ProNoC

NoC Simulator
User Manual

Summary

The ProNoC NoC is developed in RTL using Verilog HDL and it can be simulated using Verilator simulator. The ProNoC simulator provides the graphical user interface (GUI) for simulating different NoC configuration under different synthetic traffic patterns.

System Requirements:

You will need a computer system running Linux OS with:

1. Installed the ProNoC GUI software and its dependency packages.
2. Installed Verilator simulator.

For more information about the ProNoC and GNU toolchain installation please refer to the ProNoC system installation file located in `/DoC` folder.

Simulation Example:

In this example we simulate two 8×8 Mesh NoCs, one with fully adaptive routing and another with DoR routing algorithms.

Generate first NoC configuration with XY routing

1. Open `mpsoc/perl_gui` in terminal and run ProNoC GUI application:

```
./ProNoC.pl
```

It should open The GUI interface as illustrated in Figure 1.

2. Click on `NoC Simulator` tab to open simulator GUI interface:

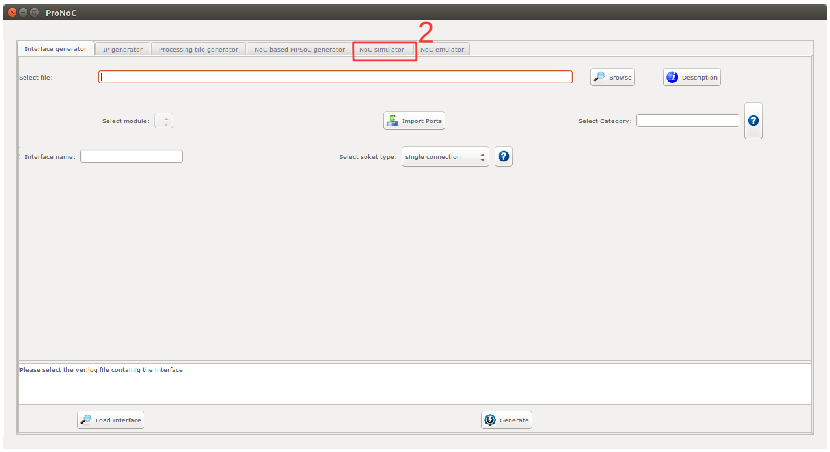

Figure 1

3. Click on `Generate NoC Configuration` tab to open NoC configuration setting page.
4. Change the default NoC parameters as shown in below table:

Parameter name	Value	Parameter	Value
Router Type	”VC_BASED”	Router per row	8
Router per column	8	VC number per port	2
Buffer Flits per VC	4	Payload width	32
Topology	”Mesh”	Routing Algorithm	”xy”
SSA Enable	”NO”		

