Battleships 4

The following new feature will be added to the game:

- Ships can be upgraded with individual or combined capabilities, according to the following table:

Upgrade compatibility table

	Armour	**Stealth technology**	**Cloaking device**
	$ 100,000	$ 2,500,000	$14,500,000
Minesweeper price: $ 1 million	y	n	n
Destroyer price: $ 15 million	y	y	n
Battleship price: $ 30 million	y	y	y
Submarine price: $ 20 million	n	y	y

For example, Destroyers can be upgraded with either Armour, Stealth technology, or both, but they cannot be upgraded with cloaking devices.
In addition to the above, the production price for each type of Ship and Upgrade is given in the table.

Each upgrade may influence the behavior of Ship objects, in particular the implementation of the method getPrice(), defined in the superclass “Ship”, and implemented in all concrete Ship classes, according to the table. When a ship is upgraded, the behavior of the method getPrice() should change automatically to reflect the new total value of the ship (i.e. old ship price + price of the added upgrade). For example, if the method getPrice() for a Battleship returns 30,000,000, after upgrading the ship with Stealth and Cloaking, the method should return 30,000,000+2,500,000+14,500,000 = 47,000,000.

Restructure the design of the game in such a way that adding upgrades to a ship changes the behavior of the ship (i.e. the method getPrice()), automatically and in a transparent way. Hint: use the design pattern Decorator, and implement Upgrades as Ship decorators.

In addition, employ the design pattern Composite in order to allow the definition of “upgrade packages” (i.e. composed upgrades or upgrade bundles) which behave and are used just like any elementary upgrade. Packages defined in this way should feature a 20% discount of the total package price as compared to the sum of its constituent upgrades (i.e. considered to be elementary ones). Hint: apply the design pattern Composite in order to model composed upgrades, or upgrade bundles.

Employ the abstract factory pattern in order to ensure that only allowed combinations of upgrades are installed for a given type of Ship.