GraphML Layout with yEd

GraphML and yEd

ComMA can export UML-style state machines to the GraphML format. Ensure that the latest version of ComMA is installed in Eclipse (menu Help → Check for Updates). Info about generating UML diagrams is found under Help → Help Contents → ComMA User Guide → Generation of UML diagrams.

According to http://graphml.graphdrawing.org/, GraphML is "a comprehensive and easy-to-use file format for graphs. It consists of a language core to describe the structural properties of a graph and a flexible extension mechanism to add application-specific data".

It is instructive to have a look at a ComMA-generated GraphML file, using a text editor (e.g. Notepad++) or XML editor. In GraphML, nodes and edges can have user-defined attributes. ComMA stores the name of a node in an attribute called "name", and the text along an edge in an attribute called "ttxt" (transition text).

The GraphML format is supported by many tools. The yEd editor (https://www.yworks.com/products/yed) can be used to create and edit GraphML graphs. In particular, it has several algorithms for graph layout. After automatic layout, the result can be manually fine-tuned in yEd. Below, it is assumed that you have yEd installed. The instructions are based on yEd version 3.19.

The steps described below need to be followed for each ComMA-generated GraphML file, except for the imports of the property mappers and palettes.

PS. The steps described below cannot be easily automated. yEd itself explicitly forbids use in an automated process (see https://www.yworks.com/resources/yed/license.html). The same company does offer the yFiles diagramming libraries that may be used for building applications (e.g. yFiles for HTML and yFiles for Java).

Using yEd to layout a graph

To use yEd's automatic layout for a ComMA-generated GraphML, follow these steps:

1. Open the .graphml file in yEd. When opening a freshly-generated ComMA graph, all nodes and edges will be drawn on the same place on the yEd canvas, so it may look as if there is only 1 node. This is because the file does initially not contain yEd-specific layout information. If you change the layout in yEd and then save the graph, this information will be stored in the GraphML file.
2. In order to map the node and edge attributes ("name" and "ttxt") from the GraphML representation to labels in yEd, use the yEd properties mapper, with the provided configuration:
    i. In menu Edit, click Properties Mapper…
    ii. In the upper left, click the import icon (with orange arrow) on the line directly beneath "Configurations".
    iii. Select the provided file yEd-properties-mapper-ComMA.cnfx and click Open. This imports the 2 properties mapper configurations, for nodes and edges. These are saved across yEd sessions.

      iv.   Apply both imported configurations: for each, select the configuration (by clicking on it) and click Apply.

      v.   Click Ok to close the properties mapper.

3. Import the provided palette. This contains styles for nodes and edges that are similar to the default style of PlantUML.

      i.   In menu Edit, click Manage Palette…

      ii.   In the Palette Manager window, click Import Section…

      iii.   Select the provided palette file PlantUML-style.graphml, and click Open.

      iv.   Close the Palette Manager.

The PlantUML-style palette is now shown in the Palette Tool Window (usually on the right side in yEd). It contains 2 node representations and 2 edge representations. The second node and edge representation (node: filled black circle, edge: straight line segments) can be used for a PlantUML-style marker to the initial node.

4. Apply the first node representation of the palette to all nodes of the graph, and the first edge representation to all edges. This is done by first selecting all nodes, applying the desired representation to them, and then selecting all edges and applying the desired representation. In yEd, a multi-element selection can only contain elements of the same kind (only nodes or only edges). See [1] for more info.

      i.   Select all nodes; this can be done by typing Control-A or by dragging a rectangle around them using the left mouse button.

      ii.   In the PlantUML-style palette, right-click on the first node representation (with label "name") and choose Apply.

      iii.   In menu Tools, click Fit Node to Label. In the Fit Node to Label window, make sure that "Ignore Width" and "Ignore Height" are **not** checked. Click Ok.

      iv.   Select all edges. This can be done by clicking on a single (arbitrary) edge to select it, and then typing Control-A. If no edge is visible, apply a layout first, e.g. using One-Click Layout as described below.

      v.   In the PlantUML-style palette, right-click on the first edge representation (with round curves and label "ttxt") and choose Apply.

5. Use the One-Click Layout feature: click on the magic wand icon in the yEd toolbar. This is likely to produce a reasonably good looking layout, which can be fine-tuned as explained below. If One-Click Layout does not give the desired result, try other choices from the Layout menu.

Fine-tuning and other yEd tips

- In order to move a node in yEd, first select it (by clicking on it). Once it is selected, it can be moved by dragging it.
- Manually (interactively) moving an edge label shows guides according to the placement model [2].
- The entire canvas can be panned by holding down the right mouse button and moving.
- Zooming is done with the mouse wheel.
- Double-clicking on a node or edge in a palette will make it default, which will be respected by (some) layout algorithms [3].
- If you accidentally start creating a new edge, hit the Escape key to cancel this.

References

[1] [Online]. Available: https://yed.yworks.com/support/qa/41/how-do-i-select-elements-in-a-diagram.

[2] [Online]. Available: https://yed.yworks.com/support/qa/5985/edge-label-placement.

[3] [Online]. Available: https://yed.yworks.com/support/manual/palette.html.

[4] [Online]. Available: https://yed.yworks.com/support/manual/layout_labeling.html.

[5] [Online]. Available: https://yed.yworks.com/support/qa/4224/how-to-align-label.