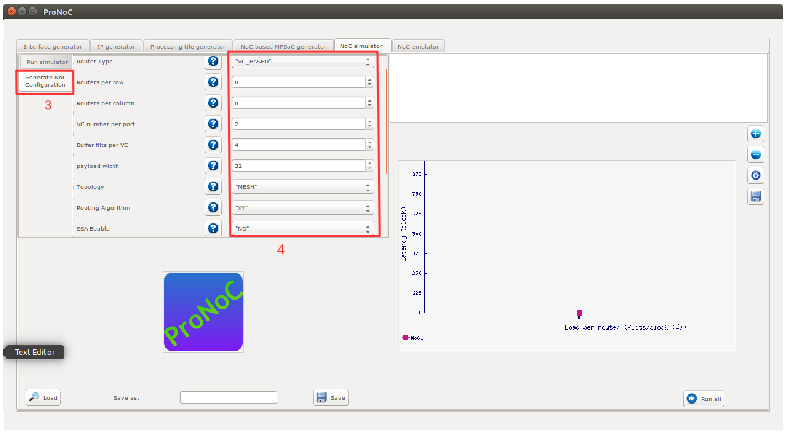

Figure 2

5. Enter a name for this NoC configuration e.g. `mesh_8x8_xy`.
6. Press the generate button.

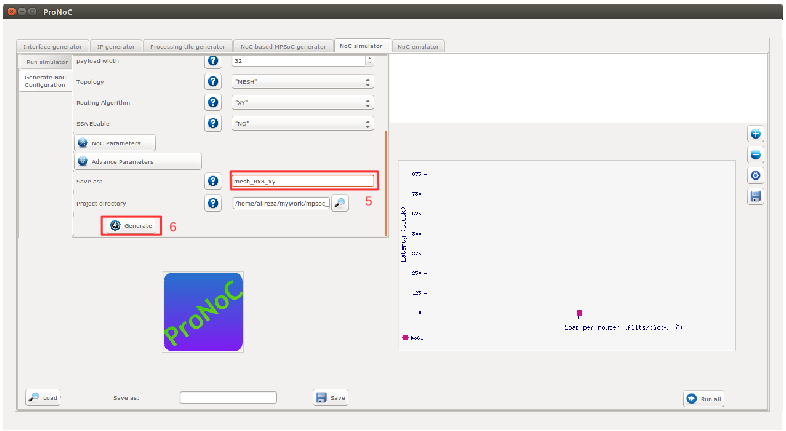

Figure 3

7. This will start Verilator compilation as shown in Figure 4

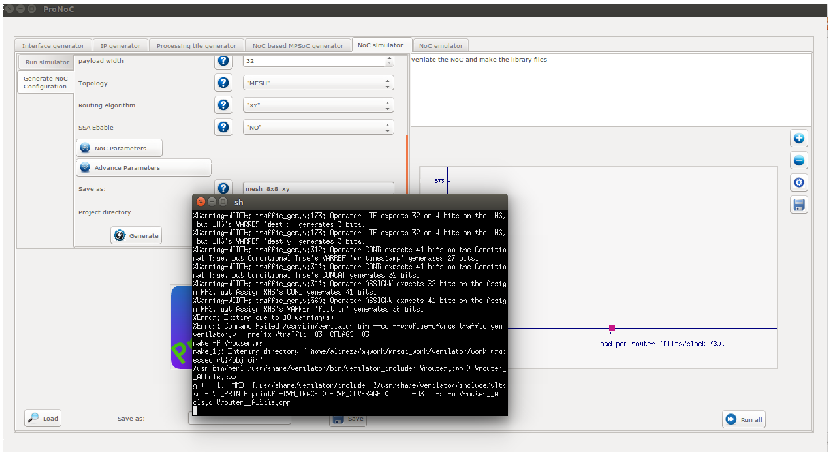

Figure 4

8. If the Verilator compilation is successful the following message must be shown.

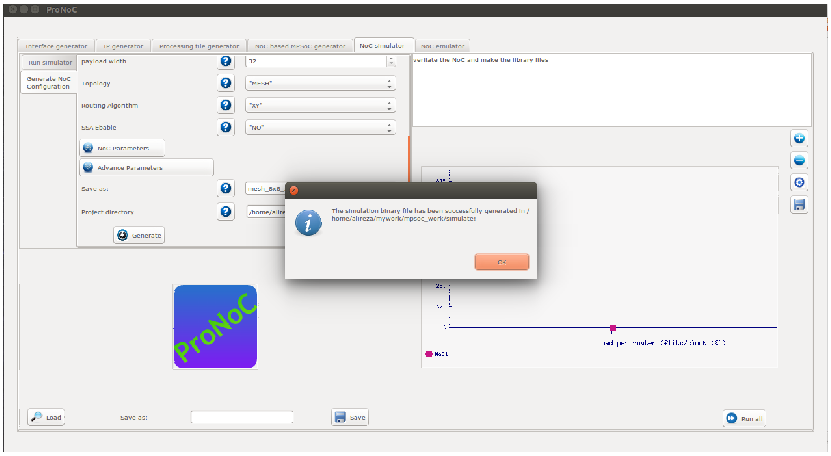

Figure 5

Generate the second NoC configuration with fully adaptive routing

9. In NOC configuration tab Keep the previously set parameters and only change the routing algorithm to ”DUATO”.
10. Enter a new name for this NoC configuration e.g. `mesh8x8_full`.
11. press Generate button and wait for compilation to be done.

