Automation of Software Component Model Integration

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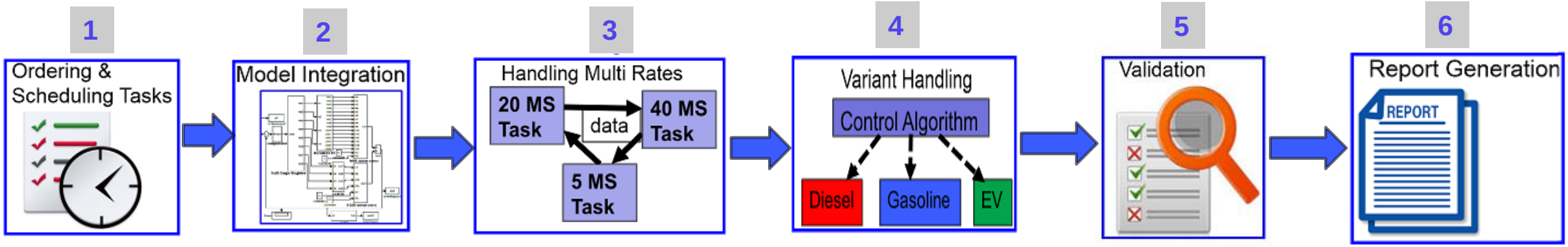
Approach for Software Component Model Integration



Inputs:

1. List of Simulink Specifications
To be integrated

2. Order of Integration (Optional)
If Not provided The tool itself will create
An order and let the user to adjust later.

Integration Tool

Outputs:

1. Integrated Simulink Model
Capable of handling Multi Rates,
Multi Variants,

2. Auto generated Simulation Report
(On Simulation)

1. Ordering & Scheduling the Specs

Inputs:

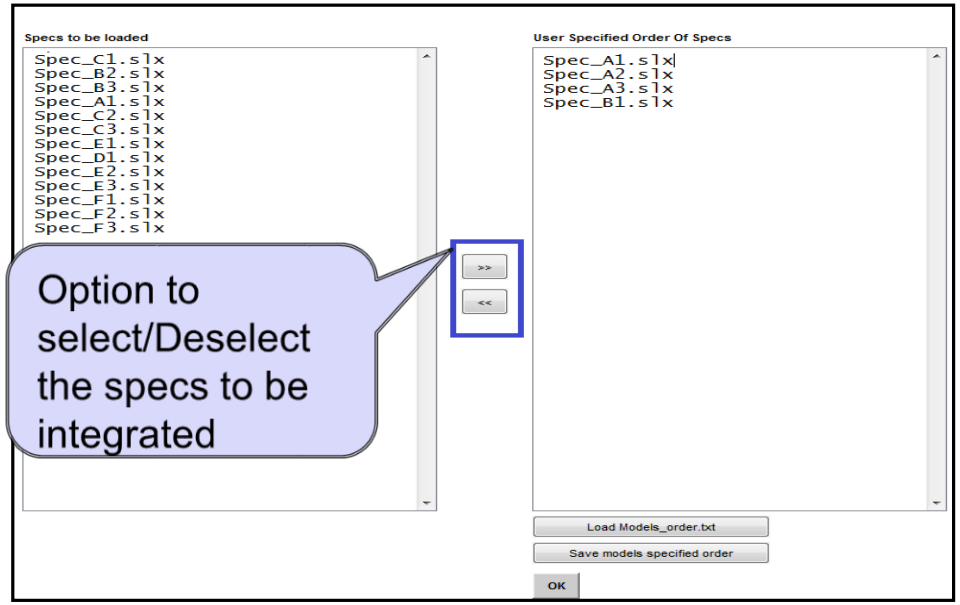
- List of Specs to be Integrated

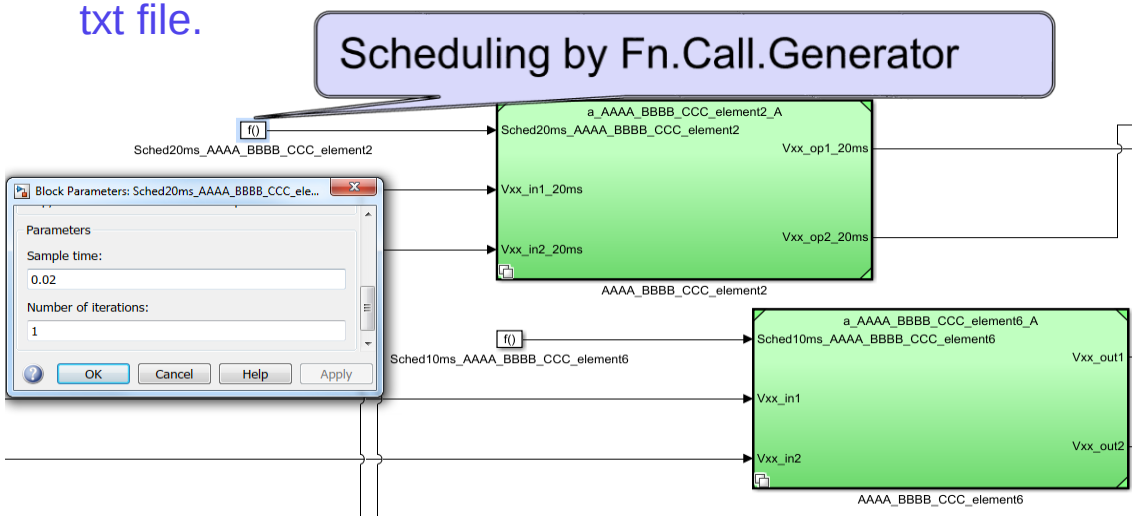
Approach :

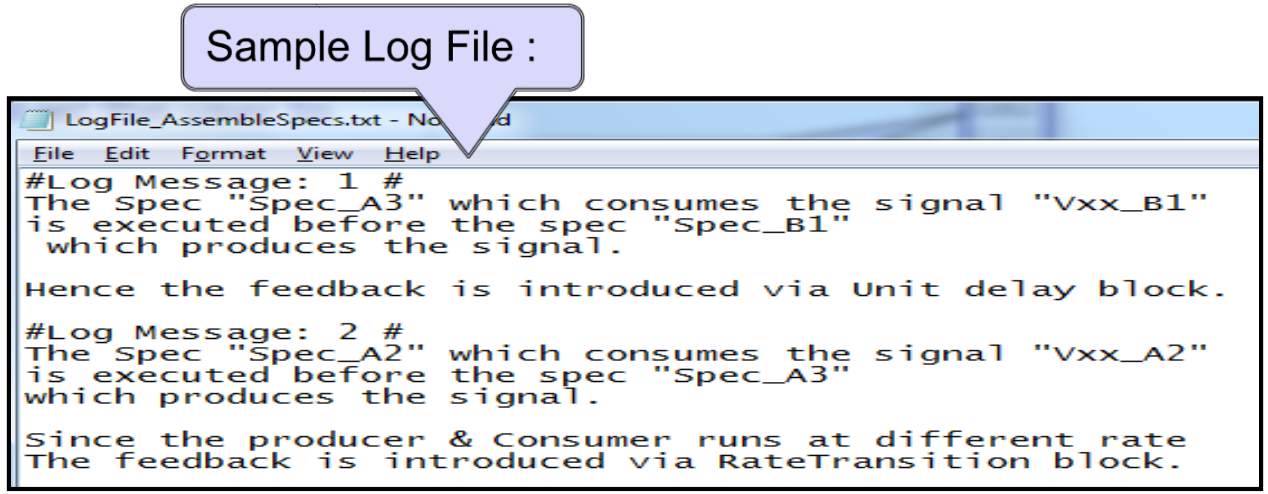
- The GUI to let the user choose the Spec Order
- Automation scripts Identify the Interfaces between the Specs
- Scheduling achieved by Function Call Generators,(SampleTime is taken from the Scheduler Port name).

Outcome:

- Suggestions on ordering the Specs in the form log file.
- The GUI let the user to save the Spec Order in the form of txt file.







