Computation Time consideration
when using vle.extension.ibm

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Introduction

This is a very preliminary study, in order to introduce the subject.
And we have taken the a user point of view.

- ▶ An empirical approach.
- ▶ A single model Lotka Voltera
- ▶ A single method, expected to be the same on both side (RK4)
- ▶ ModelMaker 3.0 has been used on a Windows Seven Virtual Machine
- ▶ vle 1.3 has been used Ubuntu 14.04
- ▶ the laptop used is an i7(2.7GHz)

Simulators
All the simulators we have been used for this study, even those of ModelMaker are available in the package ibm.computation.time.

The simulator

- A simple LotkaVoltera model with 2 variables an 4 parameters
- RK4 with fixed step length (100 steps per time steps)
- 100000 steps
- No visualisation
- A Storage view is used on the VLE side, to store at the resolution of the simulation, not the one of the RK4 method.

ModelMaker & vle.extension.differential-equation

- The unit of Table 1 is the second.
- On one side we use the duration given by ModelMaker
- On the other side we use the user time given by the unix command time
- MM_vectorized : the compartments of the model are vectorized
- MM_Duplicated : the diagrams compartments are duplicated
- VLE_ODE : the models are duplicated

Quantity	MM_Duplicated	MM_vectorized	VLE_ODE
x1	9.4	9.4	3.539
x2	17.9	46.9	6.934
x10	84.8	217.7	34.391

Table 1 :   ModelMaker and pure ODE models inside VLE

ModelMaker & vle.extension.ibm

- The unit of Table 2 is the second.
- On one side we use the duration given by ModelMaker
- On the other side we use the user time given by the unix command time
- MM_vectorized : the compartments of the model are vectorized
- VLE_ODE : the models are duplicated
- VLE_IBM : the models are duplicated and connected to a unsensitive controler to test the weight of the communication first

Quantity	MM_vectorized	VLE_ODE	VLE_IBM
x1	9.4	3.539	20.328
x2	46.9	6.934	36.742
x10	217.7	34.391	199.835

Table 2 : ModelMaker and IBM inside VLE

Conclusion

- When using pure ODE, with no comunications between the models, the computation times of the solution provided by the vle.extension.differential-equation package seems to be interresting, and could be x3 faster. And even more if considering the vector approach of ModelMaker.
- As soon as we use the communication architecture of the vle.extension.ibm, we loose much. We communicate at the resolution of integration communication. It can cost an x6 coefficient.

Prospect

- ▶ Using the same OS on the same hardware to provide a more accurate study
- ▶ Developping a output frequency filter for the outputs of the ODE of VLE
- ▶ Testing with much biggers simulators in terms of individuals (x100, x1000,...)
- ▶ Getting farther as soon as the output filter will be available
- ▶ during the study we also find out that the way the controler does gather event from outside is not optimal, this can be also fixed.