OOP Retake Exam - Mass Effect

The galaxy is a dangerous place - the vast void is full of starships which endlessly fight one another.

There are several **star systems** in the galaxy - Artemis Tau, Serpent Nebula, Hades Gamma and Kepler Verge. **Starships** can travel from one star system to another (if they are neighbouring) and **fight other starships**. A starship has **health**, **shields**, **damage**, **fuel** and shoots a specific **projectile** when attacking another ship. There are 3 types of starships - **Frigates**, **Cruisers** and **Dreadnoughts**, and each one respectively has different characteristics.

Your task is to implement each of the **ships** and a few **commands**. You are given a working engine.

Project Structure

- Engine holds the core classes for the game logic
- Exceptions holds exceptions classes
- GameObjects
 - Enhancements ship upgrades that give bonuses
 - Locations holds the StarSystem class
 - Ships namespace for all the ship classes in the game
 - o **Projectiles** namespace for all the projectile classes used by ships
 - Galaxy holds a colleciton of all star system. TravelTo() method offers functionality for ships to travel from one star system to another.
- Interfaces holds all of the application's interfaces
 - o IStarship, IGameEngine, ICommandManager, IProjectile

Study the provided code. Implement the necessary functionality by applying the best practices of Object-Oriented Programming and Object-Oriented Design.

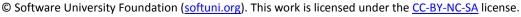
Commands

Implement the following commands:

- create {shipType} {shipName} {starSystem} {enhancement1 enhancements2 ...} creates a new ship with the given name in the given star system. Optionally, an arbitrary number of enhancements can follow in the input string they should all be added to the ship through the AddEnhancement method and their effects applied.
 - Success message: Created {shipType} {shipName}
- attack {attackerShip} {targetShip} forces a ship to attack another. The attacking ship should produce a projectile and it should be given to the target ship to respond to it (study the methods of the IStarship and IProjectile interfaces to get a better idea).
 - Success message: "{attackerShip} attacked {targetShip}"
 If the ship is destroyed as a result, print "{targetShip} has been destroyed" as well.
- plot-jump {shipName} {starSystem} changes the location of the given ship to the new star system.
 - Success message: "{shipName} jumped from {startLocation} to {destinationLocation}"
- **status-report** {**shipName**} displays information about the ship in the following format:

If health > 0	If health <= 0
ii iieaitii > 0	II II CATCII V = 0





















```
--{shipName} - {shipType}
-Location: {locationName}
-Health: {health}
-Shields: {shields}
-Damage: {damage}
-Fuel: {fuel}
-Enhancements: {enh1, enh2, ...}
--{shipName} - {shipType}
(Destroyed)
```

If there are no enhancements, print "N/A".

If the ship is a **frigate** (and not destroyed), it should also display the number of projectiles fired so far in the format:

```
-Projectiles fired: {count}
```

over - stops the game engine

Ships

Ships should implement the **IStarship** interface. There are 3 types of ships:

- Frigate has start health 60, shields 50, damage 30 and fuel 220. Shoots a ShieldReaver with damage equal to its own damage.
- Cruiser has start health 100, shields 100, damage 50 and fuel 300. Shoots a
 PenetrationShell with damage equal to its own damage.
- Dreadnought has start health 200, shields 300, damage 150 and fuel 700. Shoots a Laser with damage equal to half its shields + own damage. Responds to an attack by raising its shields by 50 before the attack and removes them after it.

Enhancements

Enhancements give a ship bonuses. Enhancement effect (shields, fuel and damage) should be applied to the ship when added through the **AddEnhancement** method. There are 3 enhancements the **EnhancementFactory** supports:

- ThanixCannon gives a ship bonus 50 damage.
- **KineticBarrier** gives a ship bonus **100** shields.
- ExtendedFuelCells gives a ship bonus 200 fuel.

Projectiles

Projectiles should implement the **IProjectile** interface.

- PenetrationShell removes health from the ship equal to the projectile's damage.
- **ShieldReaver** removes **health** from the ship equal to **the projectile's damage**. It also removes **shields** from the ship equal to **2x the projectile's damage**.
- Laser removes shields from the ship equal to the projectile's damage. If the damage is more than the ship's shields, it also takes health equal to the damage left. (e.g. 50 shields and 100 health a laser of 80 damage would remove 50 shields and 30 health, resulting in 0 shields and 70 health for the ship).

Validations

Perform the following validations:



















Exceptional conditions	Messages
If a destroyed ship attacks/is attacked or tries to travel to another star system	Ship is destroyed
Creating a ship with a name that already exists	Ship with such name already exists
Attacking a ship that is not in the current star system	No such ship in star system
Attempting to travel to the same star system	Ship is already in {starSystemName}

Extending the Engine

Add and implement the following command (without editing the GameEngine and CommandManager classes):

• **system-report** {**starSystem**} - displays information about all ships in the given **star system** in the following format:

```
Intact ships:
{information about ship_1}
{information about ship_2}
Destroyed ships:
{information about ship_3}
```

Intact ships should be sorted by **health** in descending order and by **shields** as secondary criteria (again in descending order). Destroyed ships should ordered alphabetically by **name** in ascending order.

Constraints

You are **NOT** allowed to edit the **GameEngine** and **CommandManager** classes in any way. You are also not allowed to change the provided interfaces. You may edit everything else, including the **MassEffectMain** class.

