TRUE

TEMPORAL REASONING UNIVERSAL ELABORATION

True System dynamics software

MANUAL Part 05

Actions

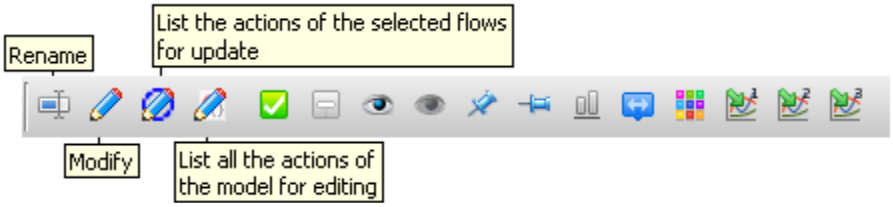
Release 2014/03/04

www.true-world.com

Contents

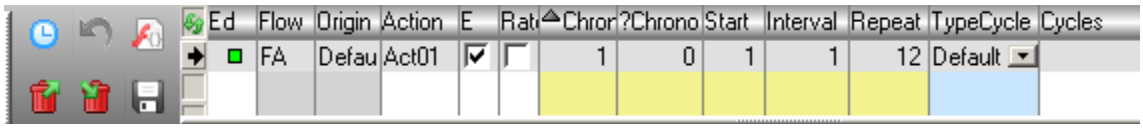
I - TABLE OF ACTIONS

- The table of actions allows creating, modifying and deleting actions which are contained in flows.
- When a new flow is created, one default action is created and loaded in the Table of Actions.
- When a flow is selected, its actions are loaded in the Table of Actions.
- A flow is selected when renaming, modifying, etc.
- All the actions of more than one flow can be loaded in the Table of Actions, only when flows are selected with the button 'List the actions of the selected flows for update'.
- To load all the actions of the model, click on the button 'List all the actions of the model for editing'



A) Table of actions

- Click on the title of a column to sort the table
- Click on the green button to reset the column's width



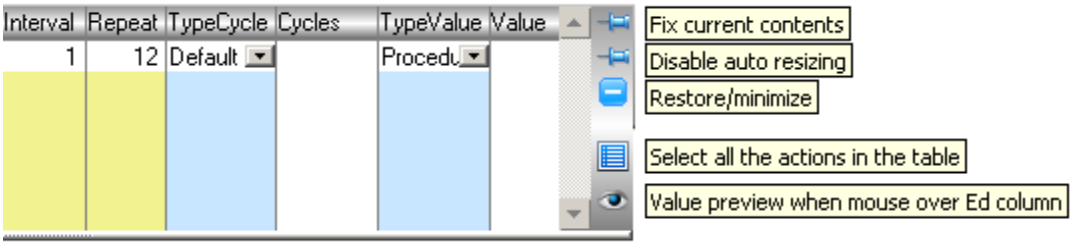
Buttons on top left :

- Open a window to modify the temporal parameters of the selected actions, such as Undo or Create New Action

Buttons on the bottom left :

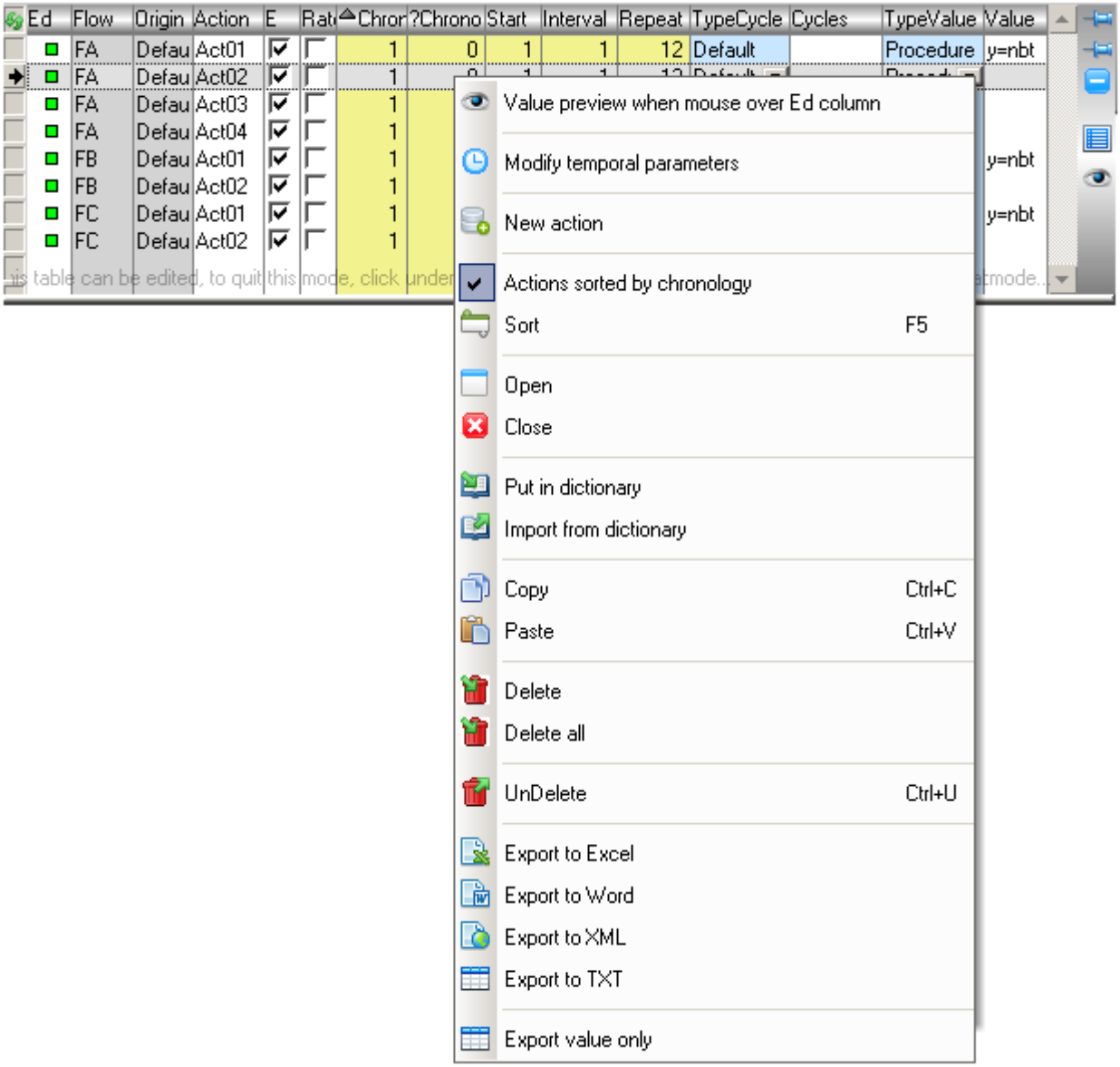
- Delete or Undelete action, Save action

Buttons on right :



B) Popup menu

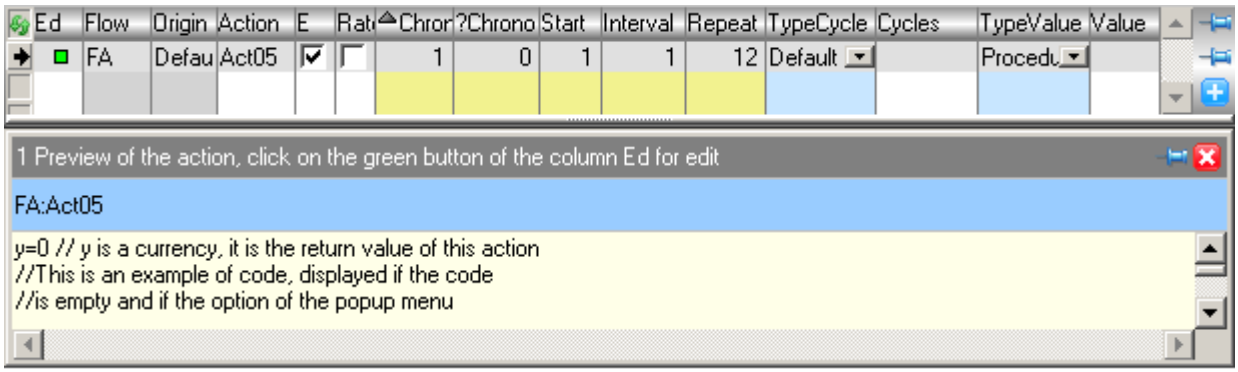
Popup menu of the table actions



1. previewing a value

When this “Preview of the action” option is checked, the value of the action will be displayed only when it is selected or when the mouse is over the columns “Ed” and “Value”

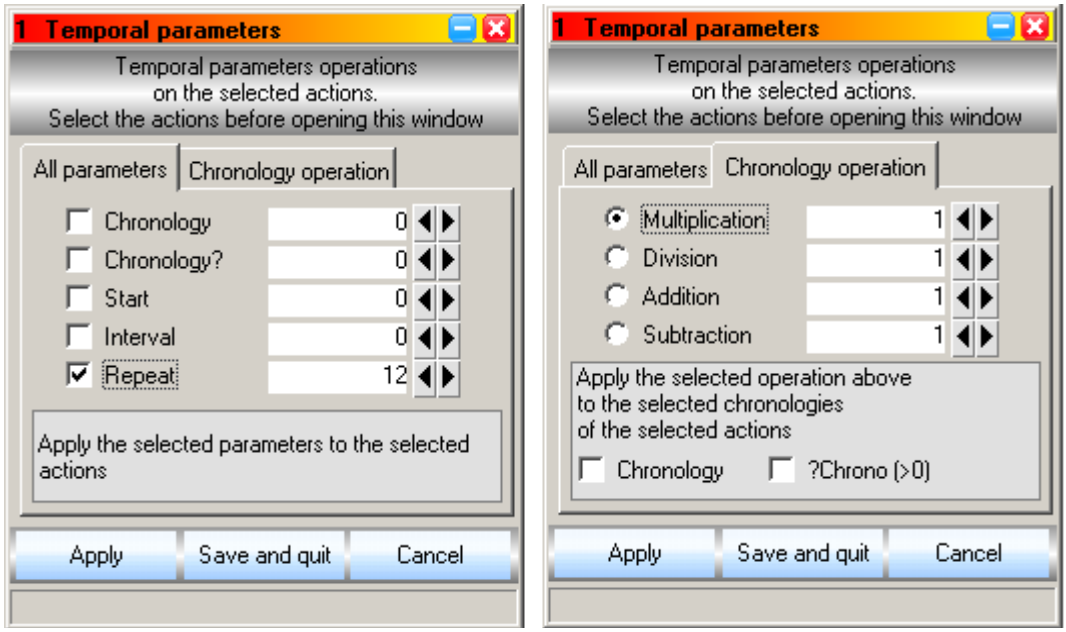
'Preview' window



2. Modifying temporal parameters

Open a window to modifiy the temporal parameters of the selected actions

'Temporal parameters' window



3. Creating a new action

To add a new action in the selected flow :

- Select the 'New action' option from the popup menu or
- Click on the 'New action' button

4. Dictionary of the actions

Importing or exporting to the dictionary those actions which are shared by all models.

To import an action :

- Select an action from the the table of actions
- Click on the 'Import from dictionary' button or select the 'Import from dictionary' option from the popup menu

To export an action :

- Select one or more actions in the table
- Select the 'Put in dictionary' option from the popup menu

5. Duplicating actions

- Select the actionss you want to duplicate
- Select the 'Copy' option from the popup menu or press and hold “Ctrl”+”C” keys
- Select the line containing the target flow
- Select the 'Paste' option from the popup menu or press and hold “Ctrl”+”V” keys

6. Deleting and Undeleting

- Select the actions you want to duplicate
- Select the corresponding option from the popup menu or
- Click on the 'Delete' button or press the 'Delete' key or
- Click on the 'Restore' button or
- Press and hold “Ctrl”+”U” keys

7. Export to Excel, Word, Xml, Txt

- Select the actions you want to export
- Select the option from the popup menu: 'Export to...'

➢ Note: You can export the values of the action only if the option 'Export value only' is checked

II - ACTIONS

When computing the model, the actions of the flows which are dynamically executed according to their temporal parameters, will return a value according to their type.

For each compiled unit of time, the value of a flow will be equal to the sum of the return values of their actions according to their chronology.

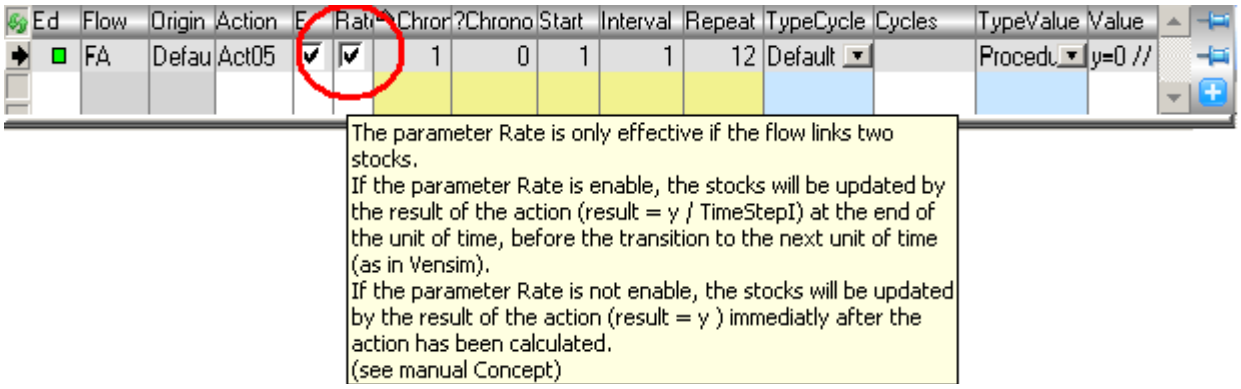
A) Creating, deleting an action

- Select a flow in the model
- Click on the 'New action' or 'Delete' buttons

B) Temporal parameters

The temporal parameters of an action will determine when it will be executed.
For each unit of time, the actions, filtered and sorted according to their temporal parameters, calculate a value and transfer it (immediately or at the end of the unit of time, according the parameter **Rate**) between the source stock(subtract value) and the target stock (add value)

1. Rate



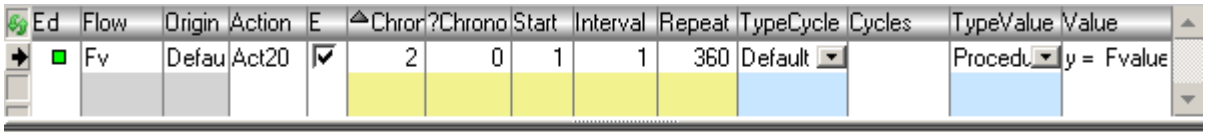
If the parameter **Rate** is **enable** and if the flow links two stocks, the return value **(value/TimeStepI)** of the action will increase and decrease the value of the source and target stocks **at the end** of each unit of time, after all the other actions with the parameter **Rate** not **enable**.

