



Introduction to Simulation

Assignment 1: Getting to know AnyLogic

Follow these steps to run a simple continuous simulation with AnyLogic:

1. Start AnyLogic
2. Create a new Model called *Assignment1* by right-clicking in the project explorer and choosing *New* → *Model...* (or by clicking on the model icon in the toolbar)
3. Navigate to the *System Dynamics* palette by selecting the correct icon/name from the left-hand toolbar.
4. Keep the selection *Start creating an new model from scratch* and click *Finish*
5. Drag a *Parameter* from the *General* palette to the canvas. Change the parameter *Name* to *a* and *Default value* to 0.175 .
6. Create the parameters $b=0.125$ and $c=0.001$ analogously.
7. Drag a *Stock Variable* from the *System Dynamics* palette to the canvas and change the variable *Name* to *Hare* and *Initial value* to 400 . Set the *Equation mode* to *Custom* (radio button).
8. Enter the following differential equation in the field $d(\text{Hare})/dt=$
 $a * \text{Hare} - c * \text{Hare} * \text{Fox}$
9. Create the visible links to the Parameters by clicking on the grey area in the differential equation field and select *Create a link from a*; analogously for *c*.
10. Drag a *Stock Variable* from the *System Dynamics* palette to the canvas and change the variable *Name* to *Fox* and *Initial value* to 37 . Set the *Equation mode* to *Custom*.
11. Enter the following differential equation in the field $d(\text{Fox})/dt=$
 $-b * \text{Fox} + c * \text{Hare} * \text{Fox}$
12. Create the visible links (for *Hare* and *Fox*) by clicking on the grey area in the differential equation field and selecting the appropriate options.
13. Drag a *Time Plot* from the *Analysis* palette.
14. Open the *Scale* slider of the *Properties* dialogue and select the *Fixed* for the *Vertical scale* and enter 1000 in the *to* field.
15. Add a data item by clicking the <Plus-sign> button and enter *Hare* in the *Value* and the title field.
16. Add a data item by clicking the <Plus-sign> button and enter *Fox* in the *Value* and the title field.
17. Right click on the *Simulation: Main* object in the project explorer and select *Run*.
18. Click on the *Run* button. You can stop or pause the simulation by clicking the <Stop Symbol> or <Pause Symbol> button in the Tools Menu bar.
19. After the run is complete, close the simulation window.
20. Modify the value of the constant *b* to twice its present value and repeat steps 15 to 17. How have the results changed? Can you explain the new behaviour?
21. Return *b* to its original value and change the value of *c* to three times its original value. How does this affect the simulation results? Can you explain the new behaviour?