Additional Notes

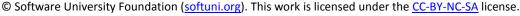
- The star systems will always be the same (Artemis-Tau, Serpent-Nebula, Hades-Gamma and Kepler-Verge).
- A ship's health and shields should not fall below 0.
- The ship's fuel should be rounded to 1 digit after the decimal point.

Examples

Zero Test #1

Input	Output
create Frigate Normandy Serpent-Nebula ThanixCannon	Created Frigate Normandy
create Dreadnought DestinyAscension Serpent-Nebula	Created Dreadnought DestinyAscension
KineticBarrier	Normandy attacked DestinyAscension
attack Normandy DestinyAscension	Normandy attacked DestinyAscension
attack Normandy DestinyAscension	Normandy attacked DestinyAscension
attack Normandy DestinyAscension	DestinyAscension has been destroyed
status-report DestinyAscension	DestinyAscension - Dreadnought
plot-jump Normandy Artemis-Tau	(Destroyed)
status-report Normandy	Normandy jumped from Serpent-Nebula to
over	Artemis-Tau
	Normandy - Frigate
	-Location: Artemis-Tau
	-Health: 60



















-Shields: 50 -Damage: 80 -Fuel: 170.0

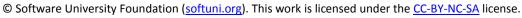
-Enhancements: ThanixCannon

-Projectiles fired: 3

Zero Test #2

Input	Output
create Frigate Normandy Hades-Gamma	Created Frigate Normandy
create Cruiser Alarei Hades-Gamma	Created Cruiser Alarei
create Dreadnought Sovereign Kepler-Verge	Created Dreadnought Sovereign
status-report Alarei	Alarei - Cruiser
attack Normandy Alarei	-Location: Hades-Gamma
status-report Alarei	-Health: 100
status-report Normandy	-Shields: 100
attack Alarei Normandy	-Damage: 50
status-report Normandy	-Fuel: 300.0
plot-jump Sovereign Hades-Gamma	-Enhancements: N/A
attack Sovereign Alarei	Normandy attacked Alarei
attack Normandy Sovereign	Alarei - Cruiser
system-report Hades-Gamma	-Location: Hades-Gamma
system-report Artemis-Tau	-Health: 70
over	-Shields: 40
	-Damage: 50
	-Fuel: 300.0
	-Enhancements: N/A
	Normandy - Frigate
	-Location: Hades-Gamma
	-Health: 60
	-Shields: 50
	-Damage: 30
	-Fuel: 220.0
	-Enhancements: N/A
	-Projectiles fired: 1
	Alarei attacked Normandy
	Normandy - Frigate
	-Location: Hades-Gamma
	-Health: 10
	-Shields: 50
	-Damage: 30
	-Fuel: 220.0
	-Enhancements: N/A
	-Projectiles fired: 1
	Sovereign jumped from Kepler-Verge to Hades-
	Gamma
	Sovereign attacked Alarei
	Alarei has been destroyed
	Normandy attacked Sovereign
	Intact ships:
	Sovereign - Dreadnought
	-Location: Hades-Gamma
	-Health: 170
	-Shields: 240
	-Damage: 150
	-Fuel: 555.0
	-Enhancements: N/A
	Normandy - Frigate
	-Location: Hades-Gamma
	-Health: 10
	-Shields: 50





















-Damage: 30
-Fuel: 220.0
-Enhancements: N/A
-Projectiles fired: 2
Destroyed ships:
--Alarei - Cruiser
(Destroyed)
Intact ships:
N/A
Destroyed ships:
N/A

Zero Test #3

Input	Output
Input create Dreadnought Sovereign Kepler-Verge ExtendedFuelCells KineticBarrier create Dreadnought DestinyAscension Kepler-Verge ThanixCannon status-report Sovereign status-report DestinyAscension attack Sovereign DestinyAscension status-report DestinyAscension attack DestinyAscension Sovereign status-report Sovereign attack DestinyAscension Sovereign attack DestinyAscension Sovereign status-report Sovereign over	Created Dreadnought Sovereign Created Dreadnought DestinyAscensionSovereign - Dreadnought -Location: Kepler-Verge -Health: 200 -Shields: 400 -Damage: 150 -Fuel: 900.0 -Enhancements: ExtendedFuelCells, KineticBarrierDestinyAscension - Dreadnought -Location: Kepler-Verge -Health: 200 -Shields: 300 -Damage: 200 -Fuel: 700.0 -Enhancements: ThanixCannon Sovereign attacked DestinyAscensionDestinyAscension - Dreadnought -Location: Kepler-Verge -Health: 200 -Shields: 0 -Damage: 200 -Fuel: 700.0 -Enhancements: ThanixCannon
	-Health: 200 -Shields: 0 -Damage: 200 -Fuel: 700.0 -Enhancements: ThanixCannon DestinyAscension attacked SovereignSovereign - Dreadnought -Location: Kepler-Verge -Health: 200 -Shields: 200 -Damage: 150 -Fuel: 900.0 -Enhancements: ExtendedFuelCells, KineticBarrier DestinyAscension attacked Sovereign DestinyAscension attacked SovereignSovereign - Dreadnought -Location: Kepler-Verge
	-Health: 50 -Shields: 0 -Damage: 150 -Fuel: 900.0 -Enhancements: ExtendedFuelCells, KineticBarrier















