point: 400

Add hero, H004, tony stark, Warrior

Add hero, H003, scarlet witch, Warlock

Create player, P002, Stan Lee

Add hero, H002, john wick, Warlock

Add hero, H001, peter pang, Warrior

Create player, P001, Thomas Yiu

-- End of undo list --

Redo List

Delete hero, H002

```
Change player's name, P001, Russo Brothers  
-- End of redo list -
```

**Requirement for Scanner usage****Wrong Scanner usage (more than one object of Scanner is created for reading keyboard input):**

```
// create new Scanner objects in loop
do {
    Scanner sc = new Scanner( System.in);
    choice = sc.nextInt();
} while (choice != 1);
```

**Correct Scanner usage (only one Scanner object is created for reading keyword input):**

Following is an example program to use a Global Scanner object or pass as a parameter to do the input.

```
import java.util.Scanner;

public class Test {
    //Global declaration for Scanner
    public static Scanner sc = new Scanner(System.in);

    public static void main(String args[]) {
        int x;
        System.out.print("Enter x:");
        x = sc.nextInt();
    }

    public static void method1() {
        int y;
        System.out.print("Enter y:");
        y = sc.nextInt();
    }

    public static void method2(Scanner sc) {
        int y;
        System.out.print("Enter y:");
        y = sc.nextInt();
    }
}
```

\*\*\* END \*\*\*