Code Description

Quick & dirty Simulation

1. Open the terminal shell

2. Go to the **NocSim/cmake-build-debug**

3. Compile and run the project.

   cmake ..

   make

   ./NocSim

Configuration

Here we list the key parameters used in the simulation

mesh_dim_x & mesh_dim_y: Dimensional Parameters. Note that x must be equal to y due to the ring topology.

injection_rate: From 0 to 1

method_size_generator: Choose the way to generate packets. 0–>Random generator 1–>Customized generator. If customized generator, the field, packet_ratio, needs to be filled in.

sim_time: Period for run-time simulation

sim_warmup: Period for warmup. Warmup must be smaller than run-time simulation.

Directory Structure

Source Code:

src/ConfigureManager.cpp: Read Parameters from the Yaml file

src/ExbManager.cpp: Functions of Extension Buffers, including initialization, pop, and push

src/Flit.cpp: Packet and flit class definition

src/GlobalParameter.cpp: The file name has told you everything

src/Injection.cpp: Injection Module. Inject data and control packets. Interruption Enable of Disable

src/KnuthRng.c,KnuthRngDouble.c: Random number generator coded by D E Knuth.

src/Noc.cpp: Abstract class for NoC. Schedule the whole system

scr/Node.cpp: Node class definition. Simulate the network interface's activity.

src/Ring.cpp: Ring class definition. Drive on-ring packets to destinations

src/Traffic.cpp: 4 types of synthetic traffic patterns

src/ringalgorithm: Rlrec Algorithm Implementation

Configuration File:

configure/configure.yaml: Input files for the simulator. **Please note that the file name should be 'configure.yaml'.**(It's fixed.)

configure/validate_uniform.yaml,validate_transpose.yaml,validate_bitreverse.yaml, validate_hotspot.yaml: These 4 files are used in the validation experiments mentioned in the dissertation for your convenience. What you should do: Change the name to 'configure.yaml', open the file and change the injection rate according to the experiment, and run to get results.

configure/avg_uniform.yaml,avg_transpose.yaml,avg_bitreverse.yaml,avg_hotspot.yaml: Used in the avg experiment. Similar to the file 'validate_uniform.yaml', Change the name to 'configure.yaml', open the file and change the injection rate according to the experiment, and run to get results.

Log File:

log: The directory where results are stored

Raw Data of experiments shown in the dissertation:

Experiment Results/Ejection Link and EXB Size: Results for the selection of ejection links and EXB size. Corresponding Section: 4.1.2

Experiment Results/Synthetic Traffic Pattern Experiments: Compare with Book-Sim2 and validate our simulator. Corresponding Section: 4.22

Experiment Results/Max&Avg: Comparison for EXB with max size and average size. Corresponding Section: 4.3.2

lib/plog: Third-party library for logging. Github URL: https://github.com/SergiusTheBest/plog

lib/yaml-cpp: Third-party library for manipulating yaml files. Github URL: https://github.com/jbeder/yaml-cpp

Example of Output & Explanation

2021-03-28 11:28:50.031 INFO Warmup Cycle: 10000

2021-03-28 11:28:50.031 INFO Simulation Cycle: 100000

2021-03-28 11:28:50.031 INFO Injection Rate: 0.005

2021-03-28 11:28:50.031 INFO Traffic Type: Uniform

2021-03-28 11:28:50.031 INFO Packet Size: Customize

\\ Two types of packet: Customize and Random. Customize allows you define length of packet and its weight(possibility). eg. We can set 3 flits with 10 weights, and 4 flits with 20 weights. The possibility of 3 flits per packet is $\frac{1}{3}$ Another is Random, which is controlled by two parameters: short_packet_size and long_packet_size. The range of random is [short_packet_size, long_packet_size]

2021-03-28 11:28:50.031 INFO EXB Strategy: Max

2021-03-28 11:28:50.031 INFO Routing Strategy: Shortest

\\ We only support this routing strategy now.

2021-03-28 11:29:23.139 INFO

Number of Packet sent during warm up phrase: 665

Number of Packet sent during sim phrase: 6432

Total Warm up cycle: 10000

Total Sim cycle 100000

Received Flit: 32165

Received Packet: 6433

Max Flit Delay: 27

Max Packet Delay: 27

Packet ID of Max Packet Delay: 6796

Flit Throughput: 0.00510556

Packet Throughput: 0.00102111

Average Flit Latency: 9.46572

Average Packet Latency: 11.4657

2021-03-28 11:29:23.140 INFO UnReceived Packet 0

\\ UnReceived Packet is the number of on-ring packets plus the number of packets in injection queues after simulation ends. This value tells you whether the network is busy during the simulation. More unreceived packets means more queued packets or on-ring packets. But in practice, the number of on-ring packets slightly fluctuates, while queued packets increase violently.