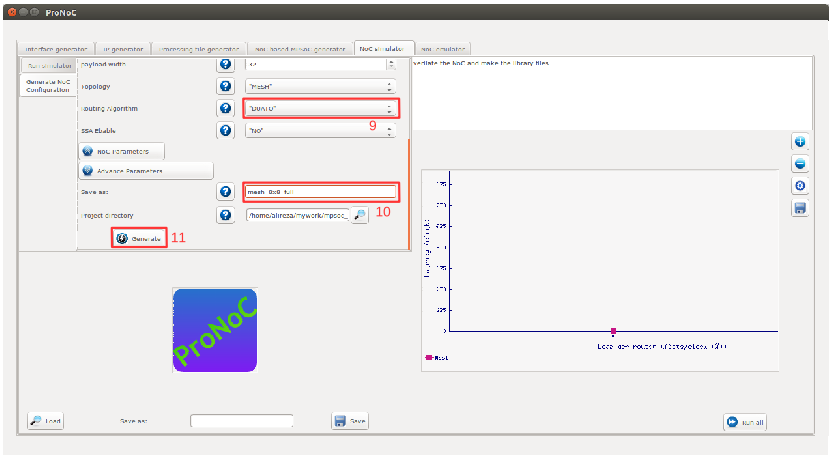

Figure 6

Run simulation under Matrix Transposed traffic pattern

12. Click on `Run simulator` tab.
13. Set `number of simulations` as 2.
14. Click on simulation 1 setting button.

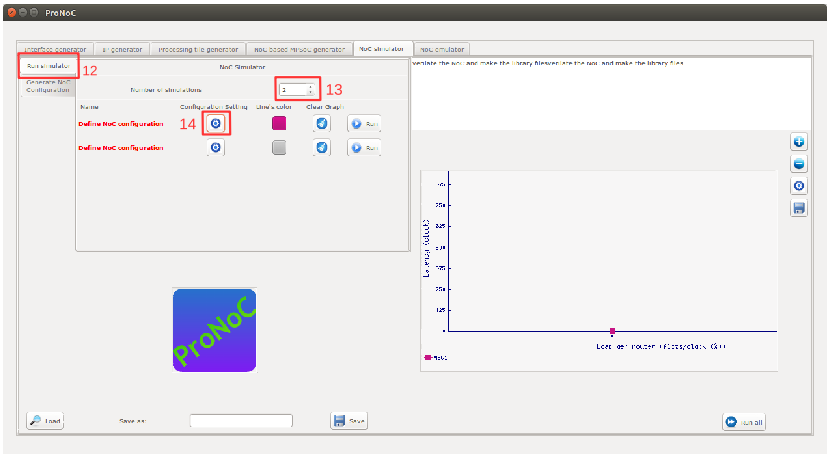

Figure 7

15. On NoC configuration setting window click on search button to select the verilated file.
16. Select `mesh_8x8_xy`.

17. Enter a name for this NoC configuration e.g `mesh_xy`. This name will be shown in NoC simulation graph legend.

18. Select `transposed 2` as network traffic pattern.

19. Enter flit injection rations and then press OK. You can define individual ratios seprating by comma (',') or define a range of injection ratios with `[min]:[max]:[step]` format.

