

AGBOOLA ABIOLA  
17/SCI01/007  
COMPUTER SCIENCE  
CSC310

### **ASSIGNMENT**

Explain the following Interconnection networks:

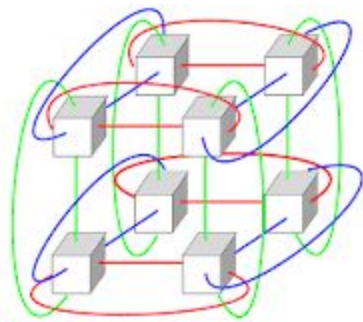
1. Torus
2. Hypercube Interconnection Network

### **ANSWERS**

**1.** A torus interconnect is a switch-less network topology for connecting processing nodes in a parallel computer system. It can be visualized as a mesh interconnect with nodes arranged in a rectilinear array of  $N = 2, 3,$  or more dimensions, with processors connected to their nearest neighbors, and corresponding processors on opposite edges of the array connected.

A Torus interconnect has a rich topology with many paths between any pair of nodes in the system. This configuration allows the addition of nodes to a system without degrading performance. Each new node is joined as an addition of a grid, linked to it with no extensive cabling or switches. It scales linearly, with little or no performance loss is strictly true for those problems that heavily rely on next neighbor communication.

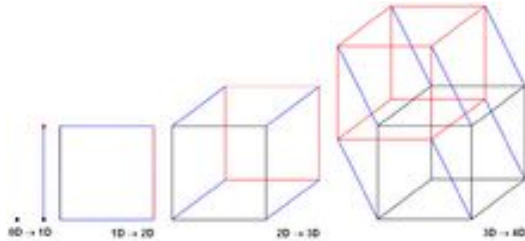
The addition of a node in a large system happens with much less working and potential he addition of a node in a large system happens with much less working and potential troubles. Being the connections between nodes short and direct, the latency of the links is very low.



**Diagram of a 3-dimensional [torus](#) interconnect. It is not limited to 8 nodes but can consist of any number of nodes in a similar rectilinear array.**

**2.** Hypercube networks are a type of network topology used to connect multiple processors with memory modules and accurately route data. Hypercube networks consist of  $2^m$  nodes. These nodes form the vertices of squares to create an internetwork connection.

A hypercube is basically a multidimensional mesh network with two nodes in each dimension. Due to similarity, such topologies are usually grouped into a k-ary d-dimensional mesh topology family where d represents the number of dimensions and k represents the number of nodes in each dimension. Hypercube interconnection network is formed by connecting N nodes that can be expressed as a power of 2.



**Different hypercubes for varying number of nodes**