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EXERCICE 5. FIREFLIES

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EXERCICE 5. FIREFLIES

- At night, the fireflies start to turn on and off, each at its own frequency. But after a few minutes, they begin to synchronize, and in particular the timing of their switching on and off.

https://www.youtube.com/watch?v=a-Vy7NZTGos

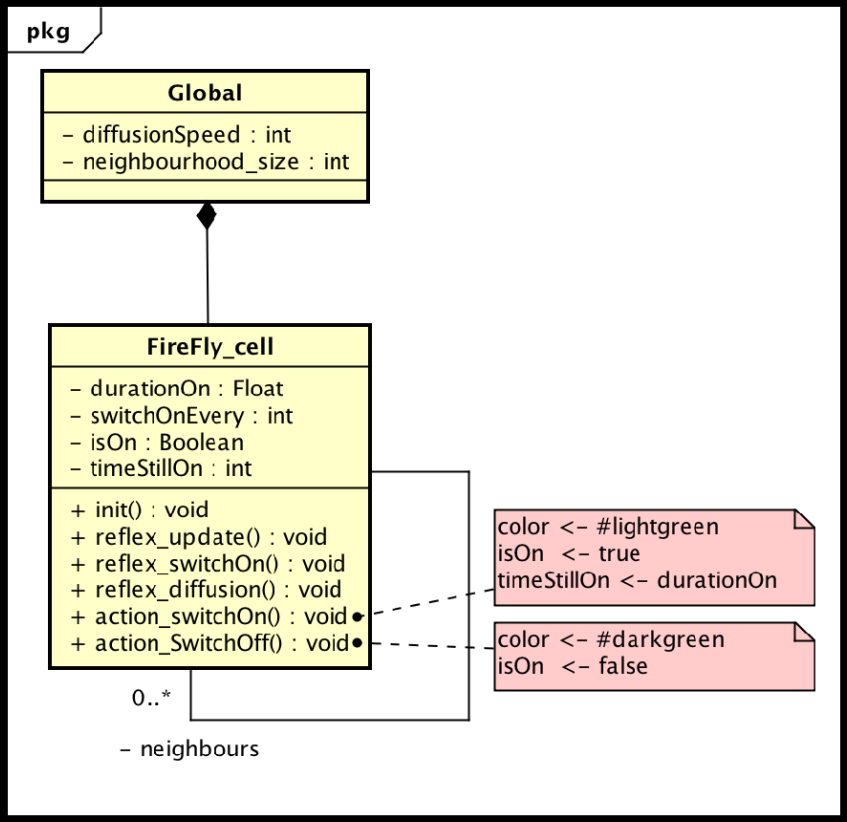
- The aim of this model is to propose a mechanism for reproducing this phenomenon.

EXERCICE 5. FIREFLIES

Consider fireflies located on a grid (each cell is a firefly).

They are characterized by :

- The time they are lit: durationOn
- The number of steps between 2 switch-ons: switchOnEvery
- Their state (on or off): isOn
- timeStillOn contains the number of steps they will remain on.



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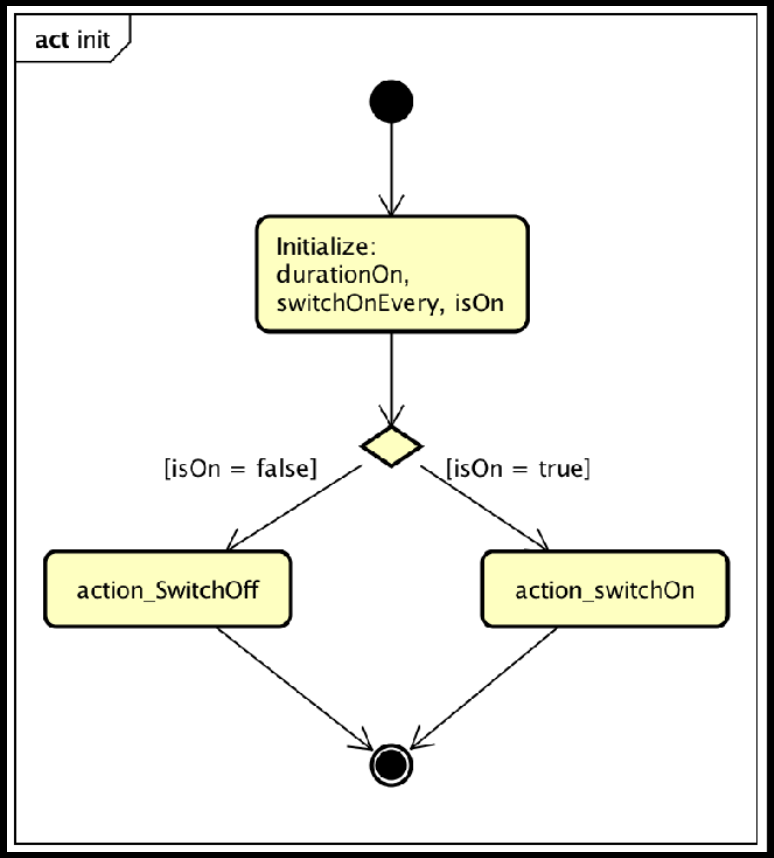
Initialisation