If the parameter **Rate** is **disable** and if the flow links two stocks, the return value of the action will increase and decrease the value of the source and target stocks **immediately**.

2. Start, Interval, Repeat

- Examples:
  - Start =1, Interval =1, Repeat=12 :
    from January, every month, 12 times

  - Start =30, Interval=2, Repeat=10 :
    from the 30th minute, every 2 minutes, 10 times



3. Chronology

The actions run in ascending order following the parameter 'Chronology', for each unit of time.

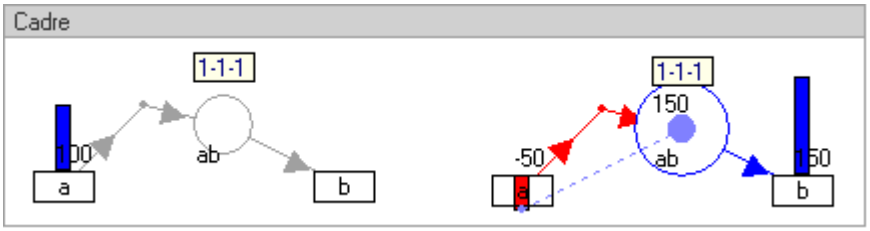
- ❖ Example: the actions Act1, Act2 and Act3 with chronologies 7, 0, et 2 will run in the order Act2, Act3 et Act1

When several actions have the same chronologies, they are executed at the same time

- ❑ We calculate and store all of the return values of these actions
- ❑ Then we calculate the sum of these values

- ❖ Example: the flow 'ab' with source stock a=100 and target stock b :
  - in this flow we have three chronologies=1
  - these three actions return the value of the source stock 'a' divided by 2
  - when the three actions are calculated, the return value of each action will be equal to 100 / 2
  - After calculating the last action, the returned sum is 50 +50 +50 = 150
  - this sum is transferred between stocks 'a' and 'b' : a=a-150, b=b+150 B -> a=- 50, b = 150

Example : Before and After computing

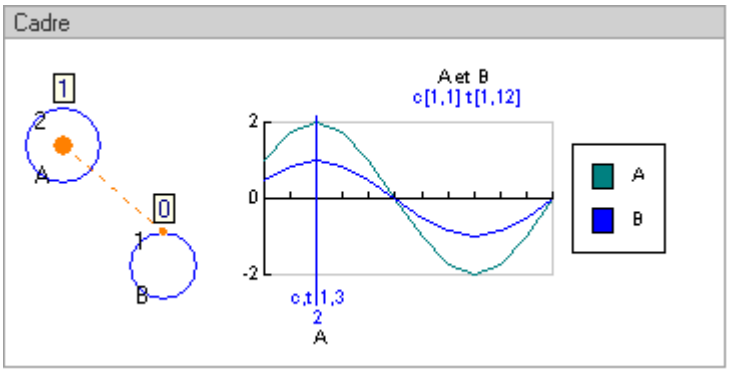


Default chronology

When the return value of an action in a 'A' flow depends on the return value of an action in the 'B' flow, the action in 'B' must be performed before the action in 'A'.

- ❖ Example: the return value of the action in A flow is twice the value of the action in B flow

Flow A is equal to twice flow B



- Notes:
  - chronologies are displayed in the small square above flows
  - the chronology of the action of the B flow is 0
  - the chronology of the action of the A flow A 1
  - the action in B is performed before the action in A

Random chronology

When the field '?Chrono' is different than 0, then :

- the effective chronology is set for a random value between :
  - the parameters 'chrono' and '?chrono', or
  - the parameters '?chrono' and 'chrono',

  before sorting the actions to be executed for the current time unit

4. Default cycle

At the beginning of the compilation, we calculate the last unit of time of each action according to its temporal parameters :

- Formula for calculating the last execution of the action = Start + (Interval * (Repeat -1))

- Note: The interval should not be less than 1 even if repeat=1, otherwise the action will not be running when it is computed

- Example : last time according Start, Interval and Repeat :
  - Act01: 1, 1, 12 => 12
  - Act02: 1, 2, 6 => 11
  - Act03: 2, 3, 3 => 8

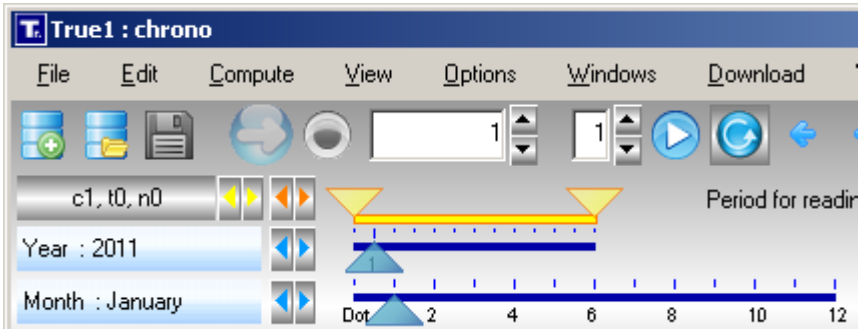
The default cycle of the model will be that which has the action with the greatest cycle :
Act01 : 12 time units.

Action Act02 : default cycle: 11 t, width cycle : 10 t

Ed	Flow	Origin	Action	E	Chron	?Chrono	Start	Interval	Repeat	TypeCycle	Cycles	TypeValue	Value
	Fv	Defau	Act01	☑	1	0	1	1	12	Default		Procedure	//return va
	Fv	Defau	Act02	☑	1	0	1	2	6	Default		Procedu	//return va
	Fv	Defau	Act03	☑	2	0	2	3	3	Default		Procedure	//return va

click under this table on the model ... This table can be edited, to quit this mode, click under this table on the model ... ...

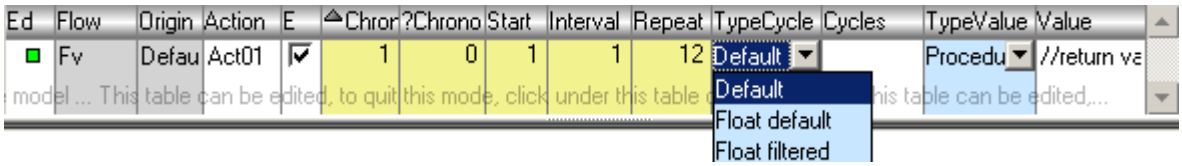
After computing, the scale of time units will indicate the end of the default cycle for the model : 12



5. Type of cycle

To establish a certain type of cycle select it from the column 'TypeCycle'

Select the type of cycle



Three types of cycle:

- Default : Default cycle of the model
- Float default : Floating cycle synchronized on the default cycle of the model
- Float filtered : Floating cycle synchronized with itself when the cycles are filtered

Default cycle

The actions will run following the temporal parameters for all cycles, or only for the filtered cycles

Floating cycles, default and filtered

The temporal parameters of an action, whose cycle is floating (default or filtered), are not taken into account when calculating the default cycle of the model.

Principles of the floating cycle of an action :

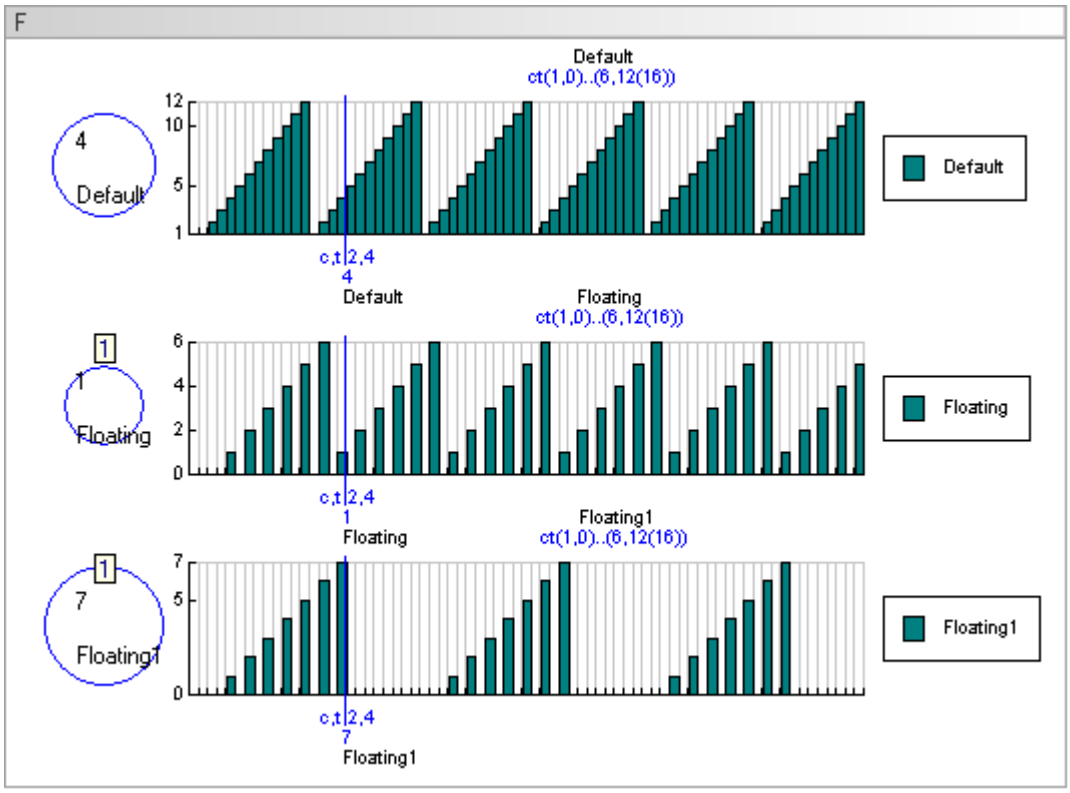
- The beginning of this cycle is represented by the time unit 'Start' from the default cycle of the model
- The ending of the cycle is represented by last execution of the action
- The calculation method of the ending of a cycle is the same as the default cycle of the model

❖ Example for Start, Interval, Repeat :
  - default cycle : 1, 1, 12 => end of default cycle : 1+ (1* (12-1) = 12
  - floating cycle : 6, 1 , 20 => end of the floating cycle : 6 + (1 * (20-1) = 25, for the first cycle

Operation :

The floating cycle (default or filtered) may have a different width compared to the default cycle of the model.
The first floating cycle begins at the unit of time equal to the parameter 'Start'.
It continues until the end of its cycle, regardless of the default cycle of the model.
The second floating cycle begins at the next unit of time equal to the parameter 'Start'.

Flow 'Default" with Default cycle type = 1,1,12
Flow 'Floating" with Float default cycle type = 4,2,6
Flow 'Floating1' with Float filtered cycle type = 4,2,7
computed for six default cycles :



Difference between 'Floating default' and 'Floating filtered' cycles

The difference occurs when cycles are filtered.

6. Filtering cycles

When cycles are filtered, the actions are computed only for these cycles:

- Enter the filtered cycles in the column 'Cycles'

The action 'Act01' will be computed for all cycles
The action 'Act04' will be computed for cycles 1 to 5, 8 and 10

Ed	Flow	Origin	Action	E	Chron	?Chrono	Start	Interval	Repeat	TypeCycle	Cycles	TypeValue	Value
■	Fv	Defau	Act01	☑	1	0	4	2	6	Float defau		Procedure	//return va
■	Fv	Defau	Act04	☑	1	0	4	4	7	Float filtere	1-5;8;10	Procedure	

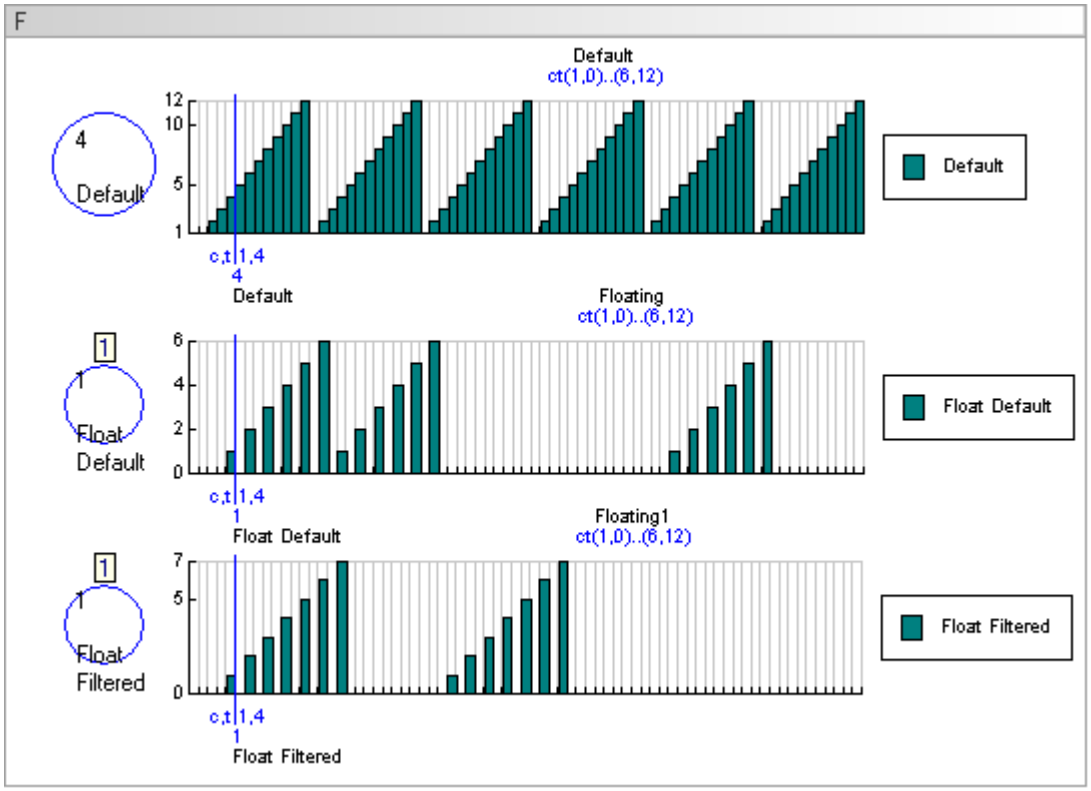
- to set a range of cycles, separate them with '-'
- to set several cycles, separate them with ';'

Filtering floating cycles

When 'float default' cycles are filtered, filtering occurs only on the number of default cycle of the model, whether completed or not, after which these cycles may be interrupted.

