

Tutorial:

How to draw a GTS (AGTS) with AGG and import it into AUGUR 2.

1. First steps
 - 1.1 Creating an empty graph transformation system
 - 1.2 Declare graph elements.
 - 1.3 Declare „lines“

2. Creating a Graph Transformation System
 - 2.1 Initial graph
 - 2.2 Adding attributes
 - 2.3 Adding an empty rule
 - 2.4 Left- and right-hand sides
 - 2.5 Create a mapping
 - 2.6 Adding attributes to rules
 - 2.7 Adding guard conditions

3. Import into AUGUR

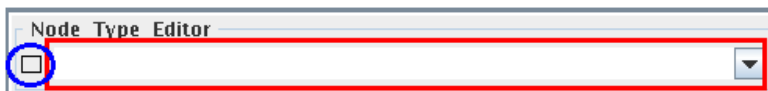
1.1 Creating an empty graph transformation system

Click on [File] --> [New GraGra]. The second option is to click on the GG-Button in the top-left corner:



1.2 Declare graph elements

After you created a new graph transformation system, click in the panel „Node Type Editor“.



Attention: AUGUR accepts only circle-shaped vertices and rectangle-shaped edges!

Change the shape with the rectangle next to the textfield (blue in the graphics) into „Circle“. Changing the color will not result in changing the color in AUGUR.

Type „v“ as a unique label for all vertices (vertices are not labelled in AUGUR) in the editor (red in the graphics).

After entering a name and setting the shape press „Enter“. The new graph element should appear on the right side in a little panel „Node Types“.

The next step is to list all possible labels of edges in „Node Type Editor“. Change the shape back to rectangle and type in the editor all labels. Press „Enter“ after each label.

All labels should also appear in a panel „Node Types“.

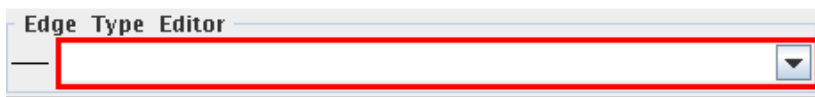
1.3 Declare „lines“

To paint the graphs, we need to connect graph elements somehow. To do this we need lines.

Attention: The lines must have names „0“, „1“, ... etc. These numbers are used later as the connections indices of vertices.

Most of time you will need only 2-3 lines, numbered with „0“, „1“ or „2“.

To declare a new „line“ click in the textbox „Edge Type Editor“ next to the box with the graph elements:



As before you just need to change the name and press Enter in order to declare a new line. After that the new line will appear in the box „Edge Types“ in the lower right. Changing the shape of the line will have no effect on the graph in AUGUR.

2.1 Initial graph

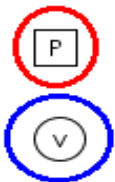
After all graph-elements are declared one can start painting the initial graph.

First click in the list on the left border on „Graph“. Here the name of the initial graph can be changed:



Now to the drawing:

You can select elements (vertices and edges) out of the „Node Types“-list and place them on the large free space in the lower center by simply clicking there.



You can see that the vertexes (here blue) are circles and the edges (red) are rectangles. The location of each element can be changed later.

To delete a graph element just right-click on it and select „delete“ from the menu.

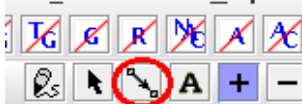
At last you must connect the graph element with lines. These are the lines, that you declared in Section 1.3. Select one with the required connection number from the list „Edge Types“ and click on the first graph-element and then on the second graph-element. (The order is irrelevant).

Below one can see two connected elements:



Go on, until the complete initial graph is drawn in this way.

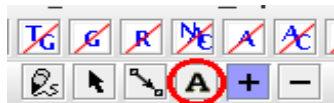
The placement of each element can be changed. Click the button (red in the figure below) in the upper part of the window in order to change into the „Move Mode“.



Now you can change the arrangement of every graph element.

2.2 Adding attributes

That part is a little tricky, because AGG uses another attribute context. To do this you have to change the editing mode to „Attributes Mode“. This can be done by clicking on the button marked red below:



After that you need to click on the graph element, that should be equipped with attributes.

A new panel will be revealed:

Attribute Context		Current Attribute	Customize			
Shown	Handler	Type	Name	Expression	OK	
<input type="checkbox"/>					<input type="checkbox"/>	

In the field „Type“ the attribute should be always declared as „String“ (AGG uses Java classes). AGG will do the adjustment for the fields „Shown“ and „OK“. After that you can name the attribute.

Now enter the attribute type (like „int“ for integer or „int-str“ for tuple integer-string) followed by „:“ and then by the value of the attribute in the field „Expression“. It is important to put everything (the complete expression) in high-commatas („“) in order to declare it as a single string.

