

## 2nd Assignment

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Group 8

### Task 10:

*10. Hobby animals need several things to preserve their exhilaration. Steve has some hobby animals: tarantulas, hamsters, and cats. Every animal has a name and their exhilaration level is between 0 and 70 (0 means that the animal dies). If their keeper is joyful, he takes care of everything to cheer up his animals, and their exhilaration level increases: of the tarantulas by 1, of the hamsters by 2, and of the cats by 3.*

*On a usual day, Steve takes care of only the cats (their exhilaration level increases by 3), so the exhilaration level of the rest decreases: of the tarantulas by 2, and of the hamsters by 3. On a blue day, every animal becomes a bit sadder and their exhilaration level decreases: of the tarantulas by 3, of the hamsters by 5, of the cats by 7.*

*Steve's mood improves by one if the exhilaration level of every alive animal is at least 5. Every data is stored in a text file. The first line contains the number of animals. Each of the following lines contain the data of one animal: one character for the type (T – Tarantula, H – Hamster, C – Cat), name of the animal (one word), and the initial level of exhilaration.*

*In the last line, the daily moods of Steve are enumerated by a list of characters (j – joyful, u – usual, b – blue). The file is assumed to be correct. List the animals of the highest exhilaration level at the end of each day.*

## Plan

To describe the animals, three classes are introduced: Tarantula, Hamster, and Cat, all inheriting from the base class Animal. Each animal class contains properties such as name, exhilaration level, and methods for caring for the animal based on different moods.

To describe the days, three classes are introduced: Joyful, Usual, and Blue, all inheriting from the base class Days. These classes are implemented as singletons. Each day class contains methods for caring for specific types of animals based on the day's mood.

In the Animal class, there's a method Care that takes a Days object as a parameter and adjusts the exhilaration level of the animal based on the specific day's mood. This method is overridden in each animal subclass to provide specific implementations for caring for each animal type.

In the Days class, there are abstract methods CareForTarantula, CareForHamster, and CareForCat, which are implemented in the concrete day classes to provide specific care actions for each animal type based on the day's mood.

The Steve class contains methods for checking Steve's mood and finding the animals with the highest exhilaration level.

Tarantula:

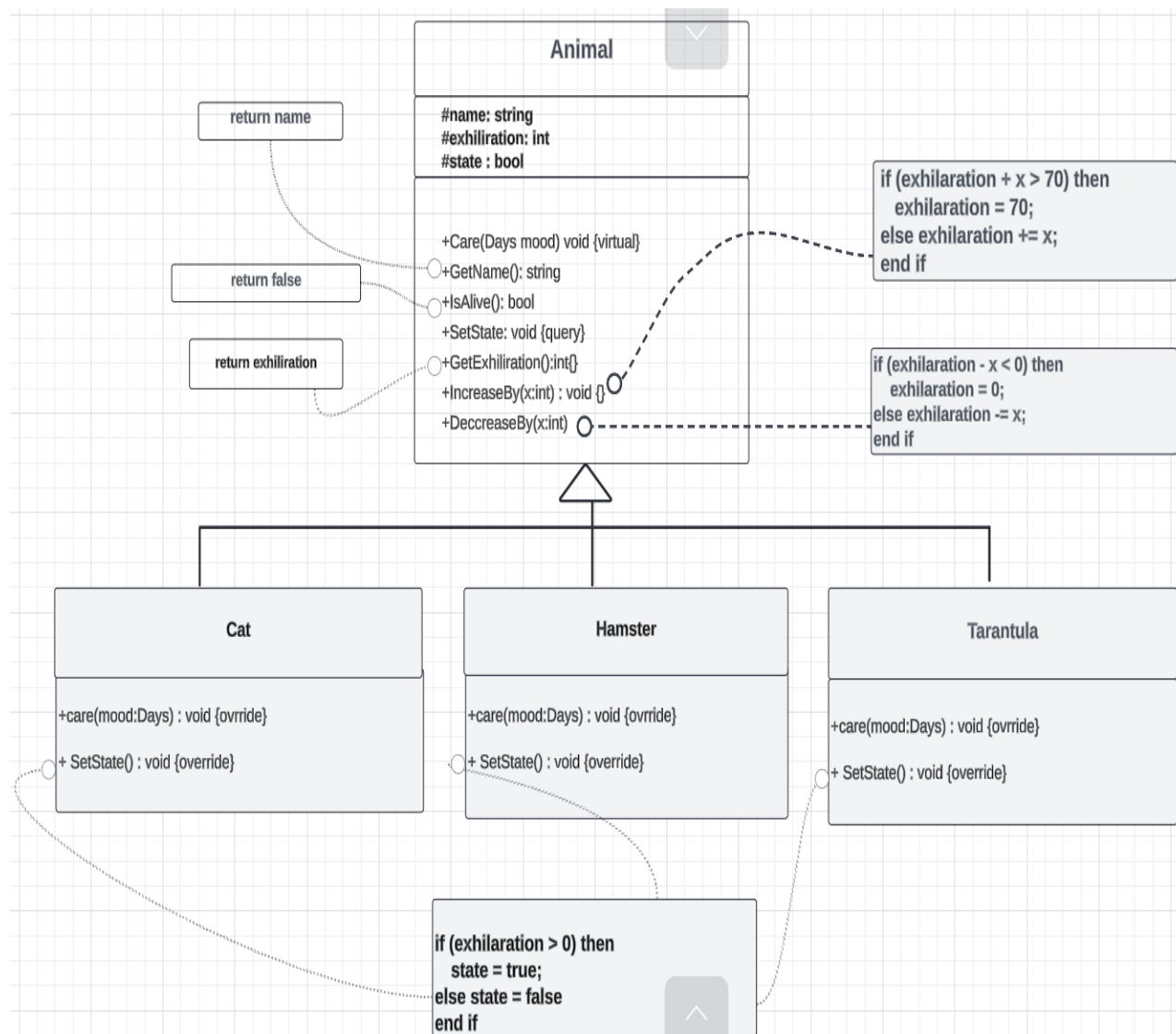
Days	Ex. Level Change
Usual	-2
Joyful	+1
Blue	-3

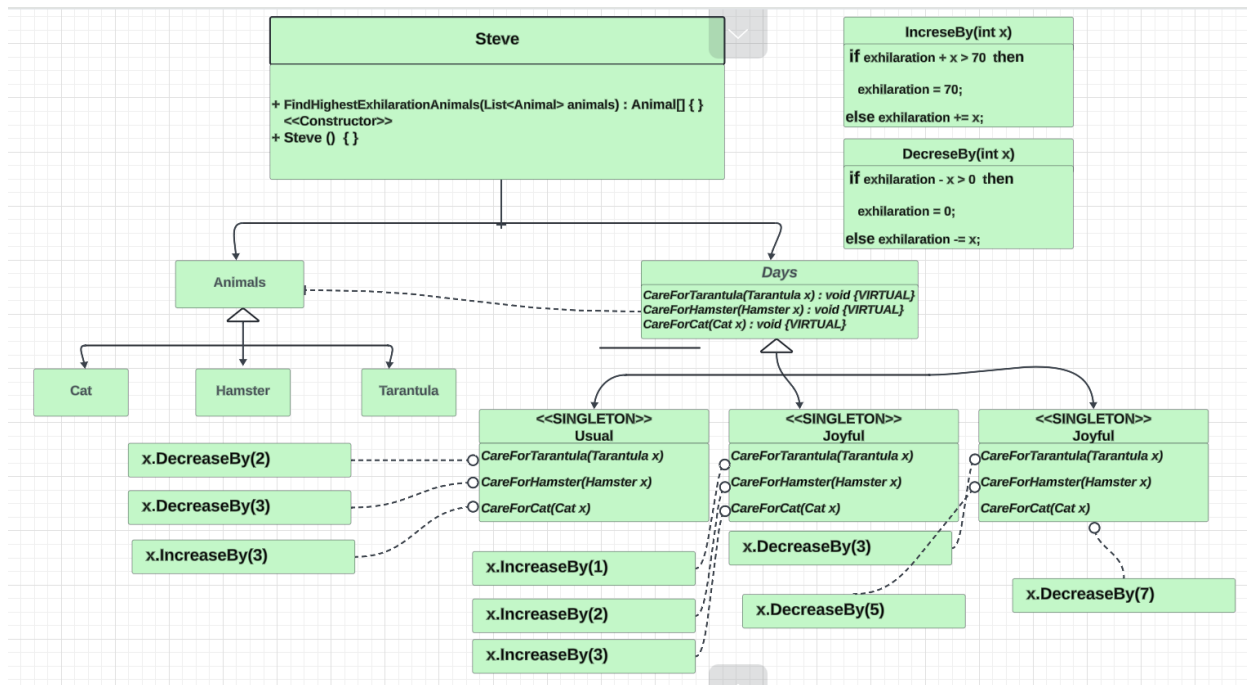
Hamster:

Days	Ex. Level Change
Usual	-3
Joyful	+2
Blue	-5

Cat:

Days	Ex. Level Change
Usual	+3
Joyful	+3
Blue	-7





**FindHighestExhilarationAnimals:**

Choose the animals with highest exhilaration each day

Formally:  $A = (a: \text{Animals}^*, h: \text{Animals}^*)$

Pre=Post= $(a=a' \wedge \text{animal} \in a: \text{exhilaration} \geq 0) \rightarrow h = \bigoplus \forall \text{animal} \in a \mid \text{exhilaration} = \max(\text{exhilaration in } a)$

enor(E)	$i=1.. d $
f(e)	Days.FindHighestExhilarationAnimals(d)
s	(l, ind)

⊖

H,+,0	(Bool, Int), , d[i]
enor(E)	i=1.. d
f(e)	<a[ind]> if 1
s	FindHighestExhilarationAnimals
H,+,0	Animals*, , <

⊖

**FindHighestExhilarationAnimal(Animals[])**

newAnimal := []		
highestExhilaration = 0;		
Animal animal = Animals[1]		
i = 1 ..  Animal		
	animals[i].GetExhilaration() > highestExhilaration	
T		F
highestExhilaration = animal.GetExhilaration()		Skip
animal = Animals[i]		
newAnimal.add(animal);		
return newAnimal;		

# Testing

## 1. AnimalTests

Objective: Verify correct functionality of the Animal class.

Methods Tested:

AnimalConstructor\_GetName: Confirms that animal names are correctly initialized.

AnimalMethods: Tests state setting and exhilaration manipulation functionalities.

## 2. TarantulaTests

Objective: Ensure that the Tarantula class responds accurately to care states.

Methods Tested:

TarantulaMethods: Checks survival status and exhilaration updates under Joyful care.

## 3. HamsterTests

Objective: Validate the Hamster class's reactions to care adjustments.

Methods Tested:

HamsterMethods: Observes the impact of Usual care on survival and exhilaration.

## 4. CatTests

Objective: Test the Cat class's response to different care conditions.

Methods Tested:

CatMethods: Evaluates survival and exhilaration effects under Blue care.

## 5. JoyfulTests

Objective: Assess the effects of Joyful care on multiple animal types.

Methods Tested:

JoyfulMethods: Monitors exhilaration changes in cats, hamsters, and tarantulas.

## 6. UsualTests

Objective: Measure the standard care impact on various animals.

Methods Tested:

UsualMethods: Determines exhilaration adjustments for cats, hamsters, and tarantulas.

## 7. BlueTests

Objective: Examine the impact of Blue care on animal exhilaration and survival.

Methods Tested:

BlueMethods: Tracks the negative effects of care on different animals.

#### 8. SteveTests

Objective: Validate the functionality of the Steve class in evaluating animal moods.

Methods Tested:

SteveMethods: Tests mood assessment and identification of highest exhilaration animals.