Danilo Zelenovic

COE838 Project

SystemC based NoC Modeling Course Project

For this project, a NoC is to be modelled using SystemC. The system will consist of routers and Ips. Interconnection structure will be defined as mesh, torus, or hypercube. Using the provided simple mesh design, a more practical NoC model will be specified. The NoC simulator is divided into multiple modules, each being a component. It consists of the source module, a receiver module, as well as a router. Ports and processes exist throughout. These are to enable communication between modules. The source will produce random packets. A specific message structure will be used. The structure of the packets is defined in the manual. For the sake of keeping the project summary brief, as required, many details will be kept short.

The source module has input and output signals. The output port will be connected to the router. This will be used to send packets. Inputs are used to identify modules inside the NoC. Another signal is also to accept acknowledgement signals. Clk will be, as guessed, the clock signal, for synchronization. The signal will be positive edge sensitive. Next, the sink accepts packets from the router, and sends an acknowledgement. It Is also in charge of recording amount of time as well as the number of flits. The router accepts packets, and routes them to the sink. It contains multiple sub-modules. It will accept packets and acknowledgment signals, the clock signal and then transfers the packets. The arbiter module handles methods. It checks if output ports are busy, and if not, enables them to be used to output from that port. The FIFO buffer module has 3 input ports. When a write event occurs, the packet is stored at the tail of the buffer. The grant signal is checked, and if given, it will be sent to the crossbar module. The crossbar switch module reads the address of the output port and sends packet via that port. The main file includes all modules, with all the lower-level modules instantiated. The signals must be declared as well. It can also be used to create a trace file to test if simulation is working as intended.

What will need to be done for the project is to understand the provided code and answer questions regarding it. After that, a 4x4 NoC will need to be designed and tested by generating various communication patterns. The communication patterns are provided in the manual. A bonus may also be done where the design is altered to a 4x4 torus topology.