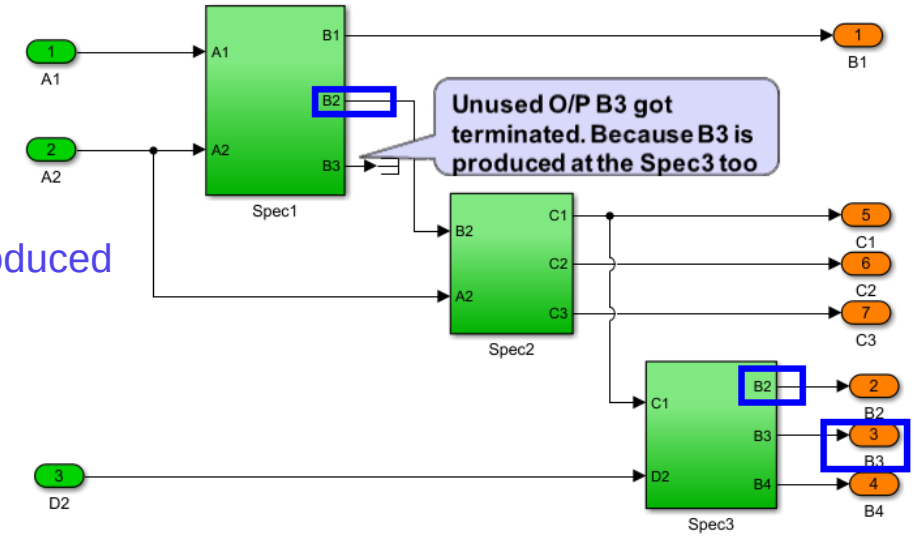
2. Model Integration

Inputs:

- List of Interfaces of each specs

Approach :

- The Tool analyze the Interfaces connect them as per the name of the interfaces.
- Outports are connected from the bottom to top of the specs so that the updated Signal is considered for outport.
- Inports are connected after connecting the outports
- Inports are connected from the bottom to top of the specs
- Unused Output ports Terminated.
- Feedbacks are introduced as per the need
- Incase of different rates of the signals, Rate Transition blocks are introduced



Outcome:

- Specs connected with each other specs

3. Handling Multi Rate

Inputs:

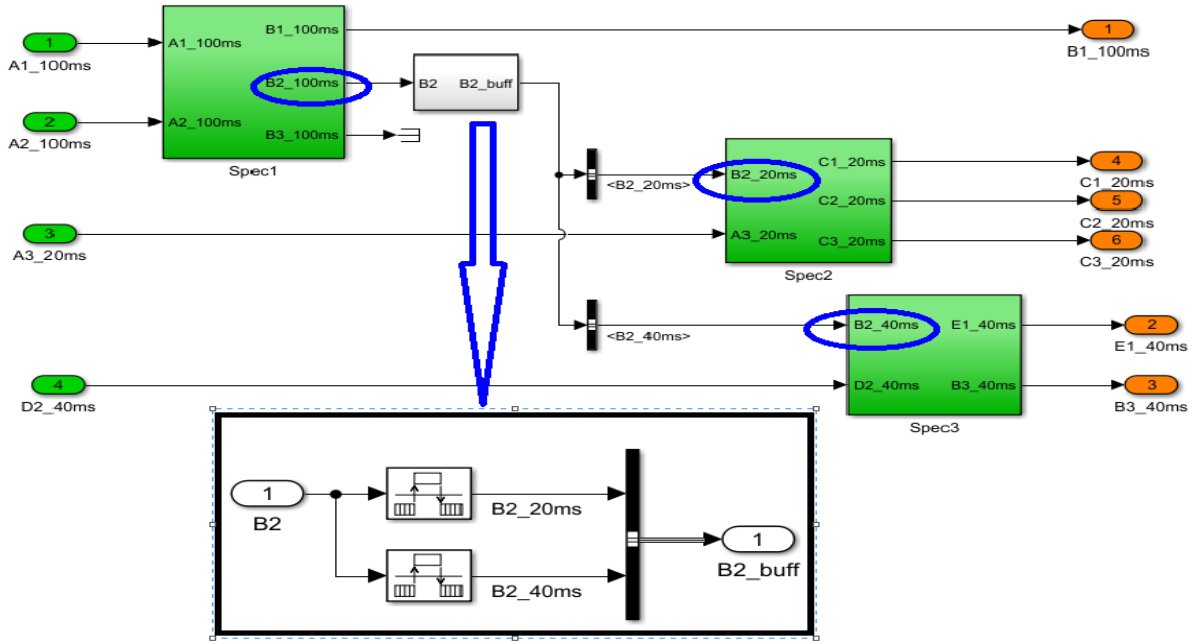
- Interfaces and their sample time

Approach :

- Tool finds the sample time of the Outport and Inport Interfaces
- Rate Transition Blocks inserted with the expected sample time value.

