Hierarchical Block Structures

In Extend, groups of blocks can be selected, then "made hierarchical" via the Model … Make Selection Hierarchical tab on the main toolbar. The effect is to encapsulate these blocks and represent them on the model plane with a single generic icon. Any item path or data path that extends outside the logical boundary of the encapsulated block is handled by an automatically generated connector of the right type. Inside the encapsulated block these appear as connector boxes. This capability provides a quick means of reducing the clutter on the model plane, but care must be used, because there is no provision for reversing this process.

The user can also create hierarchical blocks of this nature from scratch, also via the Model tab. In this case, a blank hierarchical block structure is provided to be filled in. It has 4 distinct areas:

- the icon draw area
- the connector names list area
- the help/documentation text area
- the block structure area.

When a hierarchical block structure is brought up via the Model tab, additional drawing tools are included on the tool bar for adding connectors to the icon.

When connectors are added to the icon, generic "In" connector names are added to the connector names list area and connector boxes are installed in the block structure area. Connector names may be renamed so long as the naming conventions are followed. Input connectors must have an "In" suffix and output connectors must have an "Out" suffix. The right type of connector automatically appears on the icon depending on the suffix value.

The icon can also have nominal animation characteristics; for example, the "Animate Value" block (Animate.lix), provides for the dynamic display of an output value on the icon. In this case, an animation object must be installed on the icon via the animation object tool. A number is automatically assigned to the animation object and the dialogue of the Animate Value block has to be pointed to the object number.

As an example, a large multi-queue, multi-server model can be represented in a small amount of space when appropriate hierarchical blocks are used. In the following example, three hierarchical blocks are employed:

- a block to dynamically exhibit interarrival time and elapsed time
- a block to distribute items to servers in accord with a line length criteria
- a block to handle queues and servers, producing line length values to be fed back to the distribution block.
The structure of the hierarchical blocks follows:

- Block to dynamically exhibit interarrival time and elapsed time.
- Block to distribute items to servers in accord with a line length criteria.
- Block to handle queues and servers, producing line length values to be fed back to the distribution block.
- Block who’s only purpose is to shrink a Constant Block to fit in tight spaces.

The model illustrates:

Multi-queue, Multi-server (up to 10)
Model Illustrating Hierarchical Blocks

(queue lengths reported by the multi-queue hierarchical block counts the item being served as being in queue)
Hierarchical Block Structure 1

Icon draw area ... the drawing tools on the toolbar expand to include tools for entering connectors. Clicking a connector tool, then clicking within the icon draw area installs the connector, and a

The length amount for a server includes the item being served.

block structure area

connector names list: (whenever a connector is added to an icon, it is given a generic "In" name and appears here and in the
Hierarchical Block Structure 2

This is a companion structure that fits with Hierarchical Block Structure 1.
Accumulate (Generic.lix) accumulates the aggregate of its input for a simulation run … in this case it is aggregating interarrival times.

Animate Value (Animate.lix) provides a dynamically updating window on the icon to show the value; in this case both the interarrival time and the total elapsed time are being displayed on the icon.

Time Unit (Generic.lix) converts from one time unit to another, in this case from hours to minutes.

Provides a value corresponding to being the longest line, effectively keeping the line from being selected.