

Topic: Network on Chip

1. Assume a 4X4 mesh NoC (nodes are numbered from 0 to 15) where Source Node 4 sends a request packet to Destination Node 14. If minimal adaptive odd-even routing is used to route the NoC packets, how many possible routes are available from Source Node to Destination Node.
(A) Only One
(B) Two
(C) Three
(D) Four
2. An NoC router does the following functions: VA: Virtual Channel Allocation, RC: Route Computation, BW: Buffer Write, ST: Switch Traversal, SA: Switch Allocation. If '<' denotes the relation happens before, which one of the following is FALSE?
(A) BW<RC
(B) ST<BW
(C) RC<VA
(D) RC<ST
3. In an NoC, which of the following techniques eliminates the head of line blocking problem?
(A) by using virtual channel flow control
(B) by modifying input selection strategy
(C) by using radial mapping
(D) by implementing odd even routing
4. Which one of the following statements is FALSE?
(A) XY routing is minimal and always deadlock free.
(B) East first routing can be non-minimal.
(C) North last routing is deadlock free.
(D) Odd even routing is adaptive but not deadlock free.

5. In an NoC, following are the functions performed by a router in order to forward the received flit to an appropriate output port.

- I. Route Computation
- II. Buffering of Flits
- III. Switch Allocation
- IV. VC Allocation
- V. Switch Traversal
- VI. Link Traversal

Which of the following is the correct sequence of the functions performed?

- (A) I-II-III-IV-V-VI
- (B) II-I-IV-III-V-VI
- (C) II-I-III-IV-V-VI
- (D) V-II-I-IV-III-VI

6. Which of the following NoC routing mechanism considers the network statistics before performing routing operation for the received flit?

- (A) Oblivious Routing
- (B) X-Y Routing
- (C) Adaptive Routing
- (D) Synthetic Routing

7. A In a 4x4 2D mesh NoC that follows XY routing, which of the following statements are TRUE?

(Hint: core numbering starts from bottom left corner as 0 to top right corner as 15.)

- I. A packet from router 1 will reach router 9 in two hops.
- II. Router 4 is the north neighbor of router 3.
- III. Routers 11 and 15 are direct neighbors.
- IV. Router 6 does not have a south neighbor.

- (A) II and III only
- (B) II and IV only
- (C) I and III only
- (D) I and IV only

8. Consider a TCMP system with a 4x4 mesh NoC where each tile consists of a superscalar processor a private L1 cache and a shared distributed L2 cache. Let T0, T1, T2... ,T15 corresponds to the tiles where T0 is the bottom left tile and T15 the top right tile. Each tile has a 32 KB direct mapped private L1 cache with a block size of 64 bytes. A total of 8 MB of L2 cache is shared and distributed across all the tiles as per SNUCA policy. The block size of L2

cache is 128 bytes and the associativity is 16. Each L2 cache slice on chip has all the 16 ways of the sets assigned to it. The L2 cache memory per tile division is such that total sets in L2 cache are uniformly partitioned across tiles in a sequential fashion. The system uses a 32-bit physical address. Tile T10 generated an L1 cache miss for the address 0xABC89234. Which tile has the mapping of L2 cache set that corresponds to the above address?

- (A) T10
- (B) T13
- (C) T1
- (D) T4

9. In a 5x5, 2D-mesh network on chip, the number of routers in the network that are directly connected to four other routers as well as to local tile is ____.
10. Consider a 16-core TCMP machine in which cores are organized as regular square mesh topology. The system follows minimal north last routing. How many unique minimal paths are there from 11 to 4? (*Hint: Core numbering starts from bottom left corner as 0 to top right corner as 15.*)