When 'float filtered' cycles are filtered, filtering is done on the number of filtered floating cycle of the action, after which these cycles can not be interrupted.

Flow 'Default" with Default cycle type =1,1,12
Flow 'FloatDefault" with Float default cycle type = 4,2,7, filtered cycles : 1,2,5
Flow 'FloatFiltered" with Float filtered cycle type = 4,2,7, filtered cycles: 1,2,5
for six default cycles :



- **Feature** : the first 'float default' cycle is interrupted to start the 2nd cycle
- Note : only the first and the second 'float filtered' cycles are displayed in the chart, the third is outside the computed period

C) 'Constant' action

- Select the button 'Constant' in the column 'TypeValue'
- To enter a value, type the value in the column 'Value'

Each time an action of constant type is computed, it returns that value.

Value of the 'Constant" action =10

Ed	Flow	Origin	Action	E	Chron	?Chrono	Start	Interval	Repeat	TypeCycle	Cycles	TypeValue	Value
	Fv	Defau	Act01	☑	1	0	1	1	12	Default		Constan	10

D) 'Curve' action

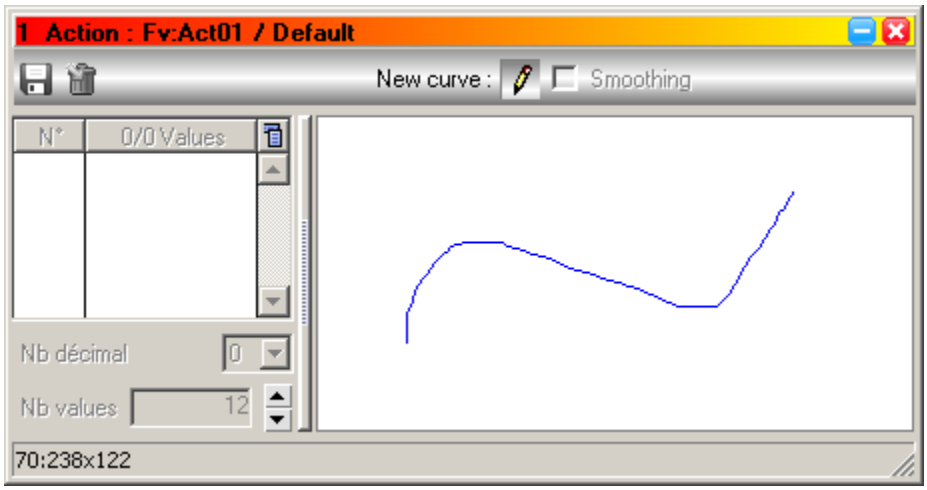
An action of the type 'Curve' stores a number of values corresponding to the temporal parameter 'Repeat'. The action returns the value of the 'curve' corresponding to the number of step in the current cycle.

- Select the type 'Curve' in the column 'TypeValue'
- Click on the green led 'Ed' or on the field 'Value'
- The 'Curve' window is opened
- The green led turns red, the action is in edit mode

'Curve action

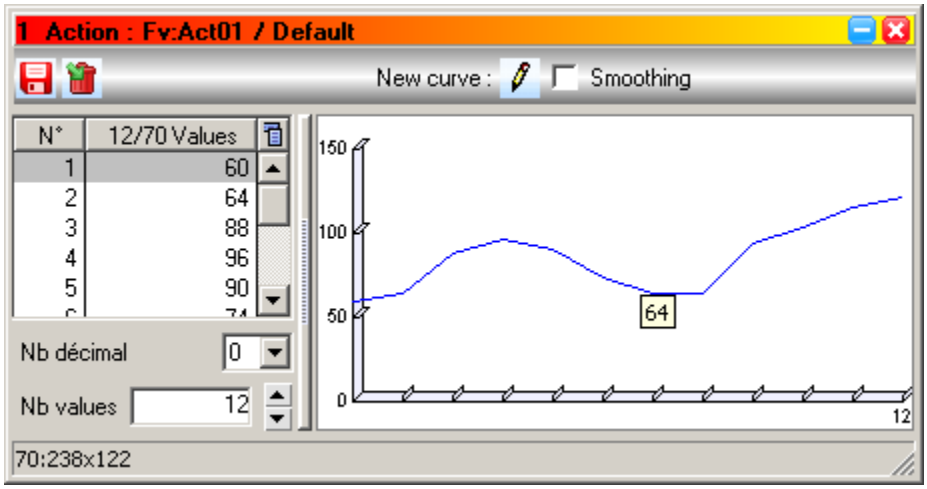
Ed	Flow	Origin	Action	E	Chron	?Chrono	Start	Interval	Repeat	TypeCycle	Cycles	TypeValue	Value
■	Fv	Defau	Act01	☑	1	0	1	1	12	Default		Curve	[0]

'Curve' window with a new curve



- Click on the 'New curve' button, draw the curve, click again on the button to finish

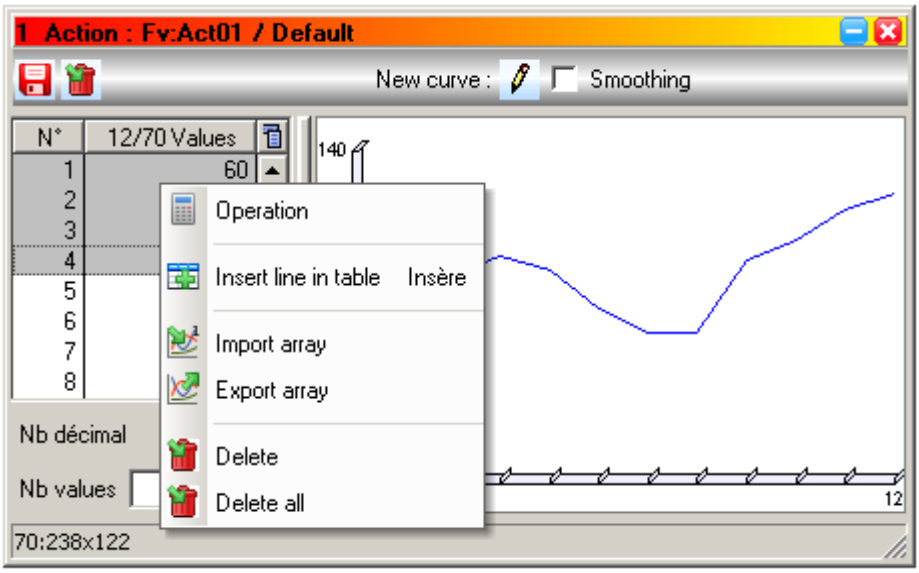
New curve with values in the table

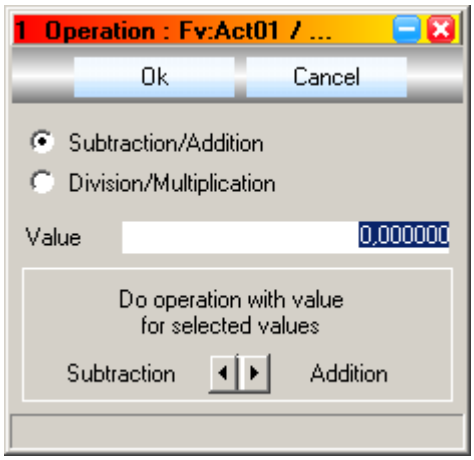


To modify the curve :

- Adjust the number of decimal or
- Edit the values in the table or
- Select lines in the the table
- Select the 'Operation' option from the Popup menu
- Make the changes in the 'Operation' window

Popup menu, 'Operation' window





- Note : in order to import or export a curve, select the 'Import or Export array' option.

  The file is in text format (.txt); it must contain a line by value.
  When a array is imported, the first line is filtered if it is not numeric.
  When the table is exported in a file, the first line should contain the name of the action.
  By default, the directory 'Export' is created in the model.

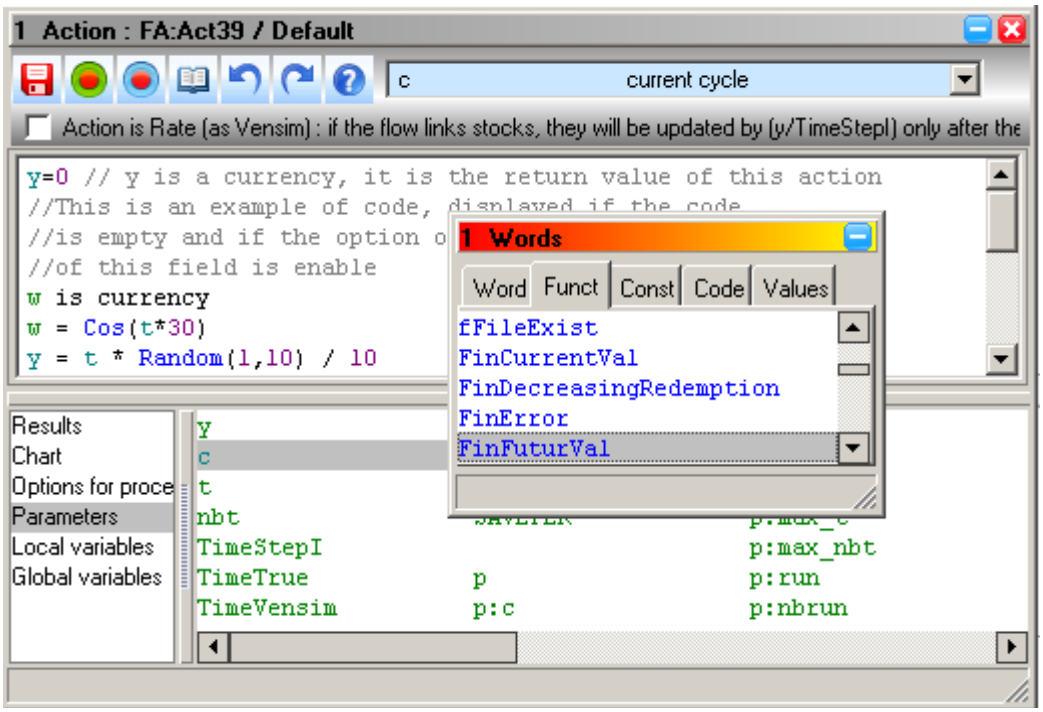
E) 'Procedure' action

Ed	Flow	Vect.Typ.	Action	E	Rat	Chron	?Chrono	Start	Interval	Repeat	TypeCycle	Cycles	TypeValue	Value
■	FA	Default	Act39	☑	☐	1	0	1	1	12	Default		Procedu	

- Select the 'Procedure' type in the 'TypeValue' column
- Click on the green led 'Ed' or on the 'Value' field
- The 'Action' window is opened
- The green led turns red, the action is now in edit mode

An action of the 'Procedure" type, whose code is dynamically computed when the action is performed, returns a value, meaning the variable y.
The code used is the Wlanguage (Windev Version 12 copyright PcSoft), available in French and English. Specific functions have been added; see the 'Functions' chapter.

'Action' window and 'Words' window



Description of the window

Top (left to right) buttons :

- 'Save'
- 'Local computing of the action' (green)
- 'Save the action and compute the model' (blue)
- 'Words' : opens the 'Words' window
- 'Undo' and 'Redo'
- 'Help"
- A combo containing the list of parameters passed to the procedure

- Below the top buttons there is a field used to edit the code of the procedure

- On the bottom left there is a list from where you can select : Results, Chart, Options, Parameters, Local variables

➢ Note: the decimal separator is the decimal point '.' and not the comma ','

✓ Warning: when computing the model, the results of some functions (global variables, memories zone, matrix) will be deleted if the compute module is stopped.

1. 'Words' window

The 'Words' window contains instructions, functions and constants of Wlanguage.

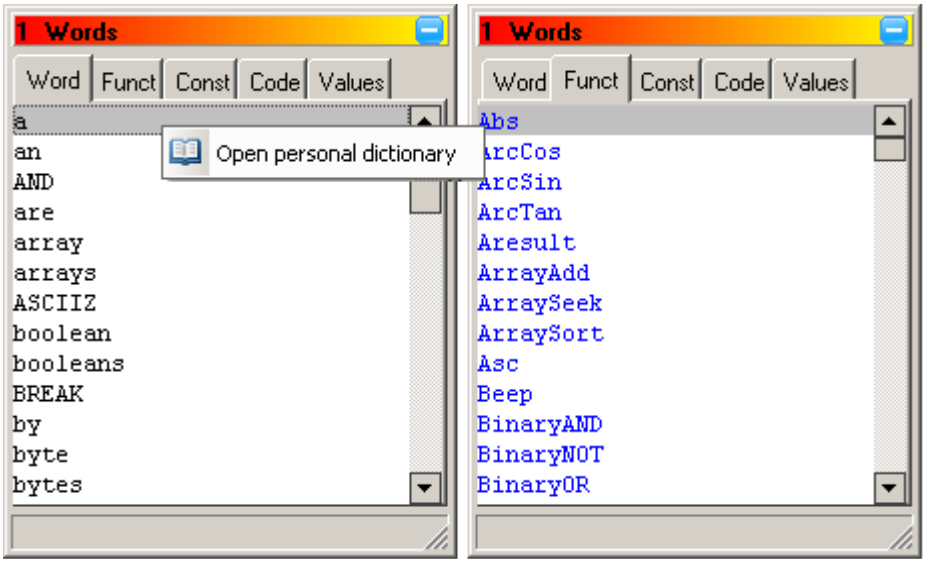
To learn more about these instruction consult 'Wlanguage help' :

Select the 'Wlanguage help' option by

- Clicking on the button '?' of the 'Action' window, or
- Press F1 key in the 'Action' window, or
- Press F1 key in the 'Words' window

The Wlangage Online Full help is also available in English and in French
http://help.windev.com/en-US/search.awp?origin=browse&cat=fonctions-wlangage,489
http://doc.pcsoft.fr/fr-FR/search.awp?origin=browse&cat=fonctions-wlangage,489