Outcome:

- Automated rate handling achieved between specs.



4. Variant Handling

Inputs:

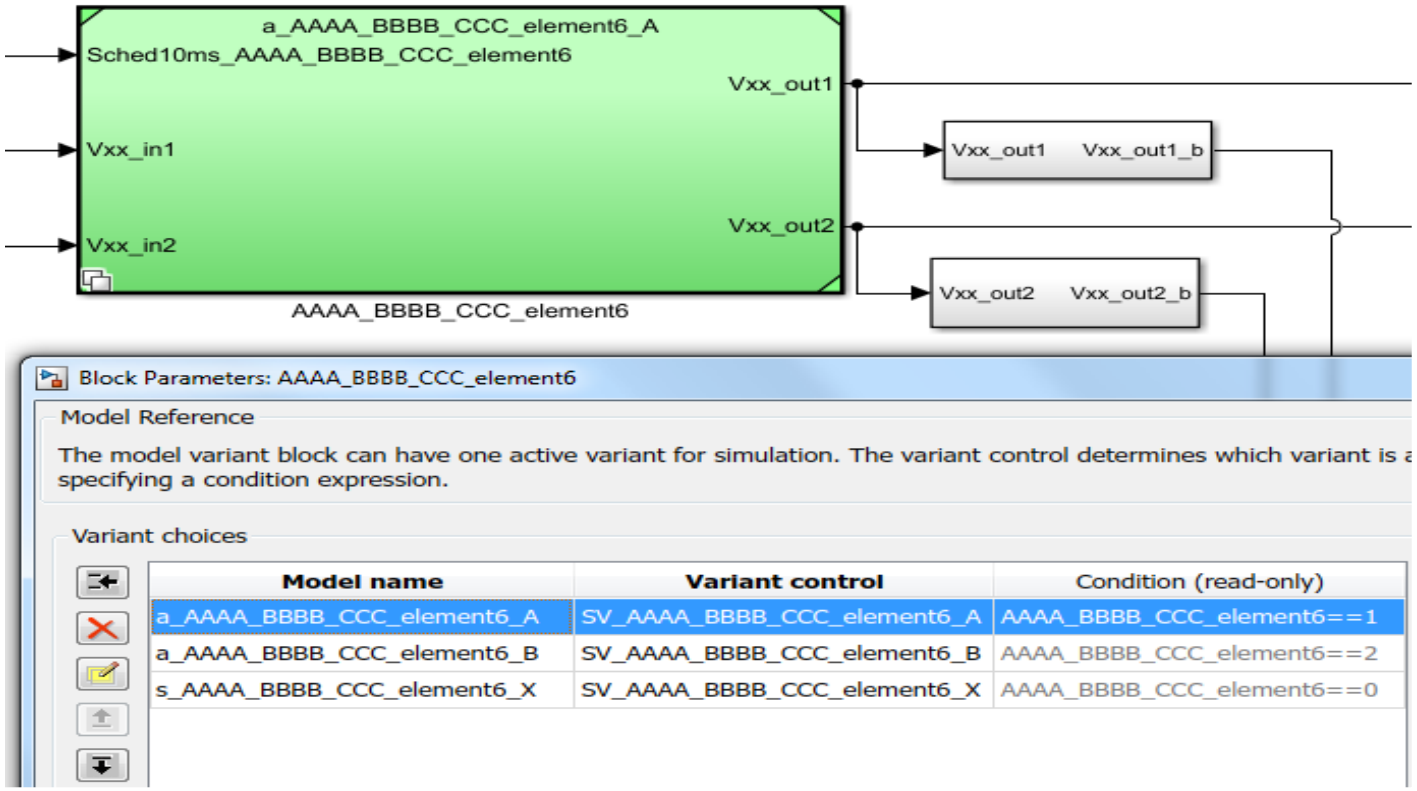
- List of Specs and their corresponding variants
- Simulink.Variant objects for each variant.

Approach :

- Tool loads the Simulink.Variant objects in the base workspace
- Identifies the Variants of the spec
- Setting the variants using the parameter “Variants” of the Model Reference Blocks referring the specs.

Outcome:

- Reusable Integrated model for different variants.