Global variables

- neighbourhood_size: 2
- diffusionSpeed: 0.4
- Number of cells: 50 x 50

Firefly

- durationOn: random value between 0 and 10
- switchOnEvery: random value between 1 and 21
- isOn: 50% true, 50% false



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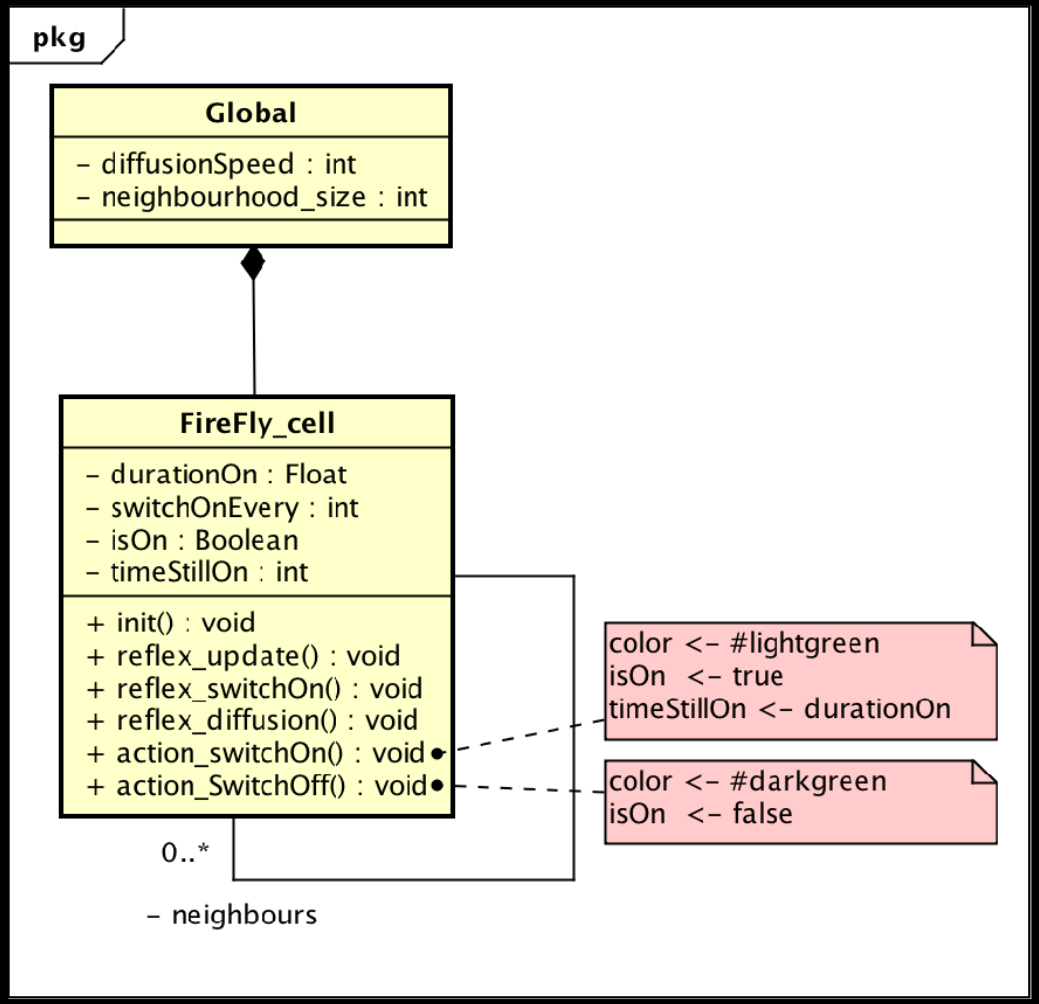
reflex_update updates the agent's state (in particular, decreasing timeStillOn and changing the state according to its value).

reflex_switchOn will be called when it's time to switch on.

reflex_diffusion: each firefly chooses 1 neighbor at random and tends to get closer to it in terms of durationOn and switchOnEvery (it gets closer with a certain speed, which is a simulation parameter).