It should afterwards look like this:

Attribute Context		Current Attribute		Customize	
Shown	Handler	Type	Name	Expression	OK
<input checked="" type="checkbox"/>	Java Expr	String	a1	"int-int:x,y"	<input checked="" type="checkbox"/>
<input type="checkbox"/>					<input type="checkbox"/>

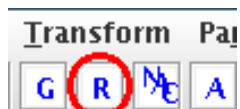
It is possible to add arbitrary many attributes.

After adding attributes, click on the graph-elements, that should be equipped with these attributes.

2.3 Adding an empty rule

When AGG is started, there is already one empty rule. In order to create a new rule you have the following possibilities:

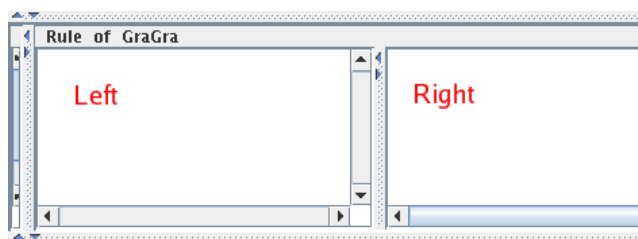
- Select an existing rule and press: Ctrl+Alt+R.
- Right-click on the GraGra Node and select „Rule“.
- Click on the new rule button (see below).



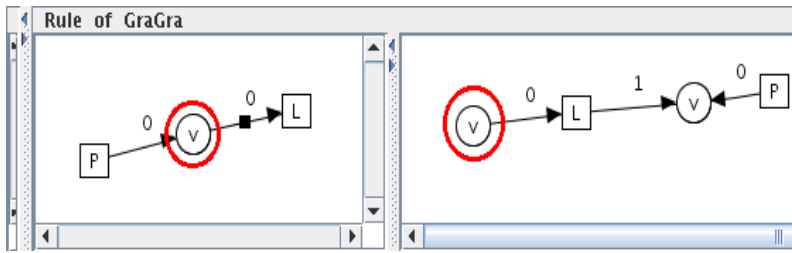
You can change the name of the rule in the way you did for the initial graph.

2.4 Left- and right-hand sides

Above the large window with an initial graph there are two smaller windows. The left one is for the left-hand side of the rule and the right one is for the right-hand side of the rule:



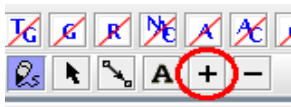
Like before (for the initial graph) you can draw the graphs with the declared graph elements in „Node-Types“ and connect them with the lines from „Edge-Types“:



2.5 Create a mapping

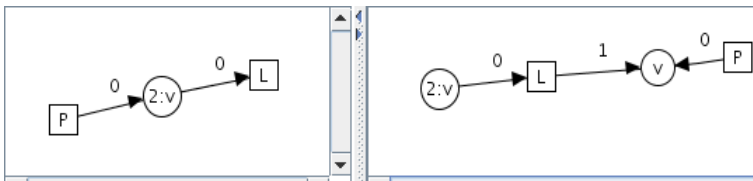
Now you need to map vertices from the left-hand side of the rule into the vertices in the right-hand side of the rule. For example we decided to „map“ two vertices with red circles above.

To do this one should change the editing mode in AGG by clicking on the „+“ sign:



In this way „+“ indicates the mapping mode. If you did something wrong, you can always undo the mapping by clicking on the symbol „-“ right to the mapping symbol „+“.

Now click on the graph element in the left-hand side and then on that from the right-hand side. After doing this, AGG will change the depiction of the graph elements like this:



2.6 Adding attributes to rules

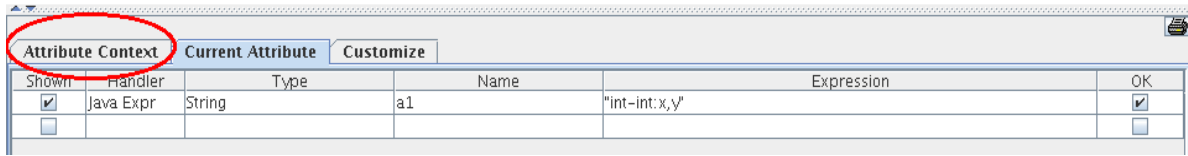
It is the same as before. You need to change the edit mode and do exactly the same steps as in Section 2.2. Do not forget that the attributes in the rules have to be from the term algebra.

