



## The Simulation

Your task is to extend a predator/prey simulation. You should use the *foxes-and-rabbits-handout* project (presented in the lecture, available for download from KEATS) as a basis for your own project, and modify and extend it to make it more interesting. (Note that this is slightly different from the book project, so please use the version from KEATS, not from the book projects).

You can either leave the Fox and Rabbit classes present and add your own classes, or replace them with different kinds of predator and prey to simulate a different habitat (for example, under water, in a jungle or in a fantasy world).

This project is a pair programming task. **You must work in pairs.** Information about pair programming is provided separately. We will not accept submissions by individuals.

## 1 The core tasks

You should aim at completing all core tasks. They are:

- Your simulation should have at least five different kinds of acting species. At least two of these should be predators (they eat another species), and at least two of them should not be predators (they may eat plants). Plants can either be assumed to always be available (as in the original project), or they can be simulated (see below).
- At least two predators should compete for the same food source.
- Some or all of the species should distinguish male and female individuals. For these, the creatures can only propagate when a male and female individual meet. ("Meet" means they need to be within a specified distance to each other, for example in a neighbouring cell.) You will need to experiment with the parameters for breeding probability to create a stable population.
- You should keep track of the time of day. At least some creatures should exhibit different behaviour at some time of the day (for example: they may sleep at night and not move during that time).

You should implement the core tasks first before you move on to the extension tasks.

## 2 Extension tasks

Once you have finished the core tasks, implement one or more extension tasks. You can either choose from the following suggestions, or invent your own.

- Add plants. Plants grow at a given rate, but they do not move. Some creatures eat plants. They will die if they do not find their food plant.
- Add weather. Weather can change, and it influences the behaviour of some simulated aspects. For example, grass may not grow without rain, or predators cannot see well in fog.
- Add disease. Some animals are occasionally infected. Infection can spread to other animals when they meet.

If you invent your own extension tasks, check with your class supervisor before implementing them. You must get their comments to ensure they your idea is not too simple or too difficult.

### 3 Extra work – just for fun

You can extend the GUI (the graphical user interface) itself if you like, but no marks will be awarded for this work. If you do this – that's good, but it is purely for fun and for your own practice.

### 4 Submission and Assessment

You must submit your code and a report. The code will be assessed for

- Correctness
- Appropriate use of language constructs
- Style (commenting, indentation, etc.)
- Design (code quality, appropriate use of inheritance)
- Difficulty (marks for extension tasks)

Report: You also have to submit a report that includes

- A description of your simulation, including the types of species that you are simulating, their behaviour and interactions.
- A list and description of all extension tasks you have implemented.
- Known bugs or problems (Note: for a bug in your code that you document yourself, you may not lose many marks – maybe none, if it is in a challenge task. For bugs that we find that you did not document you will probably lose marks.)

The report should be no more than three pages long.

Marking the assignment will involve an interview in your lab class. More detail about the interview will be provided separately.

The code and report must be submitted via the assignment 3 submission link on the PPA KEATS page, before the deadline, by **both members of your pair**. Both the source code and the report should clearly state the names of both authors.

#### Deadline

This assignment (code and report) is due on

**Friday, 23 February 2018, 5pm**