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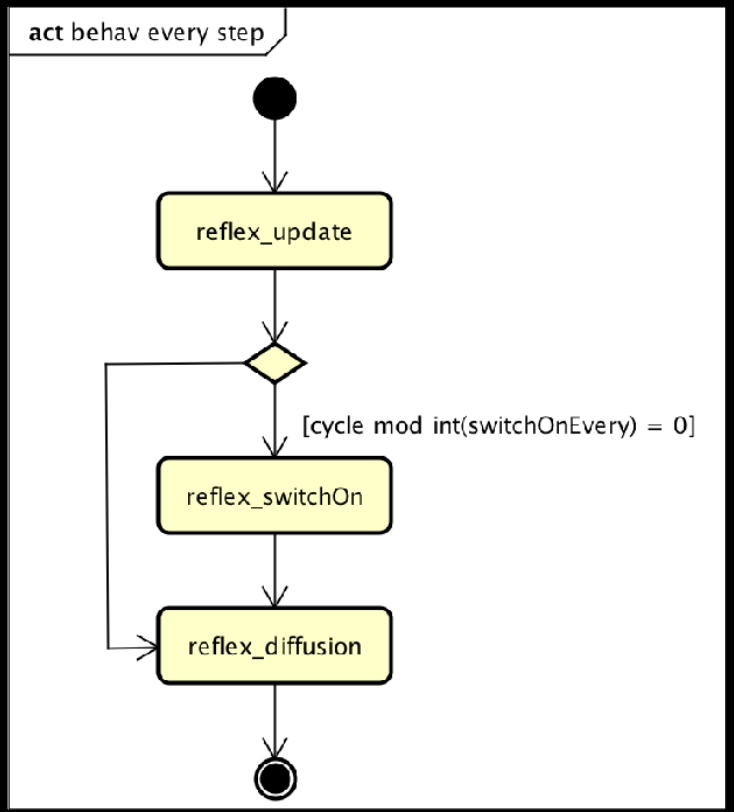