Plans of the 'Words' window



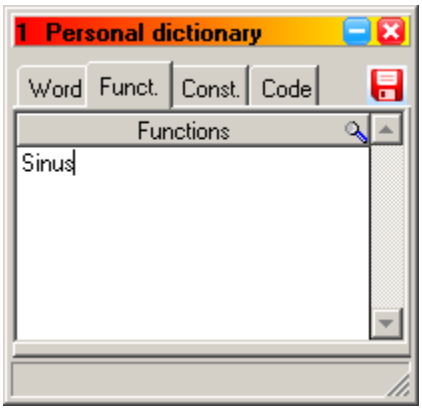
Inserting a word in the code of the procedure from a list of words :

- Drag-and-drop the word in the code, or let go of the mouse cursor in the in the field where you want the word to be inserted
- Double-click on the word from the the list you want to insert

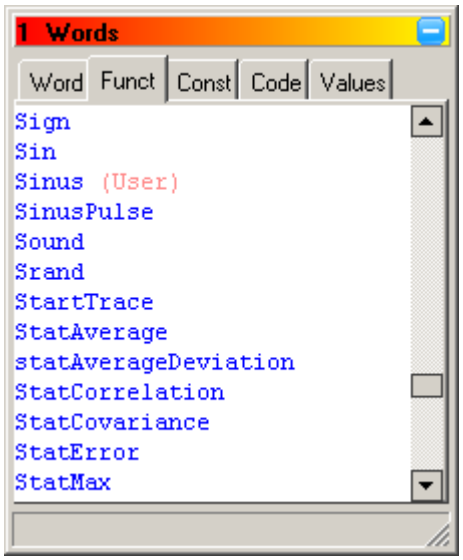
Adding 'User' words :

- Open personal dictionary with the popup menu
- Select a plan
- Edit the current line in the table
- Click on the 'Save' button
- Close the dictionary

'Personal dictionary' window

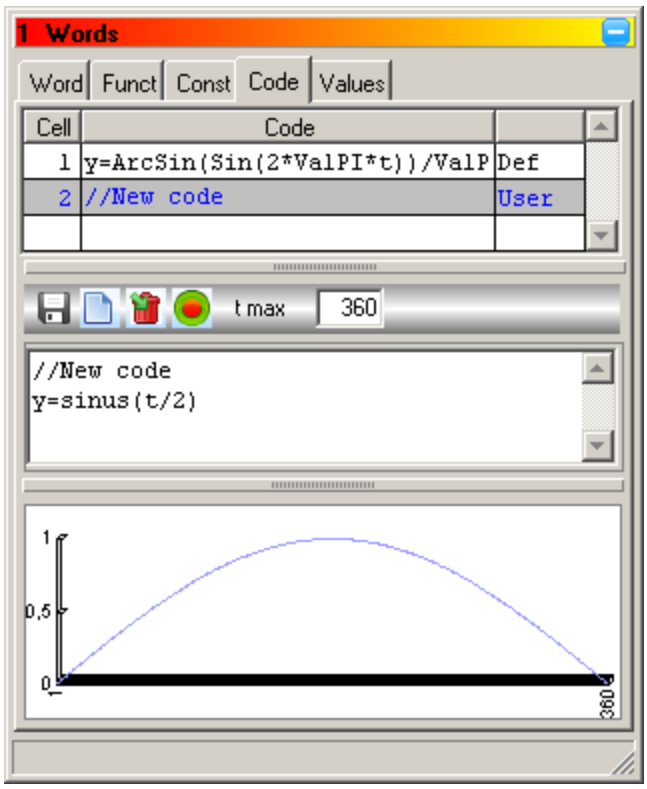


- Your 'User' word is now in the 'Word' window with (User)



'Code' plan

The 'Code' plan displays a user code that can be locally computed and copied in the code of the procedure.



Description of the window :

- Table Code : contains one 'User' code per line

- 'Save' button : saves selected 'User' code
- 'New User code' button : creates a new line of 'User' code
- 'Delete User code' button : deletes the selected line of 'User' code (only 'User' code, not Default)
- 'Local computing of the action' button (green) : computes the 'User' code
- The 't max' field contains the maximum units of times allowed for the local computing

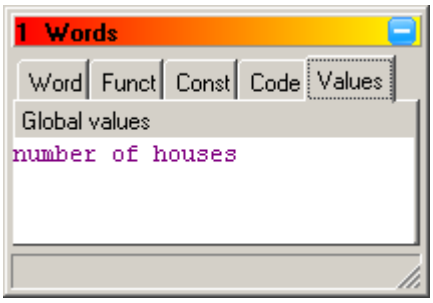
- Field of 'User' code
- Chart of the result of the value returned by the code after local computing it

'Value' plan

The 'Value' plan displays the names of all the global pseudo-variables contained in the model created by the function `ValueWrite()`

- Example:
  - Enter following code : `ValueWrite("number of houses",10)`
  - Click on the 'Local computing of the action' button

'Value' of global pseudo-variables



- Note: Compute the model to refresh the list of global pseudo-variables

2. Parameters of the procedure

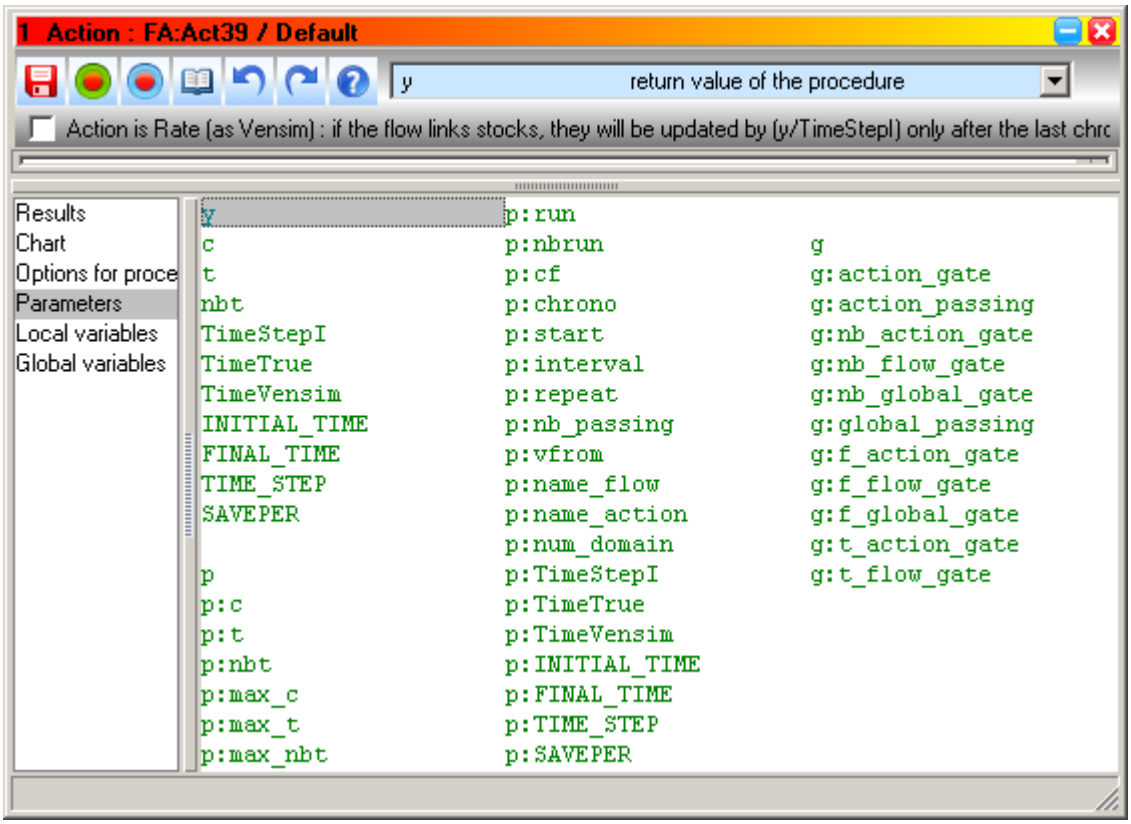
Combo of parameters1

c	current cycle
Parameters	Description
y	return value of the procedure
c	current cycle
t	current time in current cycle
nbt	number of time in cycles
TimeStepl	TimeStepl = 1 / TIME STEP (Vensim)
TimeTrue	TimeTrue = nbt/TimeStepl (= Time in True)
TimeVensim	TimeVensim= (nbt-1)/TimeStepl (= Time in Vensim)
INITIAL_TIME	INITIAL_TIME from Vensim model
FINAL_TIME	FINAL_TIME from Vensim model
TIME_STEP	TIME_STEP from Vensim model
SAVEPER	SAVEPER from Vensim model
p	Structure of parameters of the procedure
p:c	current cycle
p:t	current time in current cycle
p:nbt	number of time in cycles
p:max_c	Maximum number of cycle
p:max_t	Maximum number of time units per cycle
p:max_nbt	Maximum number of time units in the model (max nbt)
p:run	current number of running procedure, in current cycle
p:nbrun	current number of running procedure, in cycles
p:cf	current number of floating cycle
p:chrono	temporal parameter 'chronology'
p:start	temporal parameter 'start'
p:interval	temporal parameter 'interval'
p:repeat	temporal parameter 'repeat'
p:nb_passing	global passing counter
p:vfrom	current value of source stock
p:name_flow	Flow name
p:name_action	action name
p:num_domain	domain num
p:TimeStepl	TimeStepl = 1 / TIME STEP (Vensim)
p:TimeTrue	TimeTrue = nbt/TimeStepl (= Time in True)
p:TimeVensim	TimeVensim= (nbt-1)/TimeStepl (= Time in Vensim)
p:INITIAL_TIME	INITIAL_TIME from Vensim model
p:FINAL_TIME	FINAL_TIME from Vensim model
p:TIME_STEP	TIME_STEP from Vensim model
p:SAVEPER	SAVEPER from Vensim model

Combo of parameters2

g	Structure of the parameters of the function ReStartStat()
g:action_gate	number of the open gate by the current action for the current nbt, if exist
g:action_passing	number of passing for the open gate by the current action for the current nbt, if exist
g:nb_action_gate	number of open gates by the current action
g:nb_flow_gate	number of open gates by the current flow
g:nb_global_gate	number of open gates by the model
g:global_passing	last number of passing by the last gate open by the model
g:f_action_gate	true if a gate has been open by the current action for the current nbt
g:f_flow_gate	true if a gate has been open by the current flow for the current nbt
g:f_global_gate	true if a gate has been open by the model for the current nbt
g:t_action_gate	array of the numbers of the gates open by the current action
g:t_flow_gate	array of the numbers of the gates open by the current flow

'Parameters' plan



To insert a parameter in the procedure :

- Drag-and-drop it into the code field, or let go the ouse cursor in the code field where you want to insert a parameter
- Double-click the parameter you wish to insert in the list

Description of the parameters
(for more informations, see Wlanguage help)

- y : the return value of the procedure
- c : current default cycle of the model
- t : current unit of time of the current default cycle of the model
- nbt : counter of time unit in all default cycles
- TimeStepI : global inverse of time step of the model (see 'Manual Part 02', in 'Settings')
- TimeTrue : TimeTrue = nbt/TimeStepI (= Time in Vensim)
- TimeVensim : TimeVensim = (nbt-1)/TimeStempI (= Time in Vensim)
- INITIAL_TIME : Vensim parameter, after import model from Vensim
- FINAL_TIME : Vensim parameter, after import model from Vensim
- TIME_STEP : Vensim parameter, after import model from Vensim
- SAVEPER : Vensim parameter, after import model from Vensim
-
- p is the structure passed from the parameter to the procedure, the members are :
- c, p:t, p:nbt, corresponding respectively to c, t and nbt

- p:max_c : maximum number of cycle
- p:max_t : maximum number of time units per cycle
- p:max_nbt : Maximum number of time units in the model (max nbt)

- p:run : current number of running action, in current cycle
- p:nbrun: current number of running action, in all cycles
- p:cf : current number of float cycle of the action
- p:chrono : temporal parameter Chronology
- p:start : temporal parameter Start =first time unit of the cycle
- p:interval : temporal parameter Interval=interval in time unit between two runs
- p:repeat : temporal parameter Repeat=number of repeating the action

- p:nb_passing : number of global passing

- p:vfrom : current value of the source stock of the flow
  This value can be obtained by the function `Svalue()`, described in the 'Functions' chapter

- p:name_flow : name of the flow which contains the action
- p:name_action : name of the action
- p:num_domain : number of current domain of the action
- p:TimeStepI : global inverse of time step of the model (see Manual Part 02, Settings-Temporality)

- p:INITIAL_TIME : Vensim parameter, after import model from Vensim
- p:FINAL_TIME : Vensim parameter, after import model from Vensim
- p:TIME_STEP : Vensim parameter, after import model from Vensim
- p:SAVEPER : Vensim parameter, after import model from Vensim

- g is the structure of the parameters from the function `ReStartStat()` described in the 'Functions' chapter

- g:action_gate : number of the gate opened by the current action and the current nbt, if exists
- g:action_passing : number of passing for the gate opened by the current action for the current nbt, if exists

- g:nb_action_gate : number of gate opened in the current action
- g:nb_flow_gate : number of gate opened in the current flow
- g:nb_global_gate : number of gate opened in the model

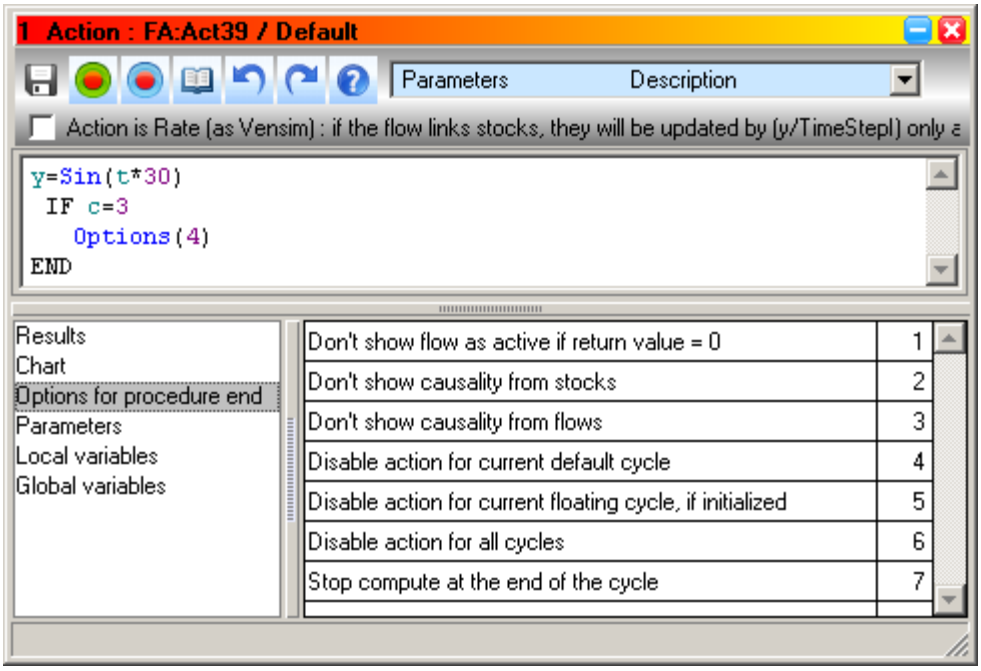
- g:global_passing : last number of passing for the last gate in the model

- g:f_action_gate : true, if a gate was opened in the current action for the current nbt
- g:f_flow_gate : true, if a gate was opened in the current flow for the current nbt
- g:f_global_gate : true, if a gate was opened in the model for the current nbt

- g:t_action_gate : array of numbers from the gates opened in the current action
- g:t_flow_gate : array of numbers from the gates opened in the current flow

3. Options for ending a procedure

'Options for procedure end' plan



To insert an option for ending a procedure :

- Drag-and-drop the option on the code field, or let the cursor in the code where you want, ans double-click on the option in the list
- In the example above : the action will not be executed for the 3rd default cycle

Options for ending of procedure

- 1) Display the flow as being active, even if the return value=0.
  By default, when the return value of a flow is null, it is displayed as inactive
  If you wish to see the flow in the active state, even if the transfer value is null, use this option.

