Subsystem

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1) Why do we use subsystems ?
   - As a model increases in size and complexity increases you can simplify it by grouping blocks into subsystems. A subsystem is a set of blocks that you group into a single Subsystem block.
   - Keeps functionally related blocks together.
   - Helps reduce the number of blocks displayed in your model window.
   - Establishes an interface with inputs and outputs.

2) What is function packaging (in code generation) ?
   - There are four types of function packaging
     - Auto
     - Inline
     - Non-reusable
     - reusable
   - If you use two subsystem for code generation and one set for auto mode and another set for inline mode then there is no any difference in the generated code i.e. function will be generated as a void for both subsystem.
   - Now to use the non-reusable and reusable function we have to provide the name for function.
   - For two subsystem which are set for non-usable mode and one for reusable mode then we must have to give different name for the functions
   - For using reusable mode with different subsystem we can provide only one name for all the function/subsystem.
   - To use non-usable mode we must have to provide different functions name for different subsystems.

3) What are the types of subsystem in Simulink?

Atomic Subsystem	Function Call Subsystem
Enabled Subsystem	For Iterator Subsystem
Triggered Subsystem	While Iterator Subsystem
Enable and triggered	Variant Subsystem
If action Subsystem	Switch Case Subsystem

   - Function Call Subsystem ->
     - A Function-Call Subsystem block is a conditionally executed subsystem that runs each time the control port receives a function-call event. A Stateflow® chart, Function-Call Generator block, S-Function block, or Hit Crossing block can provide function-call events.
   - Function Call Generator ->
     - The Function-Call Generator block provides function-call events that execute a function-call subsystem or function-call model at the rate you specify with the

Sample time parameter. To iteratively execute each function-call block multiple times at each time step, use the Number of iterations parameter.

- Function Call - Split ->
  - The Function-Call Split block allows a function-call line to branch and connect to several function-call subsystems or function-call models.

4) What is the difference between Atomic(Non-Virtual) and Non Atomic(Virtual) Subsystem.
   - Atomic(Non-Virtual) Subsystem ->
     - Atomic subsystem also name as code reuse subsystem.
     - Why Atomic subsystem is called as code reuse subsystem ?
     - -> if I have three atomic subsystem in my model which have same processing inside them but the input are different in that case I would go to the block parameter of all three atomic subsystem then change the function packaging setting to the reusable function and set the all three subsystem function name same so when I gets generate code all three subsystem share common c function, each subsystem call that function when they required and pass the input argument to it.
     - An atomic subsystem is a subsystem in which treat as atomic unit is selected by default.
     - C code will get generated for atomic subsystem
     - Atomic subsystem or non virtual subsystem are executed as a single unit.
     - It is conditionally executed subsystem that execute only when a transition occurs on a triggering, function call, action or enabling port.
     - The atomic subsystem has a dark border
     - in case of atomic subsystem the subsystem is considering as an single entity and the execution order is given to it and the logic inside it have the level 1 execution order.
     - when control come in atomic subsystem all the inside logic of subsystem execute, after all execution control left the atomic subsystem.
     - for making subsystem atomic we have to select block parameter 'Treat as Atomic Unit Option.
   - Virtual Subsystem ->
     - A Subsystem is virtual if the block is neither conditionally executed nor atomic.
     - The execution of the logic block inside the subsystem is inline with the model.
     - We can expand the virtual subsystem but we can not expand the atomic/non virtual subsystem.
     - The generated c code of the virtual subsystem is inline with the model

5) What is the difference between Enable and Trigger subsystem?
   - Enable Subsystem
     - An enabled subsystem is a conditionally executed Atomic subsystem.
     - The enabled subsystem block executes when a control signal has a positive value.
     - The enable subsystem has held and reset as the enable port properties.
     - Held is the default enable port properties of enable subsystem
   - Trigger Subsystem
     - A triggered subsystem is a conditionally executed atomic subsystem that runs each times the control signal has a trigger event.
     - The trigger event can be rising , falling or either.
     - Rising -ve to +ve , -ve to 0, 0 to +ve.
     - Falling +ve to -ve, +ve to 0, 0 to -ve.
     - The output port of triggered subsystem is not having the option of held and reset the

output
    - The main difference is that enable subsystem get execute until the input signal becomes zero and the trigger subsystem only execute for the very first time when the trigger port detect the trigger event.

6) What is an enabled triggered subsystem and how does it work?
    - An enabled triggered subsystem is a subsystem that contain both enable and trigger port inside the subsystem.
    - This subsystem will get execute when the following condition occurs:
      Enable control signal has a positive value.
      Trigger control signal has a trigger event.

7) Give example of if-else in Simulink other than switch block?
    - We can use if action subsystem block in place of switch block in Simulink.

8) Is in port and out port block in atomic system are virtual and non virtual ?
    - outside of atomic subsystem in port and out port blocks are non-virtual(Atomic) and its c code will get generated

9) How to convert if - else logic to switch-case logic in generated code ?
    - we can convert if - else logic to switch - case logic Stateflow chart and MATLAB function block by changing the setting in code generation > code style > on the switch case

10) Difference between model referencing and subsystem

Model referencing	Subsystem
• Model referencing will be not possible when the model Block is placed in the same simulink model	• We can place same subsystem in the same model or anywhere
• To do model referencing we need to browse the model from model block	• These is no need to browse the subsystem
• Changes in model block will change the original model to	• Changes in subsystem will not object the main model or subsystem
• Signal logging is not possible for model referencing	• Signal logging is possible for the subsystem

11) How to reset output instantly when we reset enable subsystem ?
    - Select output when disable option of enable block to reset and also select output when disable option of outport block to reset also then you can reset instantly.

12) Using single source enable three subsystem with different time, How would you enable them.
    - Using delay block we can delay the signal using sample time and then we can enable subsystem using different sample delay time
    - Using on delay we can delay signal using absolute time and using on delay we can enable different subsystem with absolute time.

13) What are the properties of enable and triggered subsystem?

- Enable subsystem have the two properties that is held and reset, where as the trigger subsystem have the following four properties that is rising edge, falling edge, either edge and function call.