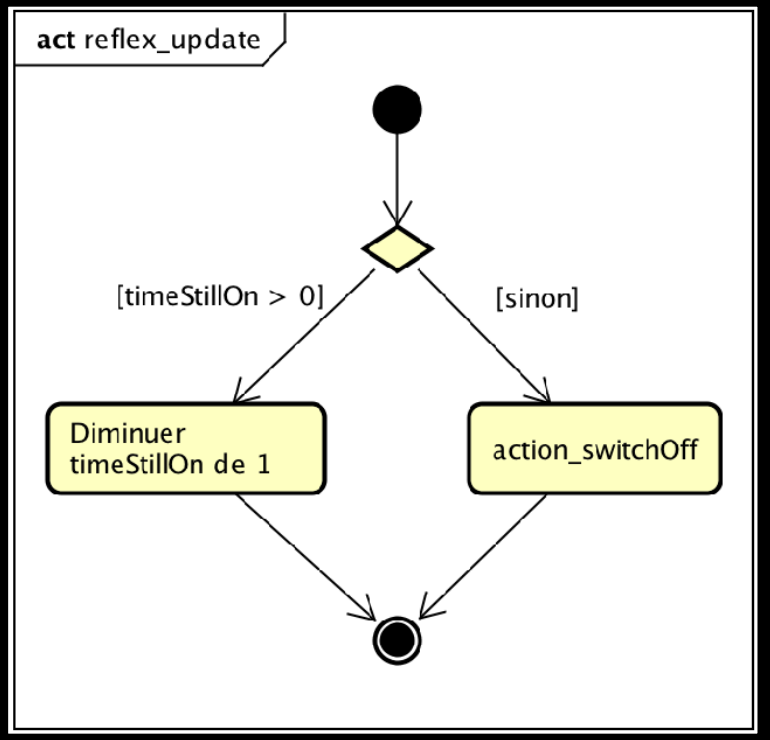

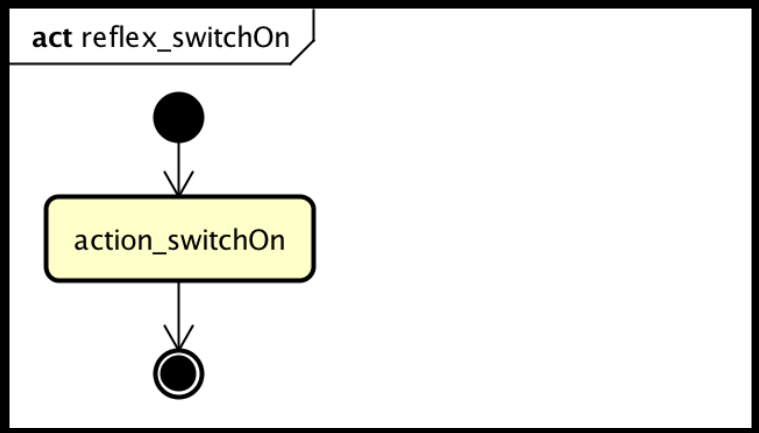

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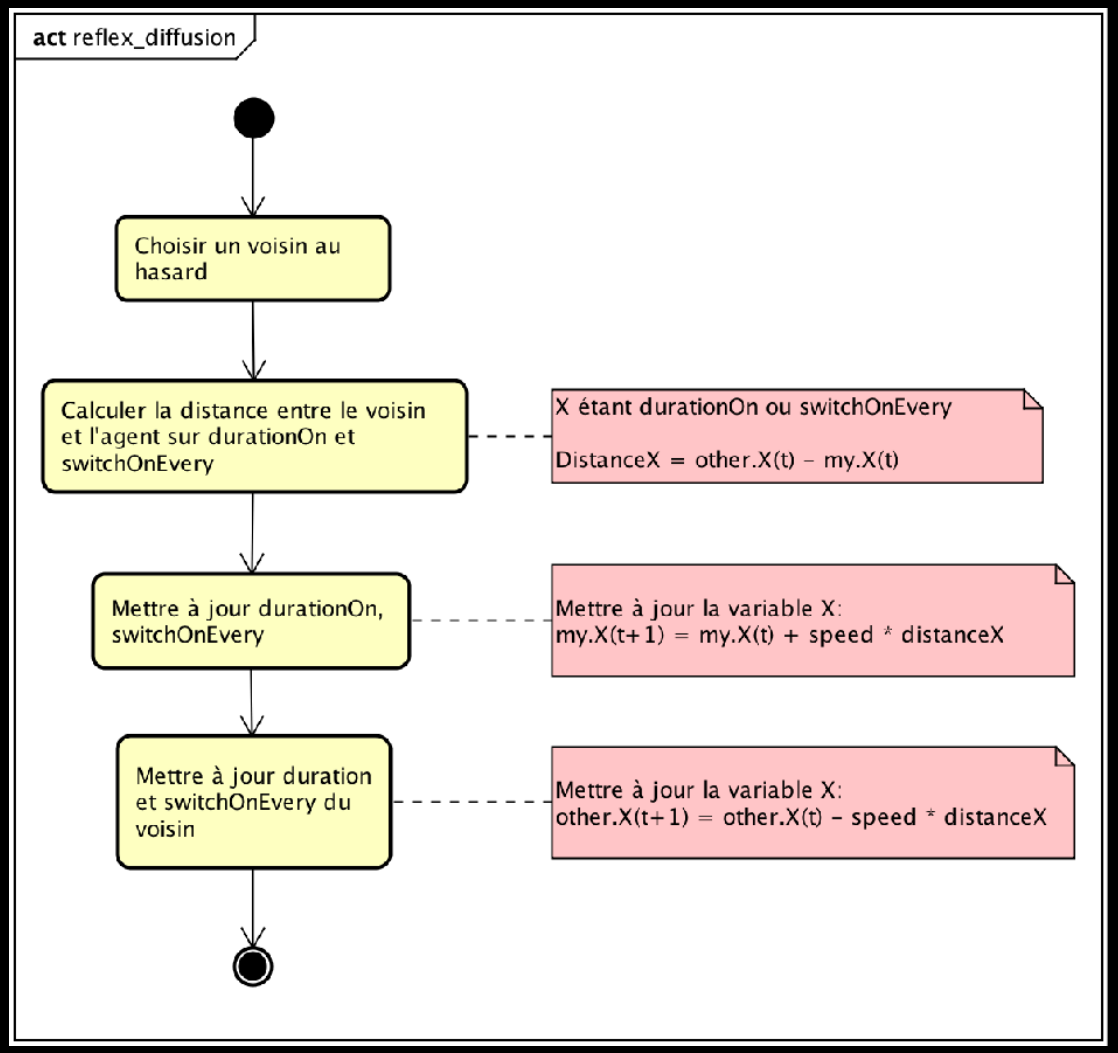

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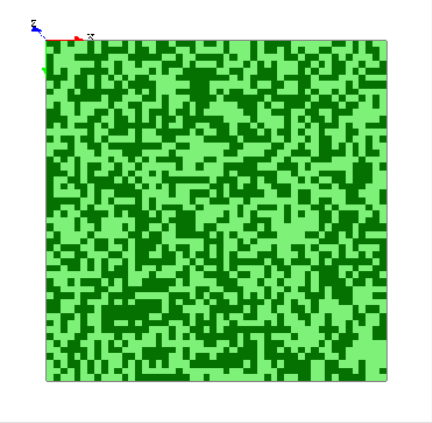
Displays

Fireflies and their colors



Charts:

- The number of fireflies that are extinguished.
- Difference between maximum durationOn and minimum durationOn, among all fireflies.