- 2) Do not display the link of causality from stocks if :
  - the the functions `Svalue()` or `Mvalue()` are called to obtain the value of stocks.
  If you do not wish to display the link of causality between these stocks, use this option.

- 3) Do not display the link of causality from flows if :
  - the functions `Fvalue()` is called to obtain the value of flows.
  If you do not wish to display the link of causality to these flows, use this option.

- 4) Disable this action for the current default cycle.
  This action will not be executed until the end of the current default.

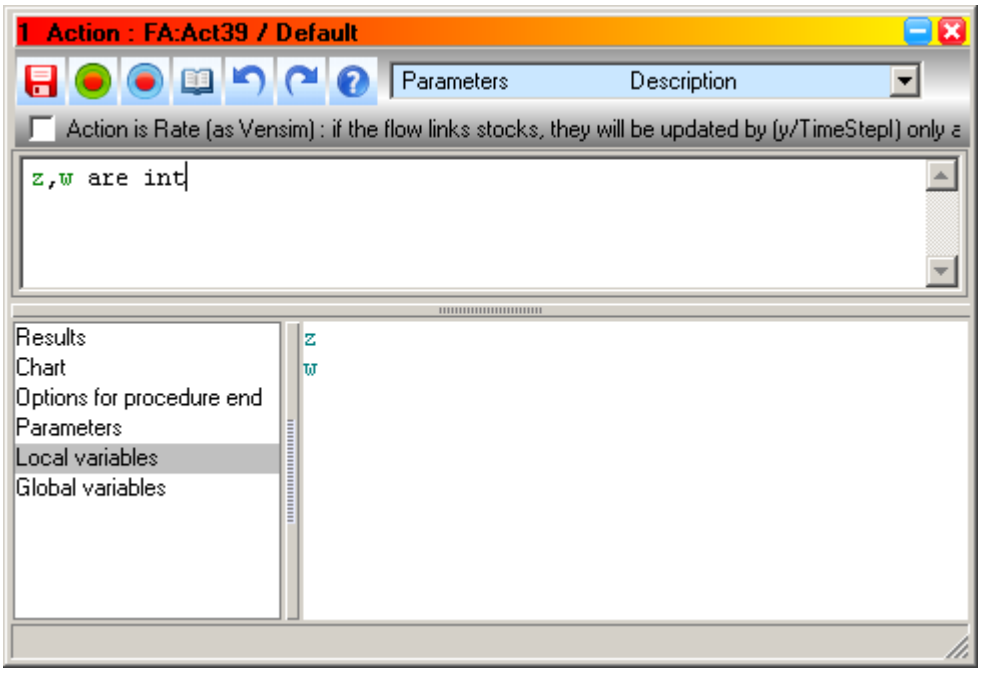
- 5) Disable the action for the current floating cycle, occurs only if the floating cycle is selected.
  This action will not be executed until the end of the current floating cycle, if the floating cycle is selected.

- 6) Disable the action for all cycles.
  This action will not be executed until ending the computations.

- 7) Stop computing at the end of the current default cycle.
  Computing will be stopped at the end of the current default cycle.

4. Local variables

'Local variables' plan



- Note : local variables are added to the list of local variables only after the compilation of the action.

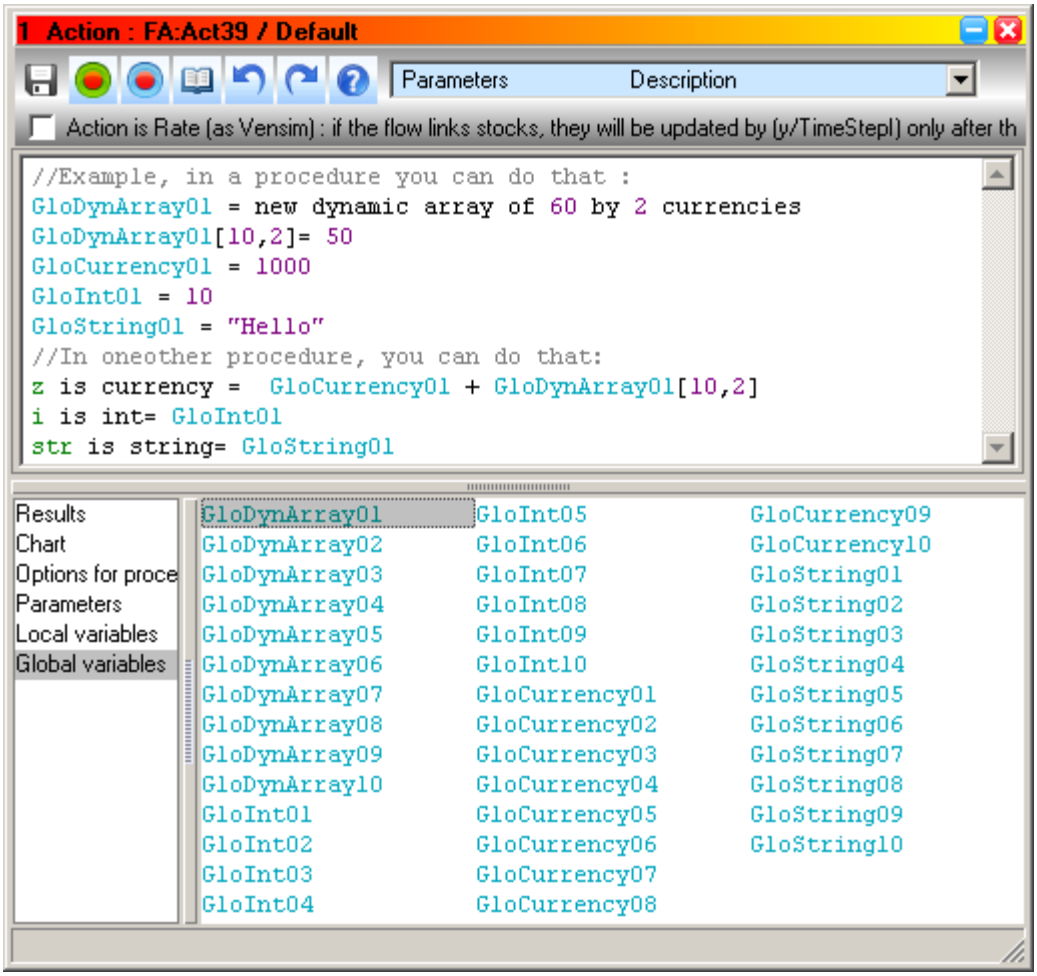
- Above you can see a sample code containing two local variables z and w.

- Note : To insert a local variable in the procedure :

  - Drag-and-drop the local variable in the code field or:
  - put the cursor in the code field where you want to insert a local variable
  - double-click on the local variable in the list

5. Global variables

'Global variables' plan



Global variables are :

- 10 dynamic arrays
- 10 integers
- 10 currencies
- 10 strings

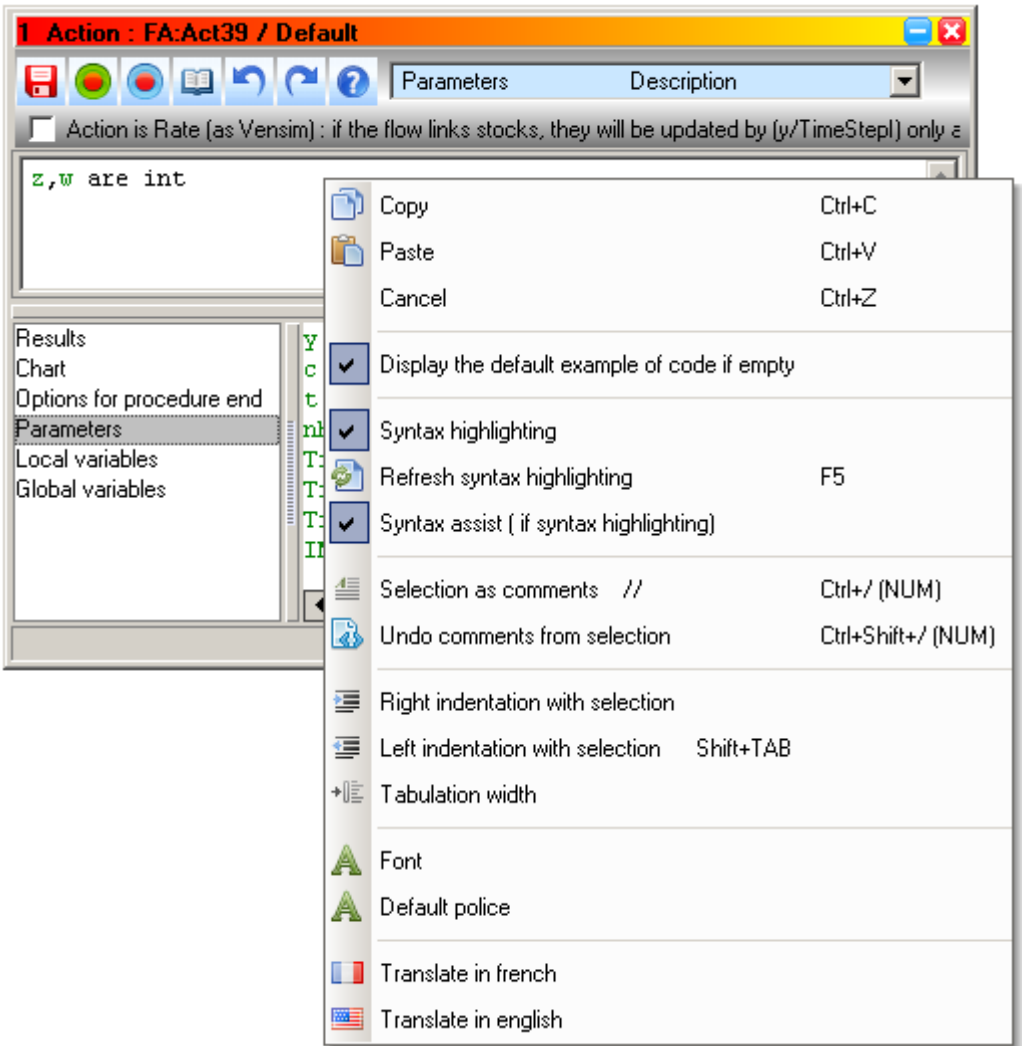
➢ Note : global variables allow to share value between several procedure
➢ Warning: global variables are not saved after model closing

➢ Note : To insert a global variable in the procedure :

- Drag-and-drop the local variable in the code field or
- put the cursor in the code field where you want to insert a global variable, then
- double-click on the global variable in the list

6. Code field

Popup menu



Options for the Popup menu of the code field

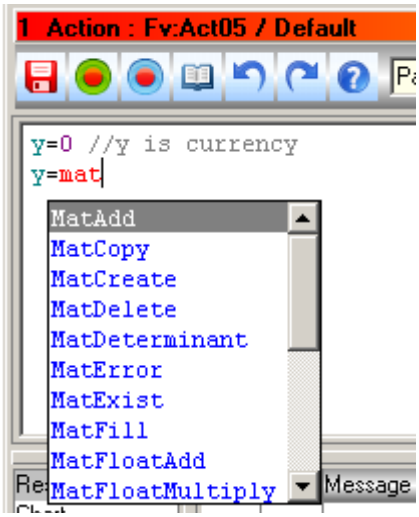
- 'syntax highlighting'

  - enables syntax highlighting : coloring words according to their type
  - key words are in written with Capital Letters : IF, THEN, END…
  - functions are written in Blue : Sinus, Cosinus…
  - constants are written in Italics, Blue : *False, True, LF…*
  - parameters of the procedure are written in Dark Cyan : `c,t,nbt,y...`
  - local variables are written in Green : ch, w …
  - the strings and numbers are in Magenta : 'A',123..
  - Unidentified words are in red : aert

- 'Syntax assist (if 'syntax highlighting' is enabled)

  - enables syntax assistance, meaning the words that exists, if they exist are displayed in a small window after entering the third character of a word
  - you can select the word with the down arrow and by pressing the 'Enter' key

'Syntax assist' window



- 'Selection as comment //'
  transform the selected code in a comment; it will be preceded by the characters '//'
  or you can select the lines to transform, and press and hold the 'Ctrl'+'/' key from the keyboard (numeric keypad)

Code transformed in comments

```
y=0 //y is a currency
y=Sin(t*30)
SWITCH t
 CASE 1,2,3,8
  Aresult("y = ",y)
END
```

```
y=0 //y is a currency
y=Sin(t*30)
//SWITCH t
// CASE 1,2,3,8
//  Aresult("y = ",y)
//END
```

- 'Undo comments from selection'
  delete the '//' characters or press and hold the 'Ctrl'+'Shift'+'/' keys from the keybord (numeric keypad)

- 'Right indentation with selection'
  add a tab before the selected lines,
  or press the 'Tab' key