2.7 Adding guard conditions

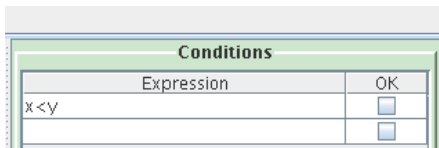
In this section we show how to add a guard expression to a rule. First you need to change the editing mode into the attribute mode by clicking on the „A“ button in the upper area of the window:



Go to the rule where you want to add guard condition and click on some attributed edge in order to open the following window:

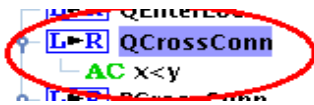


In this window click on „Attribute Context“ (marked red above). On the right side of the newly opened window there is a sub-window „Conditions“:

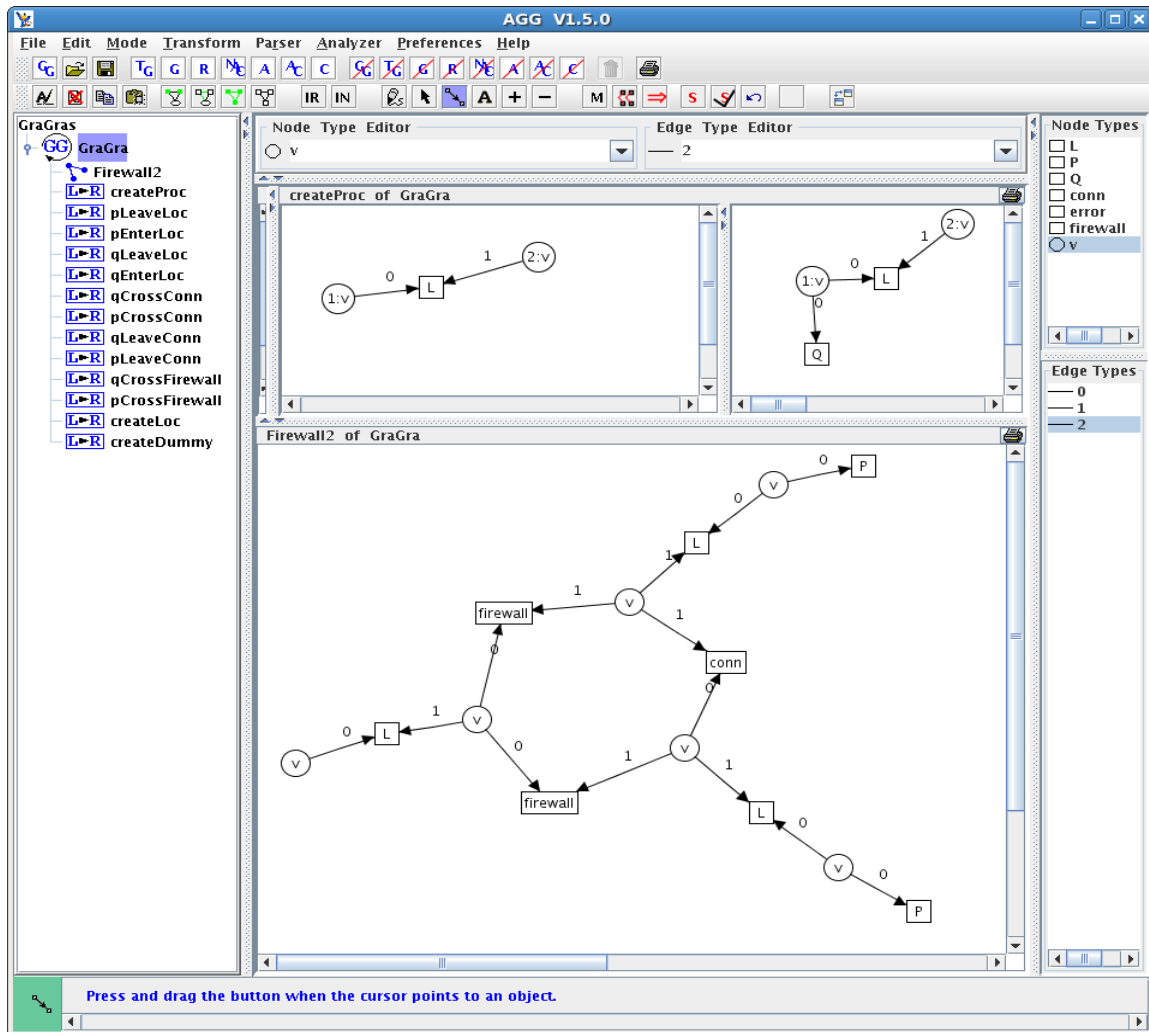


Here you can enter your conditions. AGG will not accept the arguments. In the example above it does not know the variables x and y. Still pressing enter will result in acceptance by AGG. Once entered you can not modify the Conditions. You have to delete the whole expression and create a new one.

After setting a guard condition your rule will look like this:



Below is a complete view of AGG after the input procedure is finished:



3 Import into AUGUR

After creating your graph you should save the result in the AGG Format *.ggx.
The saved file can be used as an input into AUGUR 2.

There are some restrictions in the usage:

- The names should not contain „_“ because we use LaTeX for the visualisation of graphs.
- The names should not contain a space symbol („ “) because AGG does not support this. We suggest to use the „CamelBack“- Notation (Example: GraphTransformationSystem).

Questions/Errors/etc can be send to:
michael.mayer@stud.uni-due.de