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**CSC 310**

**ASSIGNMENT**

1. **THE CROSSBAR NETWORK**

Crossbar networks allow any processor in the system to connect to any other processor or memory unit so that many processors can communicate simultaneously without contention. A new connection can be established at any time as long as the requested input and output ports are free. Crossbar networks are used in the design of high-performance small-scale multiprocessors, in the design of routers for direct networks, and as basic components in the design of large-scale indirect networks. A crossbar can be defined as a switching network with N inputs and M outputs, which allows up to min{N, M} one-to-one interconnections without contention.

1. **CUBE INTERCONNECTION NETWORK**

It's a 3 dimensional interconnection network. In Cube PEs are organized in a cube structure. An n-cube network, also called hypercube, consists of N =2n nodes; n is called the dimension of the n-cube network. When the node addresses are considered as the corners of an n dimensional cube, the network connects each node to its n neighbors. In an n-cube, individual nodes are uniquely identified by n-bit addresses ranging from 0 to N-1. Given a node with binary address d, this node is connected to all nodes whose binary addresses differ from d in exactly 1 bit.

1. **FAT TREE CONNECTION**

The fat tree network is a universal network for provably efficient communication. It was invented by Charles E. Leiserson of the Massachusetts Institute of Technology in 1985.

In a tree data structure, every branch has the same thickness, regardless of their place in the hierarchy—they are all "skinny" (skinny in this context means low-bandwidth). In a fat tree, branches nearer the top of the hierarchy are "fatter" (thicker) than branches further down the hierarchy. In a telecommunications network, the branches are data links; the varied thickness (bandwidth) of the data links allows for more efficient and technology-specific use.