**Homework: Encapsulation and Polymorphism**

This document defines the homework assignments from the ["OOP" Course @ Software University](https://softuni.bg/trainings/coursesinstances/details/8). Please submit as homework a single **zip** / **rar** / **7z** archive holding the solutions (source code) of all below described problems. The solutions should be written in C#.

## Game Engine – The Slum

You are a given a **partially-implemented game** (see homework archive). The game consists of turns and characters. Every turn each character performs 1 **interaction** with another **character** within his **range**. The game consists of the following classes:

* **Engine** – contains several methods for parsing the input (read from the console) and executing commands. Currently, the engine only supports the **status** command (prints information for each character in the game).
* **GameObject** – base class for objects in the game. Contains field **Id**.
  + **Character** – base class for all active character objects. Contains fields **X** and **Y** coordinates, **Health points**, **Defense points**, **Team** (Blue or Red), **Inventory** (list of items), **Range** (for interacting with other champions) and **IsAlive** (for tracking if the character is dead or alive). Holds the methods **AddToInventory** /**RemoveFromInventory** (adds/removes an item to the character's inventory), **ApplyItemEffects/RemoveItemEffects** (applies/removes the item's effect on the character) and **GetTarget** (gets the most suitable target to interact with).
  + **Item** – base class for all items in the game. Contains fields **HealthEffect**, **DefenseEffect**, **AttackEffect** and affects the fields of the character who uses the item.
  + **IHeal**, **IAttack**, **ITimeout** interfaces

The following **Characters** should be implemeted:

* **Warrior** – implements **IAttack** and interacts by attacking alive characters from the other team. Always picks the first target.
* **Mage** – implements **IAttack** and interacts by attacking alive characters from the other team. Always picks the last target.
* **Healer** – implements **IHeal** and interacts by healing alive characters from his/her own team. Always picks the target with the least health (cannot target self).

All character are created via the command **create *characterClass* *id* x y *team***

The following **Items** should be implemented:

* **Axe** – **Item** with **HealthEffect** of **0**, **DefenseEffect** of **0** and **AttackEffect** of **75.**
* **Shield** – **Item** with **HealthEffect** of **0**, **DefenseEffect** of **50** and **AttackEffect** of **0**.
* **Bonus** – base class for an item with a **temporary effect**. Implements **ITimeout**. Items of type **Bonus** are removed from the character's inventory after a few turns (depending on the **timeout** value). **Their effects on the player are also removed.**
  + **Injection** – **Bonus** item with **HealthEffect** of **200** for **3** turns. If a character's health points fall under 1 after the bonus times out (and is removed), his/her **health points** become **1**.
  + **Pill** – **Bonus** item with **AttackEffect** of **100** for **1** turn.

All items are added via the command **add *character* *itemClass* *itemId***

The engine currently supports all game logic (input parsing, interactions, attacking and healing calculations, etc.). Your task is to study the engine and **implement** the necessary classes and their **functionality** so that the game engine may use them. After all turns, the engine **prints** the winning team (the team with most characters alive) and **information** about the characters.

An **empty input line** denotes the input's end.

You are **NOT** allowed to edit directly any of the given classes / interfaces. You may edit the **Main()** method only.

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| **Input** | **Output** |
| create mage Nakov 3 4 Red  add Nakov axe Axe  add Nakov pill IronPill  add Nakov injection AnalInjection  create warrior Vlado 5 4 Blue  add Vlado shield HeavyShield  create healer Alex 7 8 Red  create warrior BateArni 2 3 Blue  add BateArni axe TurboMegaAxe  add BateArni shield TurtleShield | Red team wins the game!  -- Name: Nakov, Team: Red, Health: 290, Defense: 50, Attack: 375  -- Name: Alex, Team: Red, Health: 75, Defense: 50, Healing: 60 |