'Tab' before the selected lines

```
y=0 //y is a currency
y=Sin(t*30)
SWITCH t
 CASE 1,2,3,8
  Aresult("y = ",y)
END
```

```
y=0 //y is a currency
y=Sin(t*30)
 SWITCH t
  CASE 1,2,3,8
   Aresult("y = ",y)
 END
```

- 'Left Indentation with selection'
  delete tab before the selected lines,
  or press and hold the 'Shift'+'Tab' keys

- 'Tabulation width'
  set the width of tabs; by default, corresponds to the width of 4 characters

- 'Font'
  set the font for the code

7. Computing

To locally test the code of procedure for the first cycle defined by the temporal parameters of action :

- Click on the green 'Action compute' button or press 'F3' key

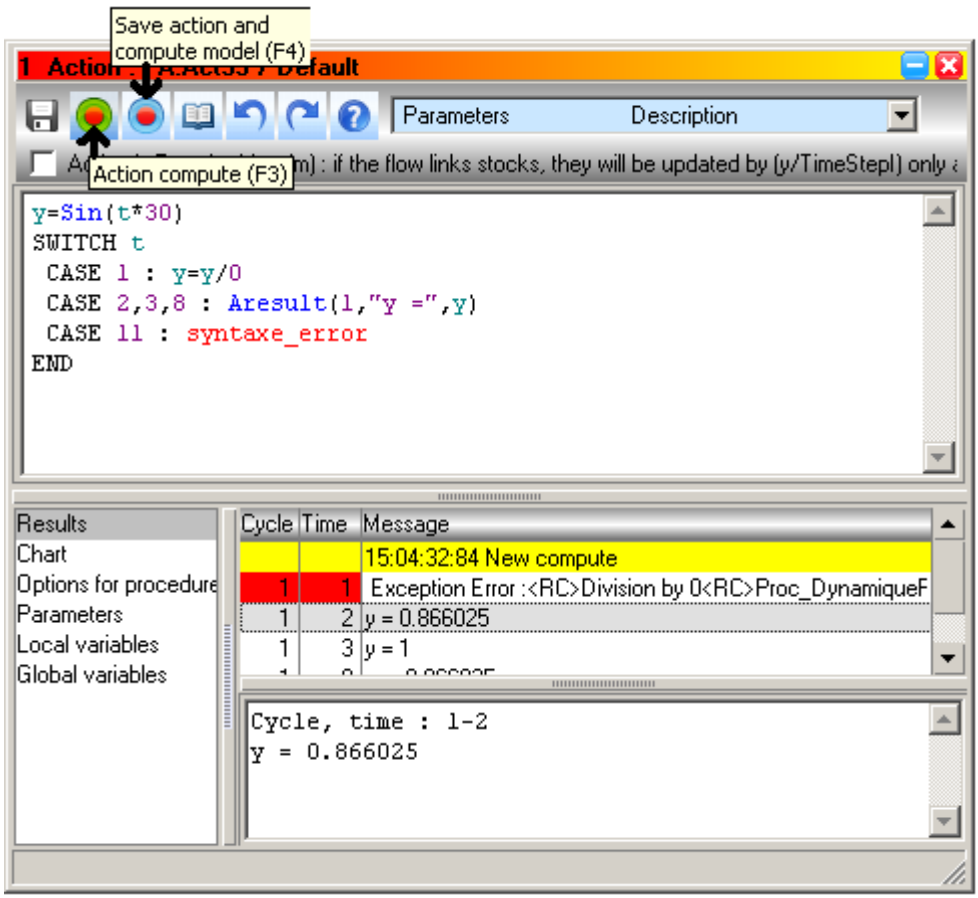
To save and compile the model :

- Click on the the blue 'Save action and compute model' button or press the 'F4' key

8. Error messages

- Select the 'Results' item in the list, to display error messages

Example of error messages



Reading error messages :

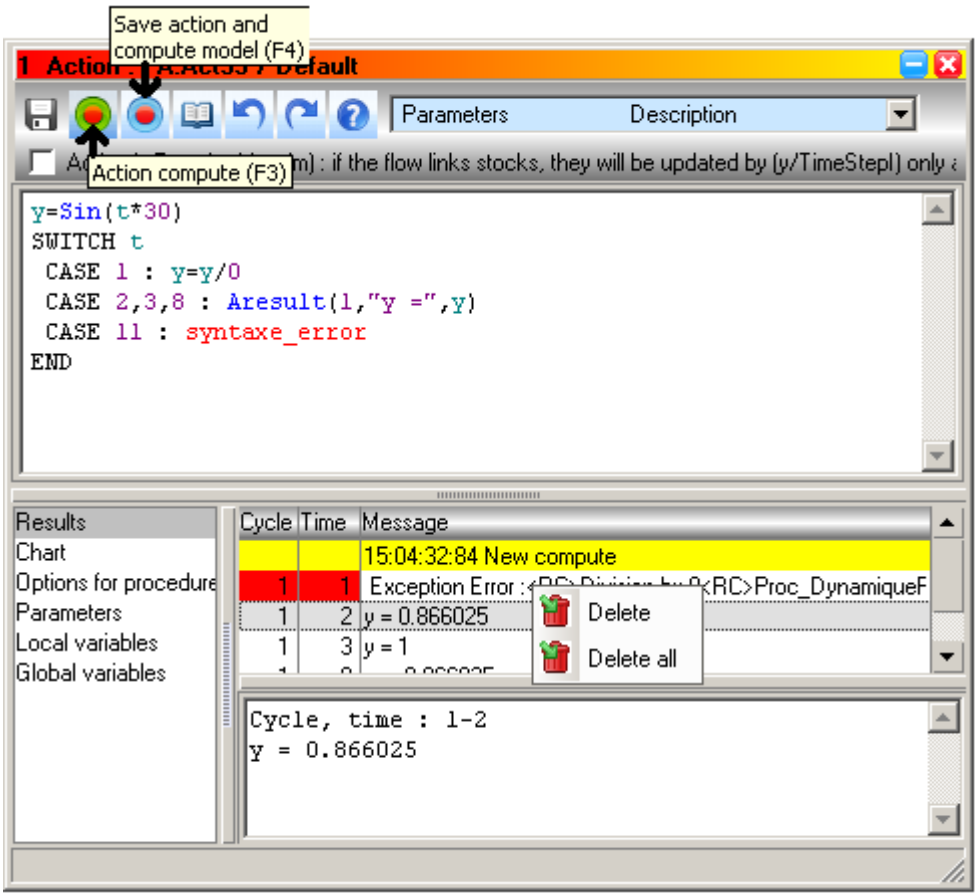
- New line : New compute
  - It separates the computed results and displays the computing start time
- first red line: Exception Error: Divid by 0
- second red line: Exception error : unknowm procedure syntaxerror

9. Display results

The function `Aresult()` displays the following messages in the model :

- Compute the action
- Select the 'Results' item in the list, provided on the left of the window

Messages generated by the function `Aresult()`

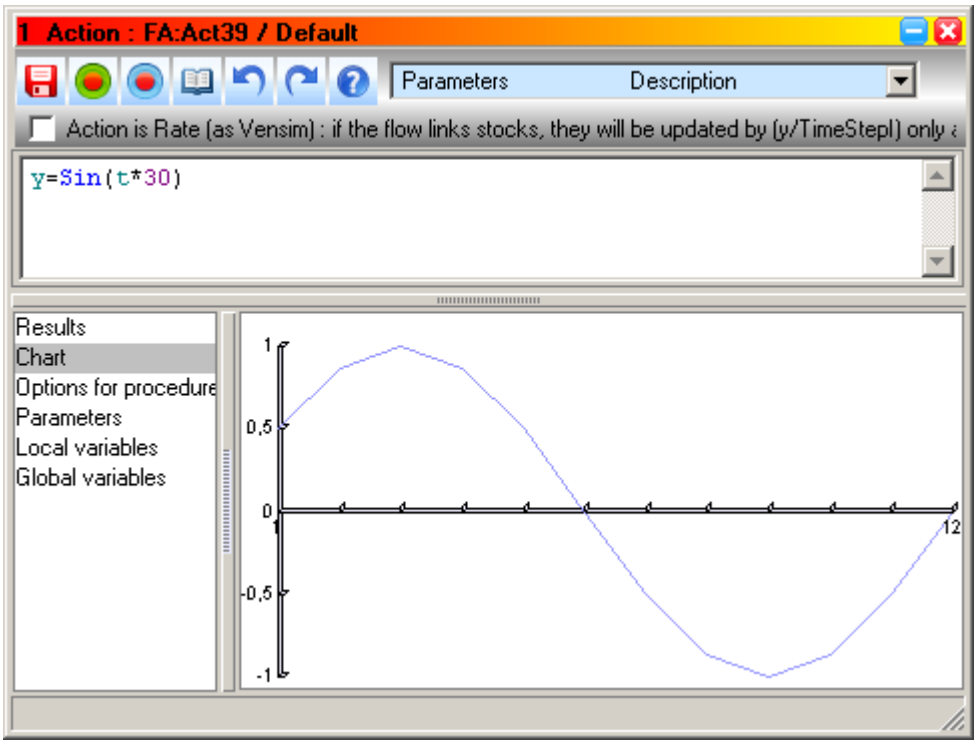


- Note: press 'F1' key to consult 'Help' for the `Aresult()` function.

10. Chart

- Select the 'Chart' item in the list provided on the left of the window

Char displays the return value y



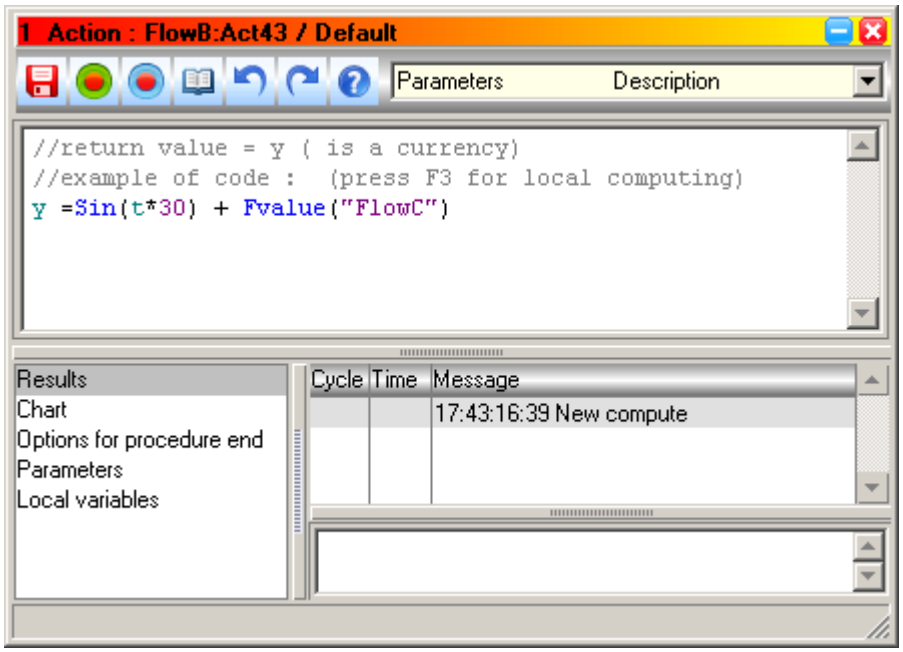
11. Read the stock or flow values

The functions `Svalue()`, `Mvalue()` and `Fvalue()` read the stock, mirror stock and flow values :

To add one of these functions in the code of the procedure :

- Drag-and-drop one element from the model or from the 'Elements' window into the code field at the desired location

Function `Fvalue()`



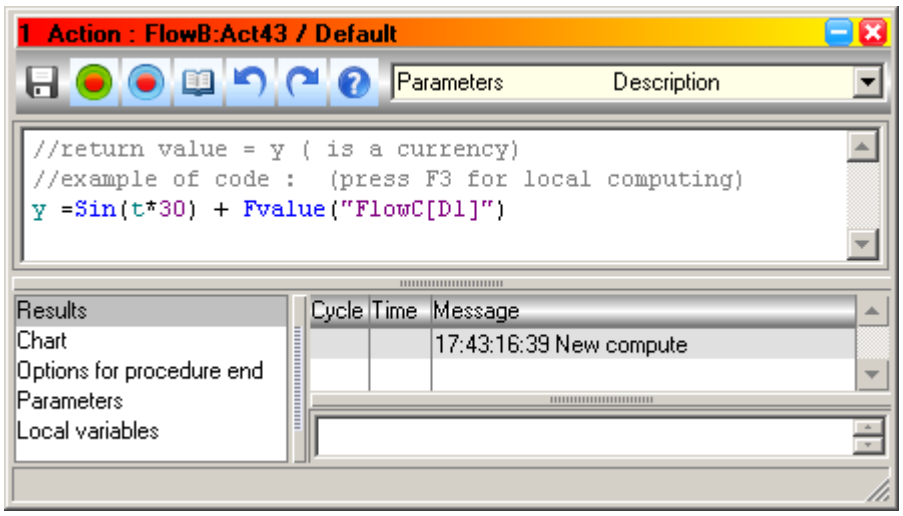
12. Read the vectorized stock or flow values

See the 'Manual Part 06 – Vectorization'.

To read the vectorized elements values:

- Drag-and-drop one element from the model or from the 'Elements' window in the code field at the desired location or
- Drag-and-drop one domain from the 'Vectors' window in the code field over the function `Svalue('stock')` or `Mvalue('mirror')` or `Fvalue('flow')` or
- Drag-and-drop one element from the 'Elements of vector' window in the code field at the desired position

Functions used for read vectorized elements values



- Notes : when computing :
- When one vectorized action gets the value of another vectorized action which doesn't indicate its name in the domain, the latter is sought in the name of the first action
- If the domain name is not found, the number of field corresponding to the current action will be taken, but if the number of domain is different, an error message will be generated
- If one action vectorized by a combined vector gets the value of anothere action vectorized by one of the source vector of this combined vector, the name of the domain name for this element will be according to the cartesian, product of the source vectors

13. Limits of the variables

- 1-byte int — -128 **to** 127
- 1-byte unsigned int — 0 **to** 255
- 2-byte int — -32768 **to** 32767
- 2-byte unsigned int — 0 **to** 65535
- 4-byte int — -2147483648 **to** 2147483647
  -2 * 10^9 **to** 2 * 10^9 about
- 4-byte unsigned int — 0 **to** 4294967295
  0 **to** 4 * 10^9 about
- 8-byte int — -9223372036854775808 **to** 9223372036854775807
  -9 * 10^18 **to** 9 * 10^18 about
- 8-byte unsigned int — 0 **to** 18446744073709551615
  0 **to** 18 * 10^18
- 4-byte real — 3.4 * 10^-38 **to** 3.4 * 10^38
- 8-byte real (real) — 1.7 * 10^-308 **to** 1.7 * 10^308
- Currency — -604462909807314587.353088 **to** 604462909807314587.353087
- Length max of a fixed string — 2 Gbyte
- Length max of a ASCIIZ string — 2 Gbyte
- Length max of a Pascal string — 255

Type of return values of stock, mirror, flow, procedure

All those values are **currency** type

Limits for the currency:

- -604462909807314587.353088 **to** 604462909807314587.353087
  - ✓ **Warning :** the values which exceed these limits will be wrong

F) 'Scatter' action

An action of 'scatter' type memorises a series of pairs values (x, y).
The return value of the action is a function of the input value x that corresponds to the current value of the flow.
See too `WithLookUp` function

The flow should contain an action with a chronology lower than this, or else the input value will always be null.