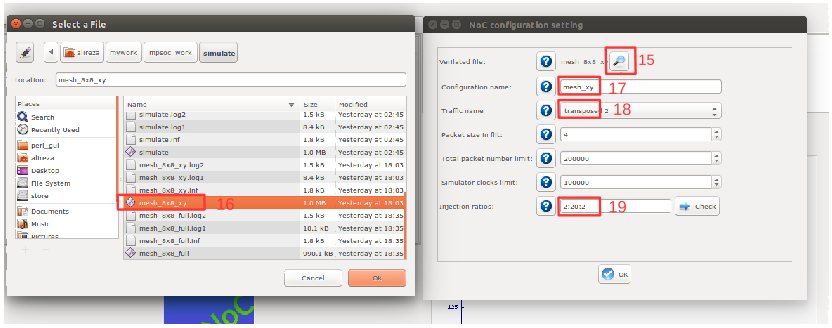

Figure 8

* Note that you can also add more injections ratios later. Each time you run the simulation the simulation results of new injection ratios are added to the previously plotted results.

20. Now click on second simulation setting button.

21. Select the `mesh_8x8_full` as the verilated file and fill the rest of NoC configuration as shown bellow:

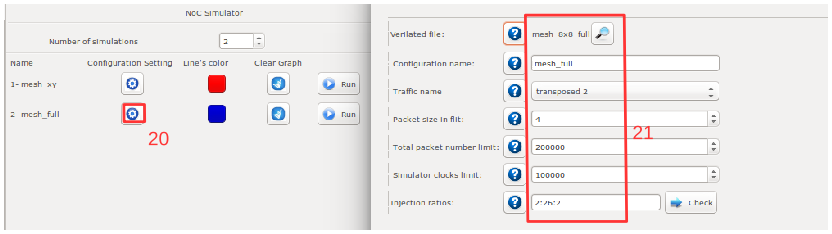

Figure 9

22. Save the simulation. You can save the simulation at any time during run time. Hence, later you can continue the rest of simulation.

23. To start the simulation press `Run all` button. You can also run each individual simulation by pressing the run button in its simulation row.

24. After the simulation is done, if your graph is not yet completed you can enter a new injection ratio range and press the run key again.

25. You can edit the generated graph and then save it from graph editing toolbox. By saving the simulation graph, the exact values of simulations also will be saved in a text file alongside with generated graph.

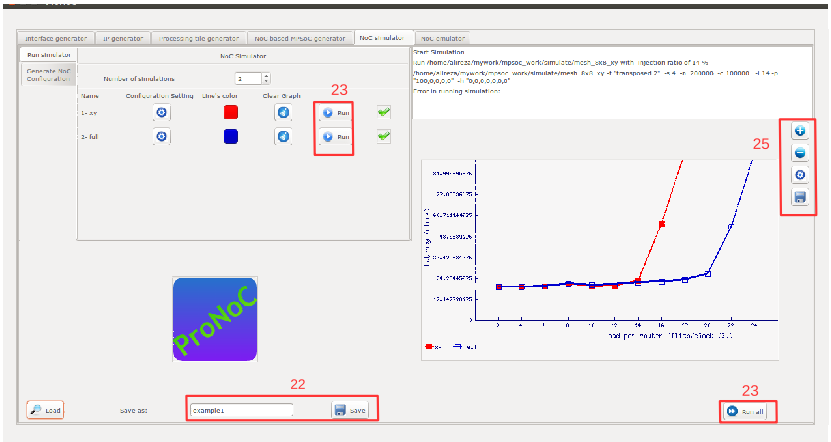

Figure 10

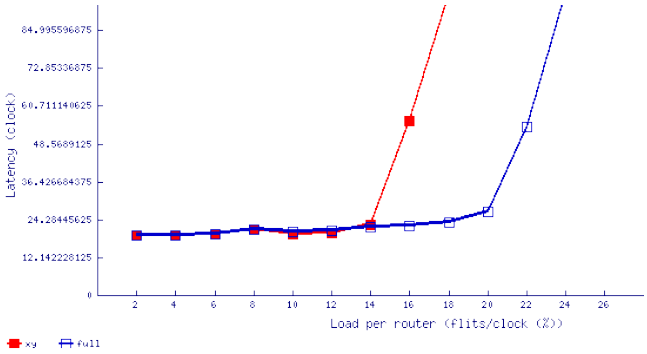

Figure 11: simulation graph output