5. Validation

Inputs:

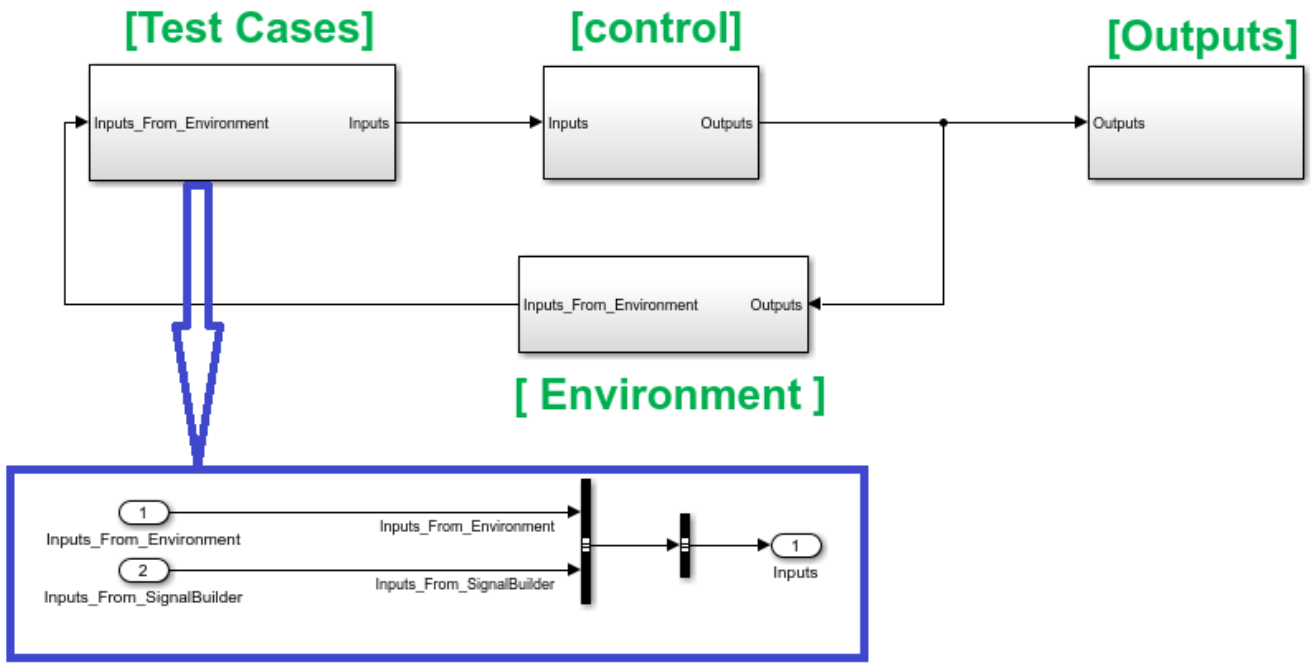
- Test cases in the form of *.mat file.
- Test cases selection Method (To mention the signal is taken from signal builder or from the environment)
- Content of “[Environment]”

Approach:

- Tool converts the Test cases *.mat to Signal Builder
- Based on the Test Case selection Method, The Inputs are feed to the “[Control]”.

Outcome:

- MIL Validation Environment



6. Report Generation

Inputs:

- The Integrated Model with complete MIL setup
- Base workspace loaded with the required data

Approach :

- Tool analyzes the Test Cases & Simulate the test cases one by one and store the results in the workspace
- Workspace data will be read & stored in the excel file as below.
  results are stored in the form of *.mat file too.

Outcome:

- Reports of the simulation results.

	A	B	C	D	E	F
1		Inputs			Outputs	
2	Time	In1	In2	In2	Out1	Out2
3	0.01	3	243	5	23	4
4	0.02	4	143	67	6	765
5	0.03	5	54	546	2	746
6	0.04	6	765	76	12	76
7	0.05	2	746	8	56	657
8	0.06	12	76	9	2	4
9	0.07	45	3	7	343	87
10						
11						
12						
13						
14						
15						
16						
17						

Test_Case_1 | Test_Case_2 | Test_Case_3

Conclusion

- This tool drastically reduced the integration phase
- The full automation of all legacy manual processes as Rate transition, unit delay and prebuild variant handling using model referencing is definitely a big leap forward to achieve the best possible productivity.
- Self-intuitive options provided in the GUI, enable the users get very quickly familiar with the tool
- Powerful integration capabilities and one-click simulation outcome.
- Anticipated Productivity Improvement by 100%
- Anticipated reduction in Rework by 50%

THANK YOU