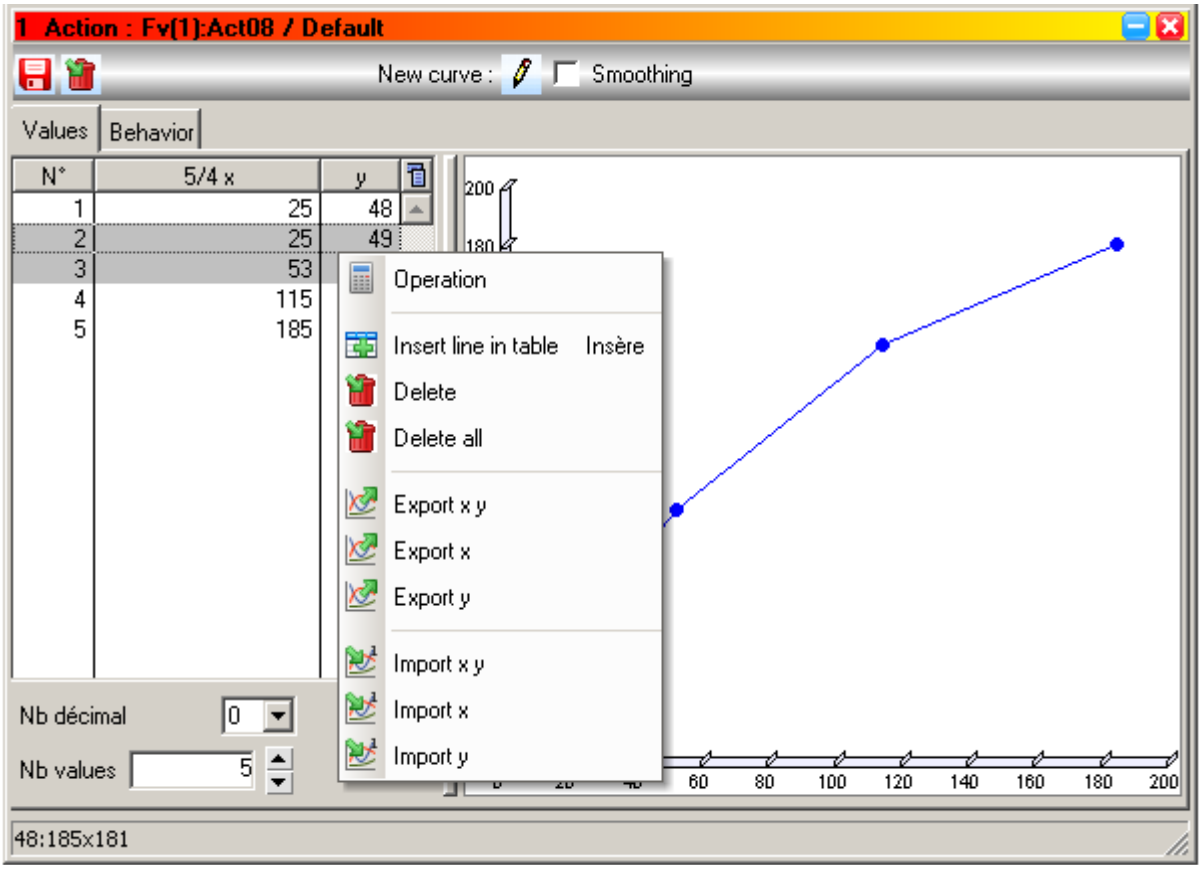
- Select the 'Scatter' type in the 'TypeValue' column
- Click on the green led 'Ed' or on the 'Value' field to open the 'Scatter' window
- If the green led turns red, it indicates that the action is in edit mode

'Scatter' action

Ed	Flow	Origin	Action	E	Chron	?Chrono	Start	Interval	Repeat	TypeCycle	Cycles	TypeValue	Value
	Fv(1)	Defau	Act09	✓	1	0	1	1	12	Default		Procedure	
	Fv(1)	Defau	Act08	✓	2	0	1	1	12	Default		Scatter	[0]
e model ... This table can be edited, to quit this mode, click under this table on the model ... This table can be e...													

Window 'Scatter'

- Click on the 'New curve' button,
- Draw the curve,
- Click on the 'New curve' button again, to finish.



To adjust the curve :

- Set the number of decimal,
- Set the number of pairs (x, y),
- Set the values in the table or
- Select lines of the table :
  - select the 'Operation' option from the Popup menu,
  - Make changes in the 'Operation' window

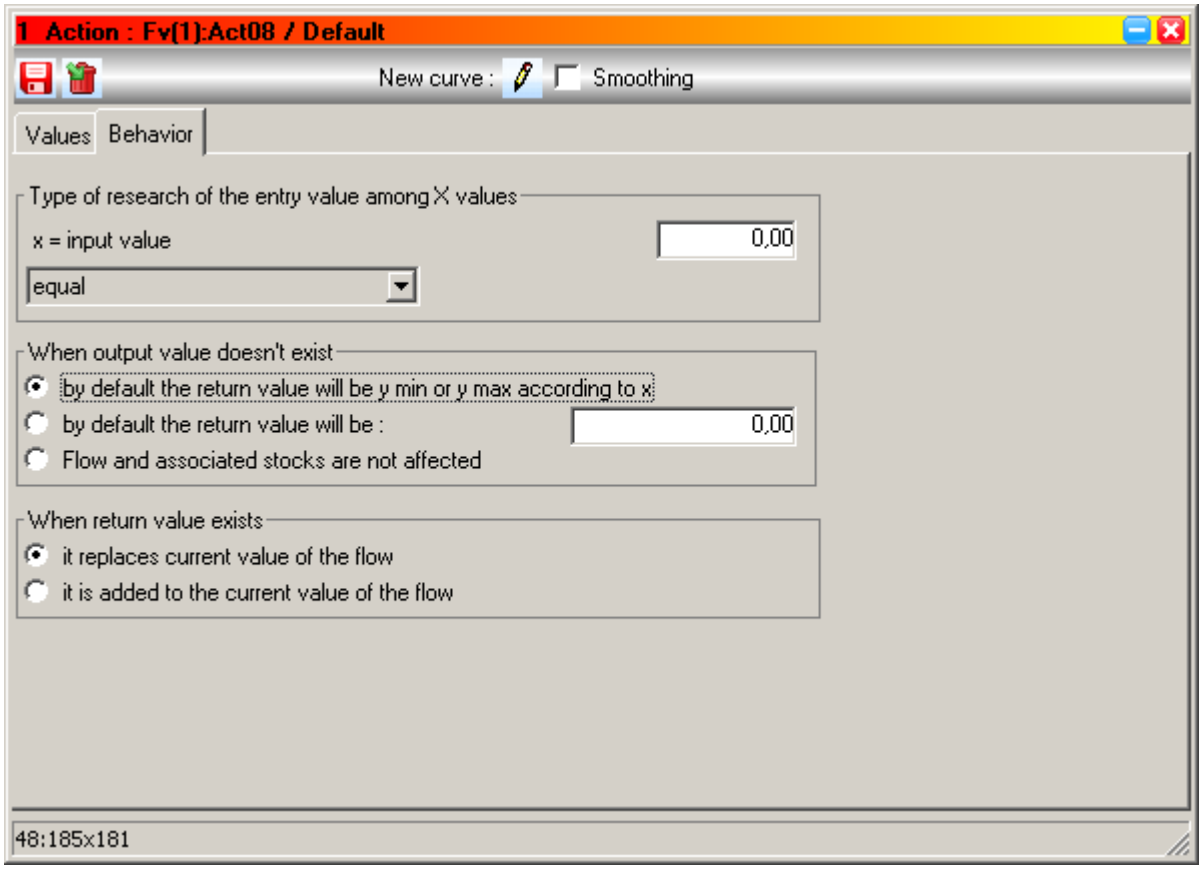
➢ Note: To import or export pairs (x, y), x or y, select the 'Import and Export' option.
The file is in text format (.txt), it must contain a line for a pair of value (x,y).
When a scatter is imported, the first line is filtered, if it is not numeric.
When exporting the values of a scatter, the first line contains the name of the action.

1. 'Behavior', search x

When searching the input x :

- Select 'Behavior' plan
- Set the parameters.

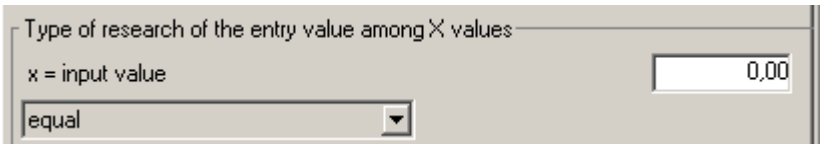
'Behavior' plan



Searching's type for the input value x

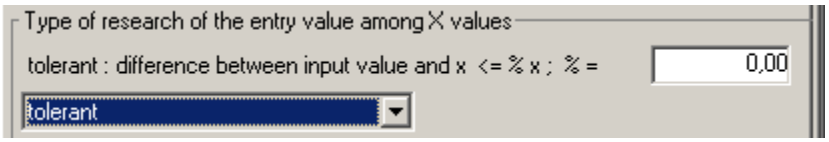
equal

Returns the value y of the pair (x, y) for x = current value of the flow



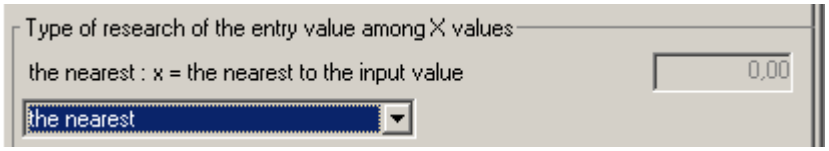
tolerant

Returns the value y of the pair (x, y) when the difference between the current value of the flow and x is less than, or equal to the specified percentage of x.



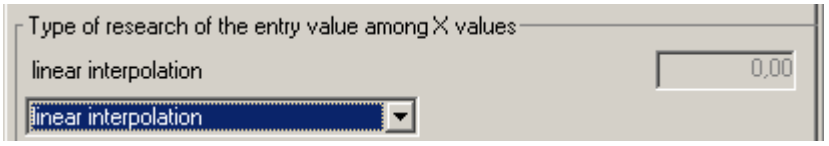
the nearest

Returns the value y of the pair (x, y) when the current value of the flow is the nearest to x.



linear interpolation

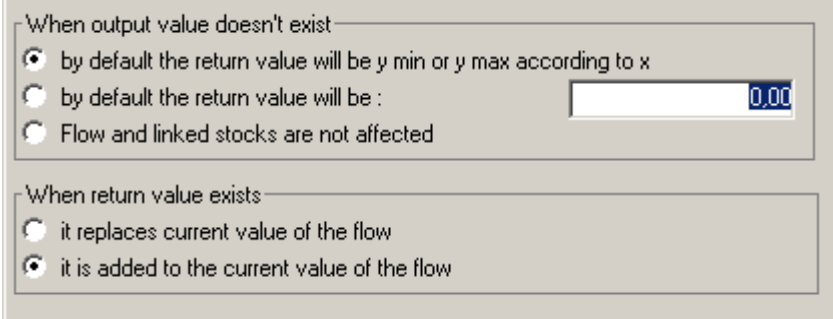
The return value y will be the result of the linear interpolation between the current value of the flow and x.



2. 'Behavior', return value y

Depending on the desired behavior, set the two following cases :

- When the output value y does not exist
- When the return value exists



III - FUNCTIONS

A 'Procedure' action (or equation) contains code to calculate its return value.
The code written in Wlanguage is dynamically compiled when the action is executed.

A) The Wlanguage

You can find the Wlanguage description in the help files :

- WlanguageV12QuickHelpEn.chm
- WlanguageV12QuickHelpFr.chm

See Windev version 19 Full Online Help in **English:**
http://help.windev.com/en-US/search.awp?origin=browse&cat=fonctions-wlangage,489

You can download and try the Windev Express (free) in English here:
http://www.windev.com/windev/WD-Express.htm

See Windev version 19 Full Online Help in French**:**
http://doc.pcsoft.fr/fr-FR/search.awp?origin=browse&cat=fonctions-wlangage,489

You can download and try the Windev Express (free) in Fench here:
http://www.pcsoft.fr/windev/WD-Express.htm

1. Mathematical functions

Abs, ArcCos, ArcSin, ArcTan, Round, Cos, CoTan, IsOdd, IsEven, Exp, Random, InitRandom, Ln, Log, Max, Min, NumToString, DecimalPart, IntegerPart, LoWord, HiWord, Power, Root, Sin, Tangent, BinaryAND, BinaryNOT, BinaryOR, BinaryXOR.

2. Financial functions

FinRedemption, FinDecreasingRedemption, FinLinearRedemption, FinError, FinPeriodInterest, FinPaymentNb, FinInterestRate, FinCurrentVal, FinNetCurrentVal, FinFuturVal, FinRepayVal.

3. Statistical functions

StatCorrelation, StatCovariance, StatAverageDeviation, StatStandardDeviation, StatStandardDeviationP, StatError, StatAverage, StatSum, StatVariance, StatVarianceP.

4. Other lists of functions

Arrays, Strings, Date, Matrix, Memory areas, Registry, Files, Xls files, ClipBoard, Mouse, Network, Http, Ftp, Socket, Serail and parallel port, DabaBase, SQL, ...

