Subsystem

A subsystem is a set of blocks that have been replaced by a single block called a subsystem block.

Creating Subsystems

You can create a subsystem in two ways:

- Add a subsystem block to your model, then open that block and add the blocks it contains to the subsystem window.
- Add the blocks that make up the subsystem, then group those blocks into a subsystem.

Creating a Subsystem by Adding the Subsystem Block

To create a subsystem before adding the blocks it contains, add a subsystem block to the model, then add the blocks that make up the subsystem:

1. Copy the subsystem block from the ports & subsystems library into your model.
2. Open the subsystem block by double-clicking it.
3. In the empty subsystem window, create the subsystem. Use Inport blocks to represent input from outside the subsystem and Outport blocks to represent external output.

For example, the subsystem shown includes a Sum block and Inport and Outport blocks to represent input to and output from the subsystem.

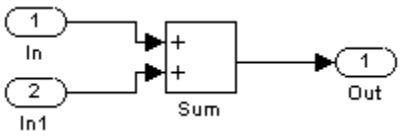

Figure1

Creating a Subsystem by Grouping Existing Blocks

If your model already contains the blocks you want to convert to a subsystem, you can create the subsystem by grouping those blocks:

1. Enclose the blocks and connecting lines that you want to include in the subsystem within a bounding box. To select multiple blocks that are in one area of the model, click the left mouse button and drag the cursor.

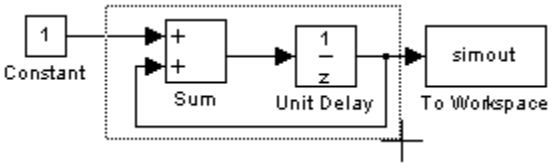

Figure 2

When you release the mouse button, the two blocks and all the connecting lines are selected.

2. Choose **Create Subsystem** from the **Selection**. A subsystem block replaces the selected blocks with a Subsystem block.

   The figure shows the subsystem.

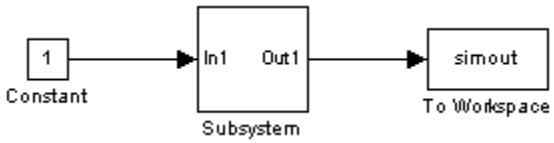

   Figure 3

3. Resize the subsystem block so the port labels are readable.

If you open the subsystem block, the underlying system opens, as shown below. Notice that Simulink adds Inport and Outport blocks to represent input from and output to blocks outside the subsystem.

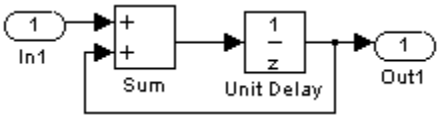

Figure 4

Conditionally Executed Subsystems

Conditional subsystems can be very useful when you are building complex models that contain components whose execution depends on other components.

A conditional subsystem also known as *conditionally executed subsystem* is a subsystem whose execution depends on the value of an input signal. The signal that controls whether a subsystem executes is called the *control signal*. The signal enters the subsystem block at the *control input*.

Simulink supports different kinds of conditional subsystems:

- An *enabled subsystem* executes while the control signal is positive. It starts execution at the time step where the control signal crosses zero (from the negative to the positive direction) and continues execution while the control signal remains positive.
- A *triggered subsystem* executes once each time a trigger event occurs. A trigger event can occur on the rising or falling edge of a trigger signal, which can be continuous or discrete.
- A *triggered and enabled subsystem* executes once on the time step when a trigger event occurs if the enable control signal has a positive value at that step.
- A *control flow subsystem* executes one or more times at the current time step when enabled by a control flow block. A control flow block implements control logic similar to that expressed by control flow statements of programming languages (e.g., if-then, while-do, switch, and for).

Conditional Execution (CE) Behavior

To speed the simulation of a model, by default the Simulink® software avoids unnecessary execution of blocks connected to switch, multiport switch, and of conditionally executed blocks. This behavior is conditional execution (CE) behavior. You can disable this behavior for all switch and multiport switch blocks in a model, or for specific conditional subsystems.