



Subject: Advanced Programming

Assignment 1

Let the Battle Commence

Requirement

You are given a class diagram as presented in the Appendix. There are three parts.

Part A consists of initial classes, most of which are abstract classes or interfaces. Initial classes will be given to you as well as bytecode form (*class* files).

Part B consists fixed classes that you need to implement, which include the following classes.

- Knight and Warrior: Normally, when battle's ground is regular number, the `CombatScore` of a Knight or Warrior is based on his `WP` and `baseHP`. If `WP` is 1, the `CombatScore` is the `baseHP`. Otherwise, the `CombatScore` is `baseHP / 10`.
 - o There are 2 special cases of ground number. If ground is a *prime* number, the `CombatScore` of Warriors will be double of their `baseHP`. If ground is a *square* number, the `CombatScore` of Knights will be double of their `baseHP`.
- Paladin: When a Paladin does battle, his `CombatScore` would be *triple* of his `baseHP` on any ground. Since Paladin is from Heaven, his `CombatScore` can exceed 999. Especially, if `baseHP` of a Paladin is a Fibonacci number F_n with $n > 2$, his `CombatScore` will be $1000 + n$.
 - o For example, if a Paladin has `baseHP` is 34 ($=F_9$), his `CombatScore` will be 1009.
- DeathEater: A Death Eater is a monster, who has no HP but only MP being a complex number $C = (real, imaginary)$. When combatting, `CombatScore` of a Death Eater would be $\sqrt{real^2 + imaginary^2}$

Part C consists classes which you are free to change.

Note: The game setting (i.e the `TeamMaker` class) will be changed based on test-cases. You do not need to implement this class.



Appendix

Initial Class Diagram

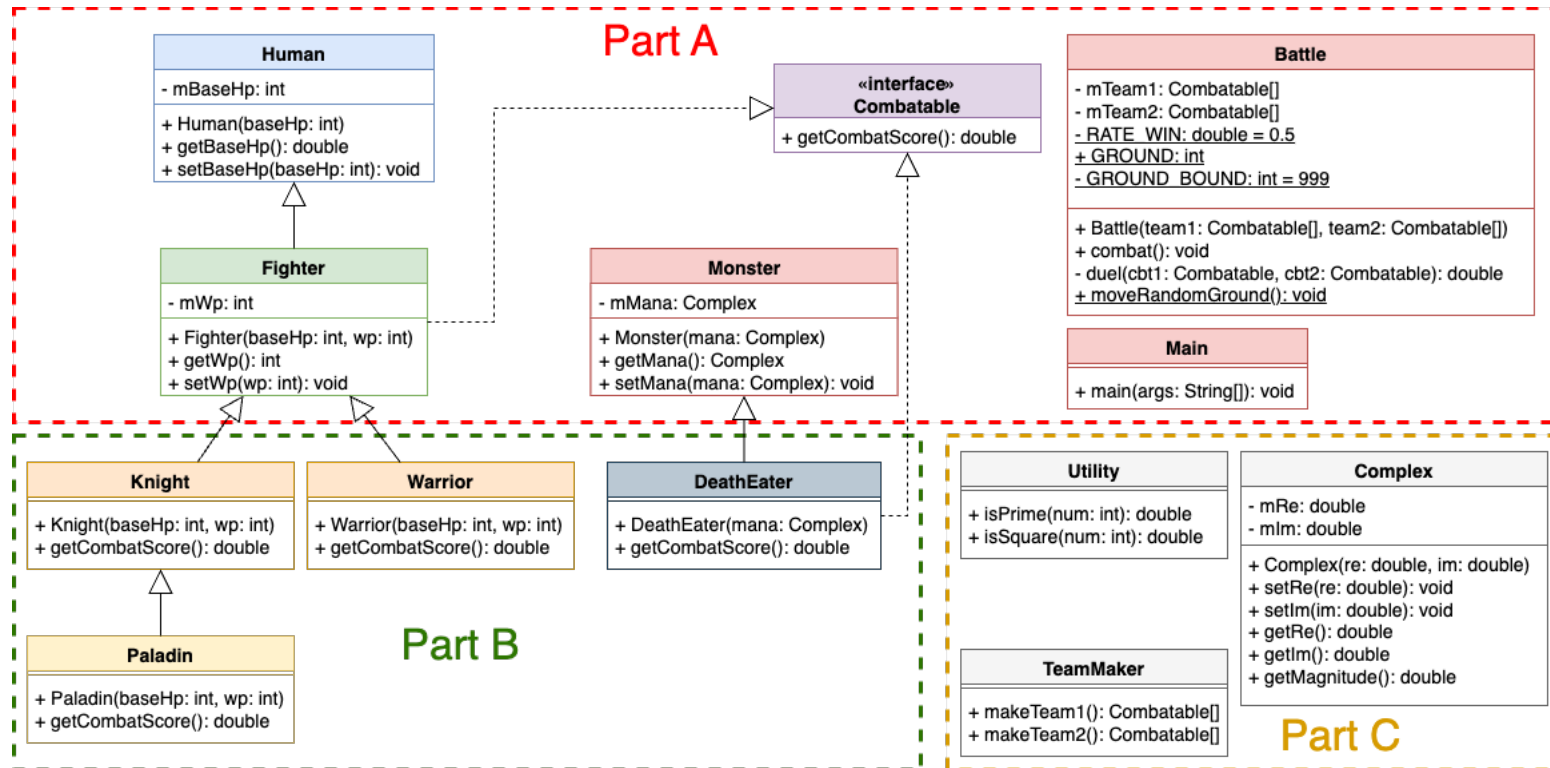


Figure 1. Initial class diagram



Part A includes following classes in bytecode form.

- The interface `Combatable.class`
- 3 abstract classes, which are `Human.class`, `Fighter.class`, `Monster.class`
- `Main.class` contains the main method.
- `Battle.class` contains the `Battle` class which simulates a battle, calculates the fighting results.

Part B includes classes that you must create by yourself. These classes are fixed as the diagram in Figure 1.

Part C is the “free-to-change” part as long as there is a `Complex` class.

Note that both `TeamMaker.java` and `Complex.java` are given with dummy code. You can change the source to adapt the requirement. The `TeamMaker.java` will also be replaced when we are grading your work.

Submission

Your initial code is provided as below structure.

```
/
├── Initial Code
│   ├── class
│   │   ├── Battle.class
│   │   ├── Combatable.class
│   │   ├── Fighter.class
│   │   ├── Human.class
│   │   ├── Main.class
│   │   └── Monster.class
│   ├── source
│   │   ├── DeathEater.java
│   │   ├── Knight.java
│   │   ├── Paladin.java
│   │   └── Warrior.java
│   └── util
│       ├── Complex.java
│       ├── TeamMaker.java
│       └── Utility.java
```



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You will complete the assignment individually and submit your code as a ZIP file via LMS. When you submit, rename the folder `Initial Code` to the following format `YourName_StudentID` (e.g., `NguyenVanA_1952968`)

Note: All classes must be placed in *default (root)* package.