1. Project title

Efficient execution of MapReduce applications on irregular NoC topology

2. Team name

HAMM

3. Problem to be addressed

Hard faults in a network on chip (NoC) interconnect can cause links to break, creating an irregular network topology and potential bottlenecks. Since MapReduce applications create considerable network traffic they are sensitive to the network topology. Nodes communicating on congested links will experience communication delays causing them to finish later than well connected nodes. For example, in figure 1, each node in the regular topology (left) completes the mapping phase of MapReduce at approximately the same time. Conversely, nodes 2, 5, and 8 in the irregular topology (right), might finish much later than other nodes when given the same number of jobs. The overall execution time depends on the node that finishes last. As a result, the total execution time will be prolonged by the slow node.
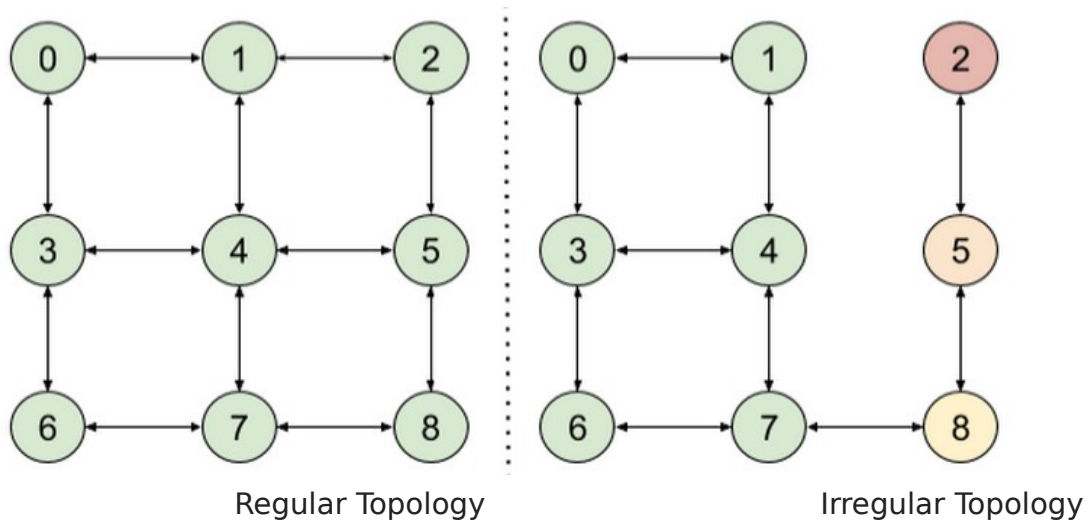

Regular Topology   Irregular Topology

Figure 1. Regular versus Irregular topology

4. Current Progress
1. Fixed word count application.
2. Created configuration files for Garnet to model various broken mesh network topologies.

5. Issues

       We are running into issues simulating multi threaded workloads on gem5. Even though we compiled the phoenix++ test cases using m5threads only 2 cores showed activity when running either k-means or word count.