Previous exam papers

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Make a class-diagram for those classes you find naturally to include, including the relations between the classes. *The solution should demonstrate inheritance and polymorphic.*

Oppgave 1)

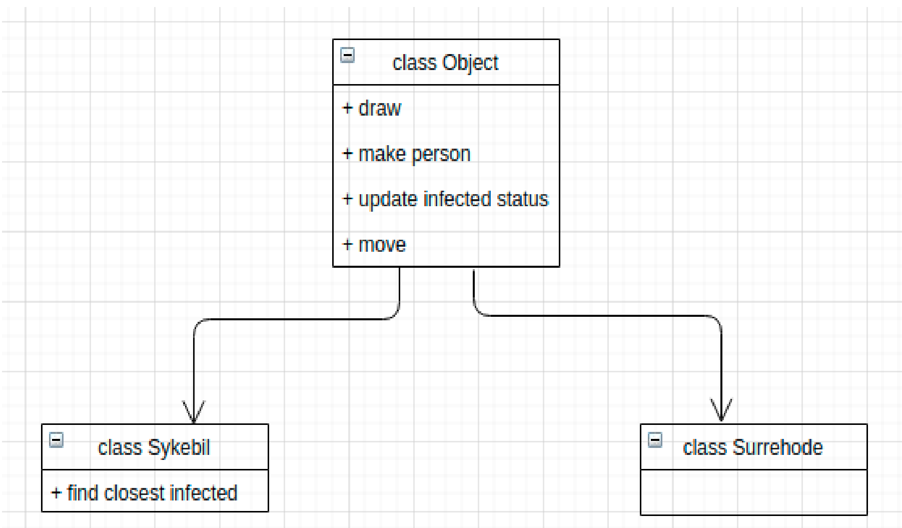

Figure 1: Illustration of an UML.

Oppgave 2)

Describe how the behavior can be implemented and rough sketches how to change the existing code. Describe assumptions you make (e.g that the incubation period should not be implemented). Explain how inheritance and polymorphism are used in the solution.

The first thing to notice, is that we put some functions in a object parent class. This includes draw, make person, update infected status and move. We also make two child classes for the two behaviors "surrehode" and "sykebil" which both inherits the attributes from the object parent class. The move function have implemented specific code for both behaviors "surrehode" and "sykebil". When this attribute is inherited down to the sub classes, it will have different impact on the two classes. If the targeted behavior is "surrehode" the x, and y movement will be set to random direction and orientation on the screen, justifying the name. If the target behavior is "sykebil" it is instructed to run the function "find closest infected" if within range. Making them behave differently from the same function. The function specifics "find closest infected" is located at the sykebil class.

The way the move function is applicable in two different ways depending on the behavior, is an example of polymorphism. The other objects in the parent class object is implemented in the same way using polymorphism and inheritance. The draw function will draw a circle for surrehode and give it a different color depending on disease status, each person that gets infected gets a new color. If the infected persons sick time passes recovery time (adjusted with steps per second) the person will be recovered. In the time the person is infected, they will be able to infect other susceptible within infection range. Assumptions made are that there is no incubation time. No persons die of the infection and are not removed. No new person come in and no one goes out. The ambulance (personnel) cannot be infected.

So, we have changed the existing code by adding tree classes: objects, "sykebil" and "surrehode". The behavior "sykebil" and "surrehode" have been implemented as child classes. We have based our implementation on the differentiation of two behaviors in the pre-code, the functions that are polymorphic (behave differently for each subclass) are put in the parent class objects, they are inherited down to the child-classes.

Oppgave 3

Oppgave 4

a) The new class "MBsurrehode" is put as a child class alongside "surrehode" and "sykebil". It inherit all the functions in the object class.

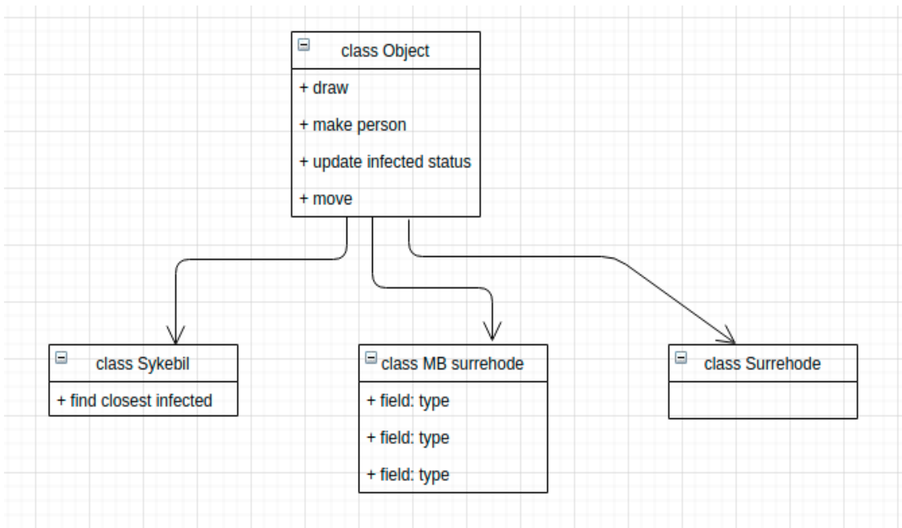

Figure 1: Illustration of an UML.

b) We needed to change the code for this implementation. We added a new method, but we did not add a new status, so even though a person i using a mask they can still be one of the tree statuses: "infected", "susceptible" and "recovered". We wanted to make changes that had an impact on: 1) how many people in the population wear a mask. Here we redistributed behavior weight between the three classes so that for each "sykebil" there is 10 with and 10 without mask. This distribution can easily be adjusted to see different scenarios. .

2) How likely is it that someone with a mask will infect others? To be able to "experiment" with this question we needed to change the update infection status code. Here we have added solutions for all the different scenarios when half of the population has masks, and half don't. If the target uses mask and get infected, the course of the disease is no different. The difference is implemented by using different three "infection range" parameters. Now if a "sick" person without mask meets another without mask within "infection range" the other person will be infected. If the same person meets a person with mask the other person will not be infected within "infection range", they need to get within the "infection MB range" for the other person to get infected.

3) How likely is it that someone with a bandage will infect others? If the target person uses mask an meet another without mask, the scenario is the same as explained above with "infection MB range" as the limit. One assumption made is that face masks protect just as much from being infected as infecting others

(this is probably not scientifically true). If the ”sick” target person with mask meets another also with mask, the infection range decreases to ”infection MBx2 range”. The ”infection range” is set to 40, we have added two new globals: ”infection MB range” is set to 10 and ”infection MBx2 range” is set to 5. We have also changed the color in the draw function for ”MBsurrehode”.