Abiola's ass

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 interconnectionswithout contention. Figure 1.9 shows an N × Mcrossbar network. Usually, M = N except for crossbars connecting processors and memory modules.

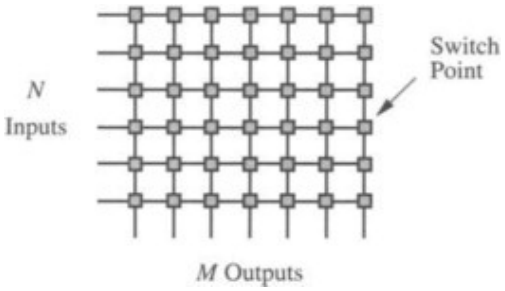
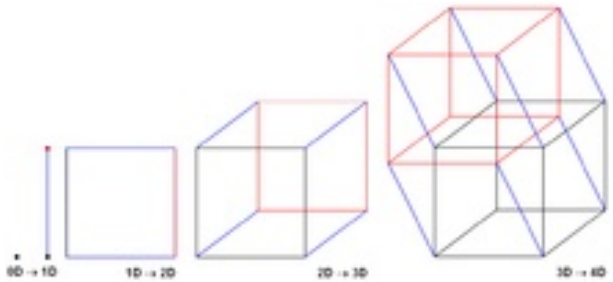
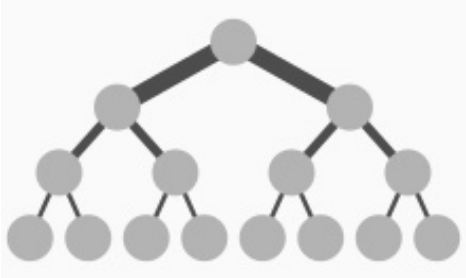


Fig 1.9

Hypercube networks are a type of network topologyused to connect multiple processors with memory modules and accurately route data. Hypercube networks consist of 2m 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.



Different hypercubes for varying number of nodes



A fat tree interconnection network

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.

Mesh and hypercube topologies have communication requirements that follow a rigid algorithm, and cannot be tailored to specific packaging technologies.