B) True specific functions

You can find a descrition of the specific functions written for True with the Wlanguage in:

- **Man05-True functions.pdf**

C) True main menu Help

All the help files can be open with the True main help menu.

Main menu –> Help:
- Wlanguage quick help
- Wlanguage functions - Full OnLine Help on Windev website in English (Windev Version 19)
- Wlanguage functions - Full OnLine Help on Windev website in French (Windev Version 19)

IV - 'ACTIONS' WINDOW

This window allows :

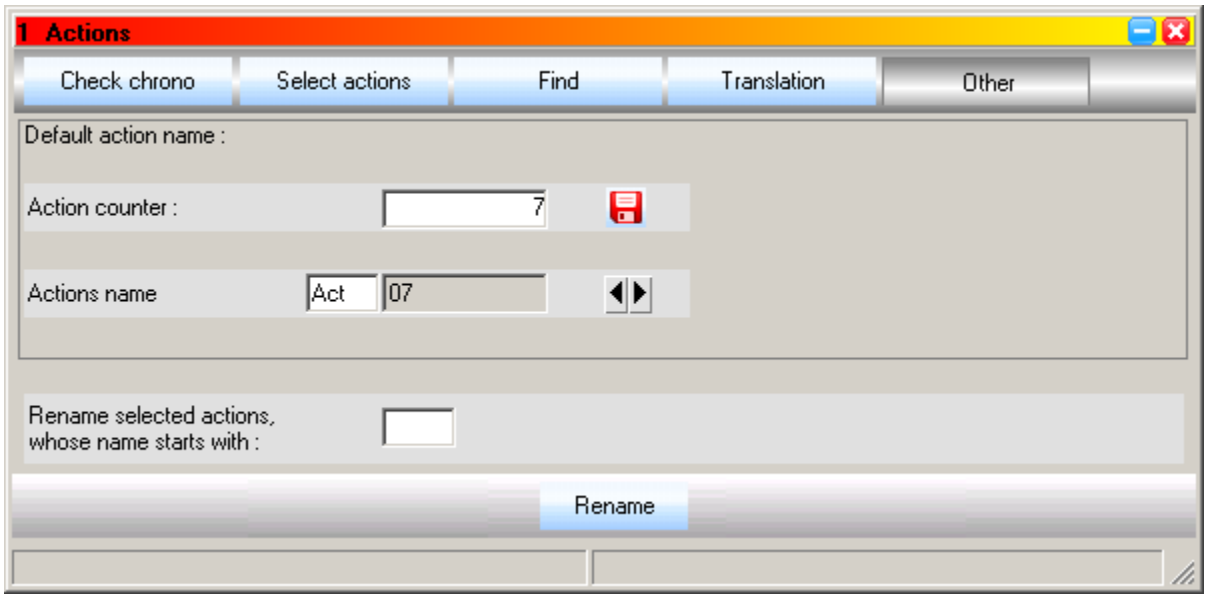
- Initializing the default name and the counter actions
- Searching and replacing string in the procedure of the actions
- Verifying the chronologies of the actions
- Translating the procedure in French or in English

Open the 'Actions' window :

- Select the 'Actions' option from the 'Tools' menu,
  or
- press the 'A' key

A) 'Other' plan

'Actions' window , 'Other' plan



1. Counter of action

This counter is incremented when creating new action

- Enter the value of the counter
- Save

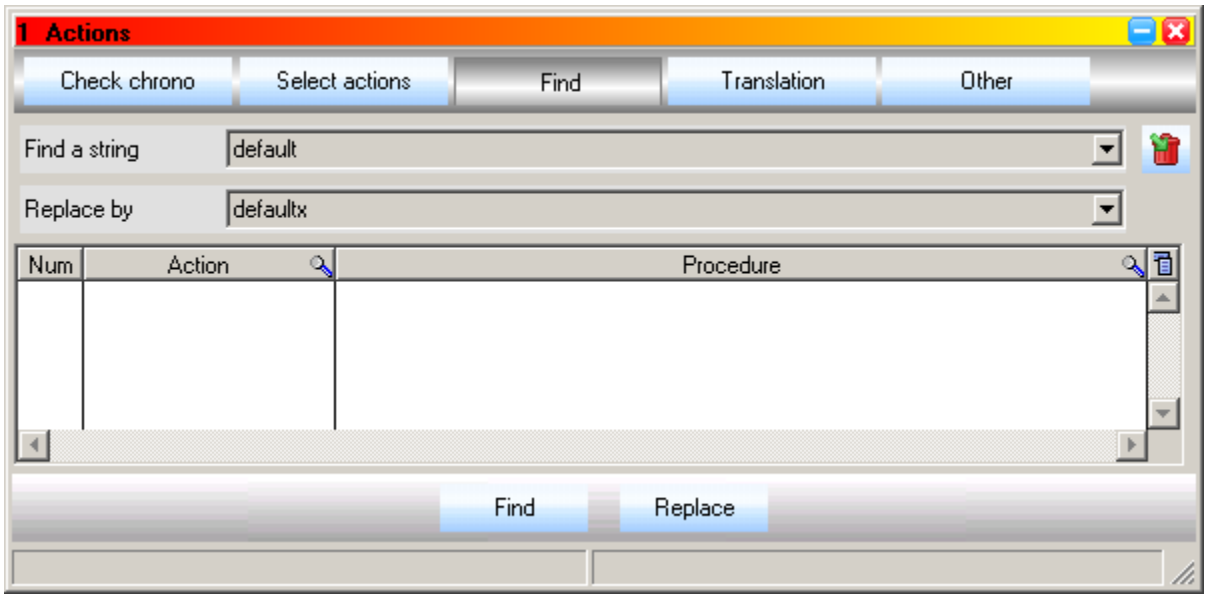
2. Naming an action

'Actions name' field

- Enter the default name of the actions
- Enter the value of the counter of actions
- Save
- The name of actions will be composed by the 'Actions name' and 'Action counter' fields

B) 'Find' plan

'Actions' window, 'Find' plan



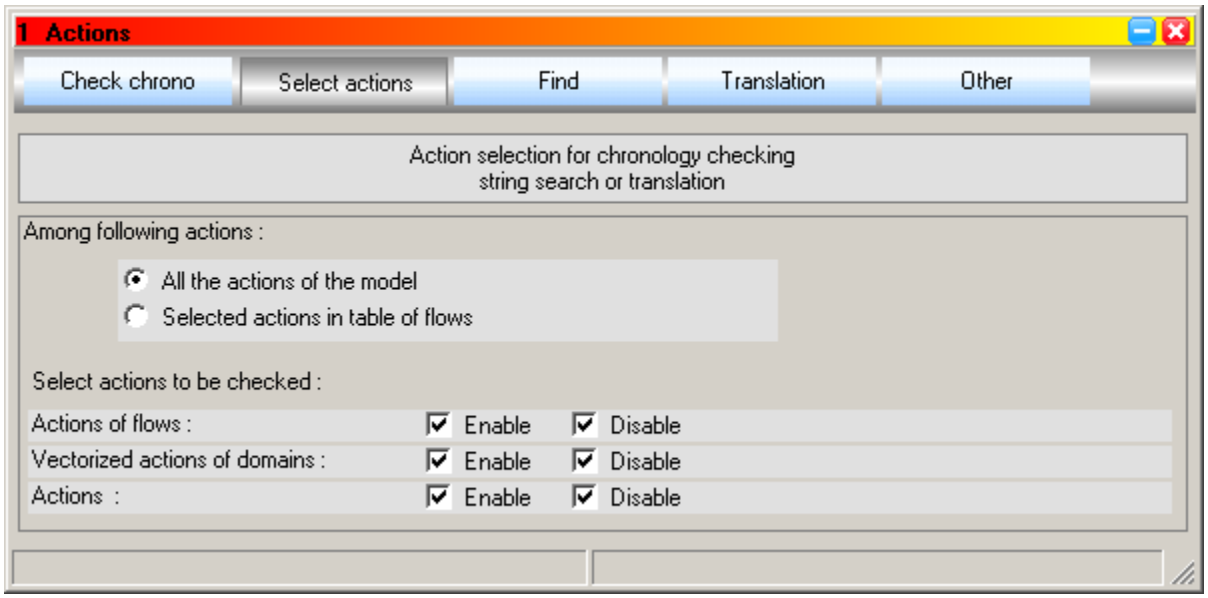
1. Find a string in the procedures of the actions

'Search string' field

- Enter the string in the 'Search string' field.
- The string will be searched in all the actions or all the filtered actions (if selected in the plan 'Select actions')
- Click on the 'Search' button (the search is not case sensitive)
- Select a line in the table
- The actions of the corresponding flow will be displayed in the 'Flow' table

C) Selecting actions

'Actions' window, 'Select actions' plan



1. Selection criteria

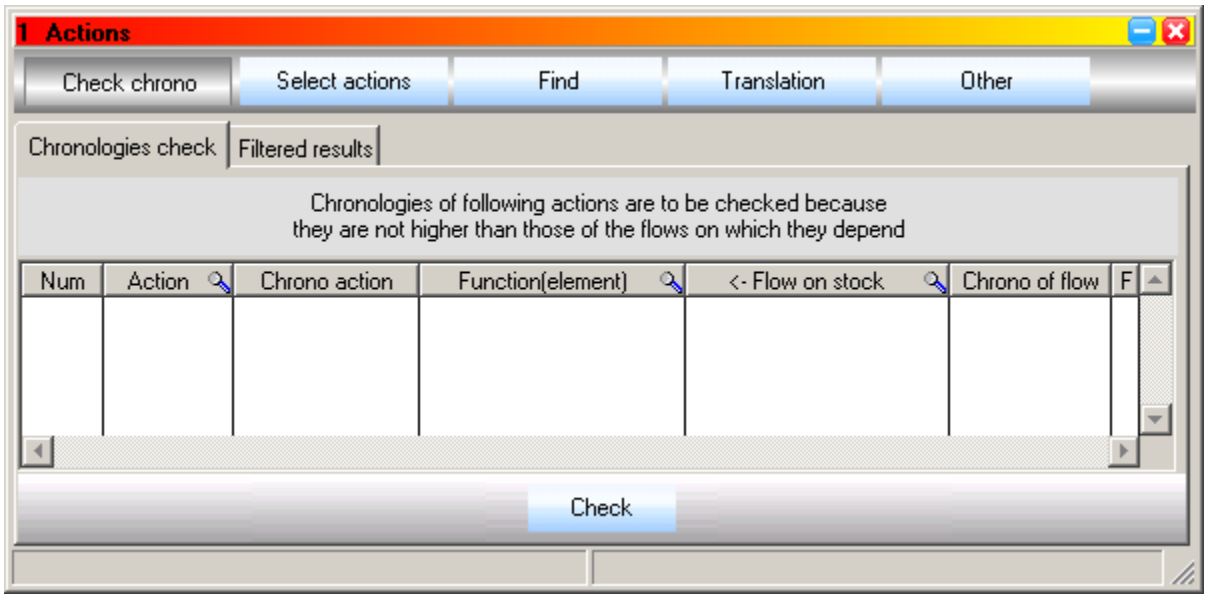
Selecting 'Among following actions':

- Select the type of selection
- Check additional filtering interrupts

- Searching string and chronologies checking will be done according to this selection

D) Checking the chronologies

'Actions' window, 'Check chrono' plan



1. Checking the chronologies

- The chronologies will be checked for the selected actions

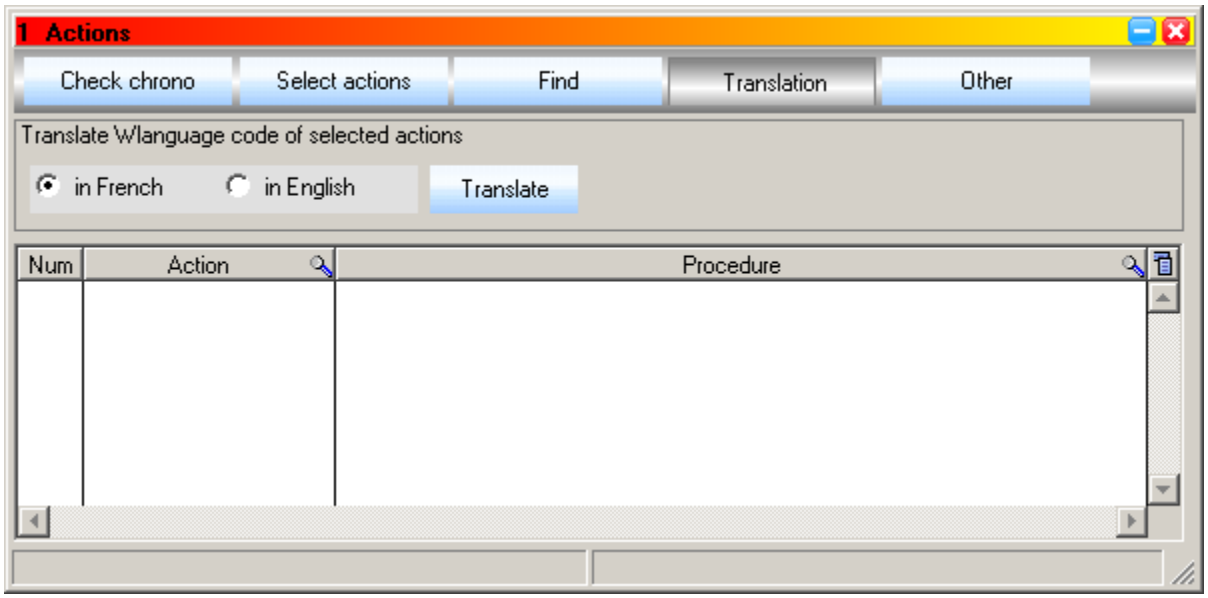
- When one action uses the '**Fvalue**' function to get the value of one flow, its chronology should be by default higher than this flow, or else the value will not be yet calculated, by default only, because the '**Fvalue**' function allows getting values of flow for a time before than the current unit of time

- Click on the 'Check' button
- Select a line in the table
- The actions of the corresponding flow will be displayed in the 'Flow' table
- Check the box 'F' to filter a result
- The filtered results will be displayed in the table of the 'Filtered results' plan

- To cancel the filtering action in the 'Filtered results', uncheck the box 'F' in the table of this plan

E) Translation

'Actions' window, 'Translation' plan



1. Code translation

- The code of the procedures of the actions for the selected flows can be translated in French or in English
- Select 'in French' or 'in English'
- Click on the 'Translate' button