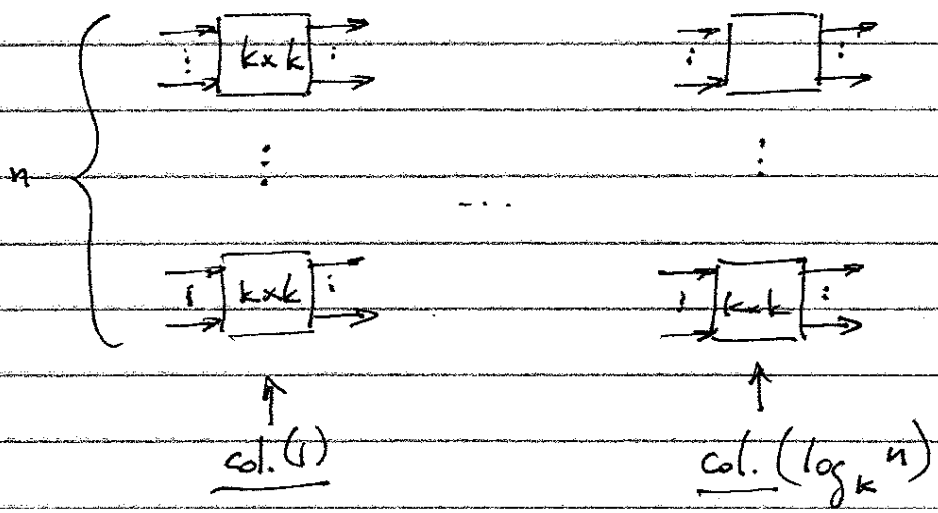
INTERCONNECTION NETWORKS

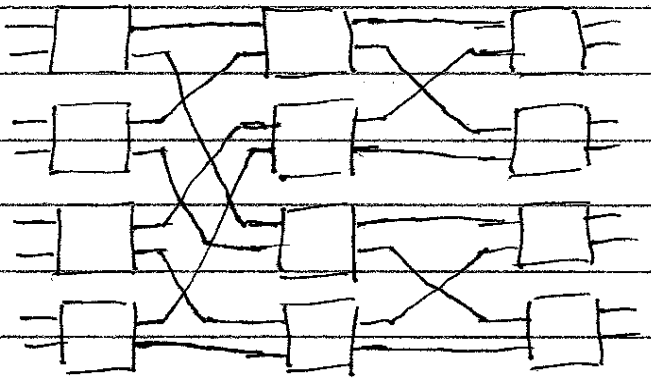
Type	Cost	Latency	Contention
Bus	$O(n)$	1	Worst
Full crossbar	$O(n^2)$	1	Best
Omega Network	$nk \log_k n$	$O(\log_k n)$	
TREE	$O(n)$	$O(\log_2 n)$	
HYPERCUBE	$O(n \log n)$	$O(\log n)$	
RING	$O(n)$	$O(n)$	
MESH	$O(n)$	$O(\sqrt{n})$	

More Detail, Omega Network

* Omega Network (Duncan Lawrie, UIUC)



Example : $n = 8$, $k = 2$



* Banyan Tree (G. Jack Lipovski, UT)

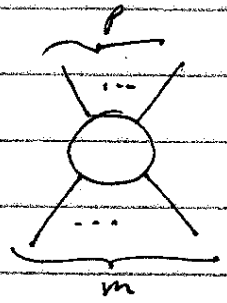
l = # of levels of switches

p = # of connections on processor side

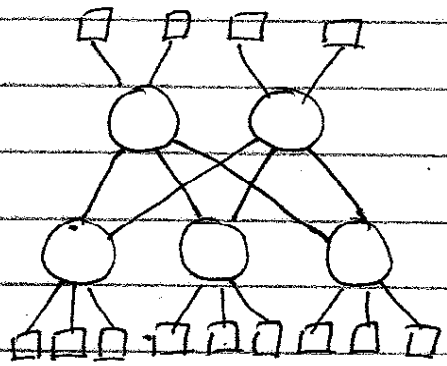
m = # of connections on memory side

BANYAN TREE (CONTINUED)

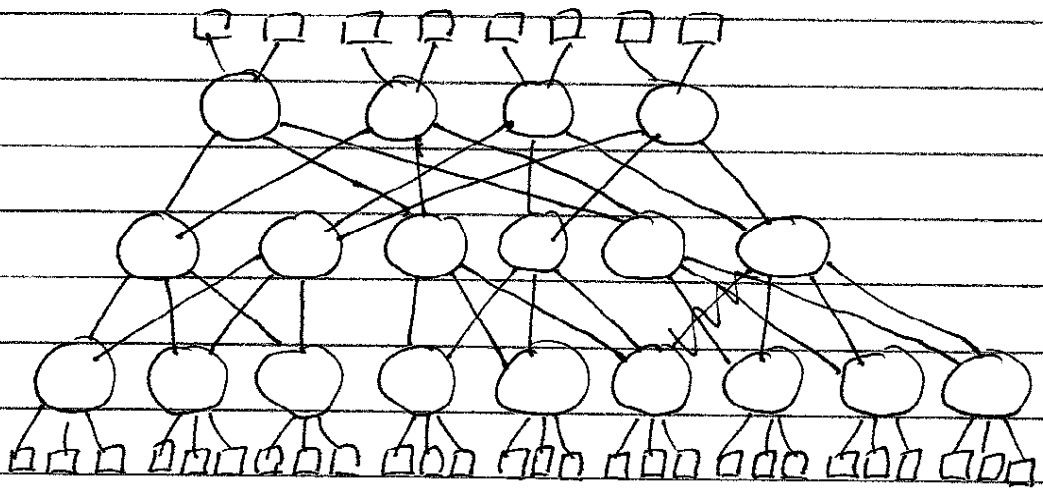
A SWITCH :



EXAMPLE: $l = 2$, $p = 2$, $m = 3$

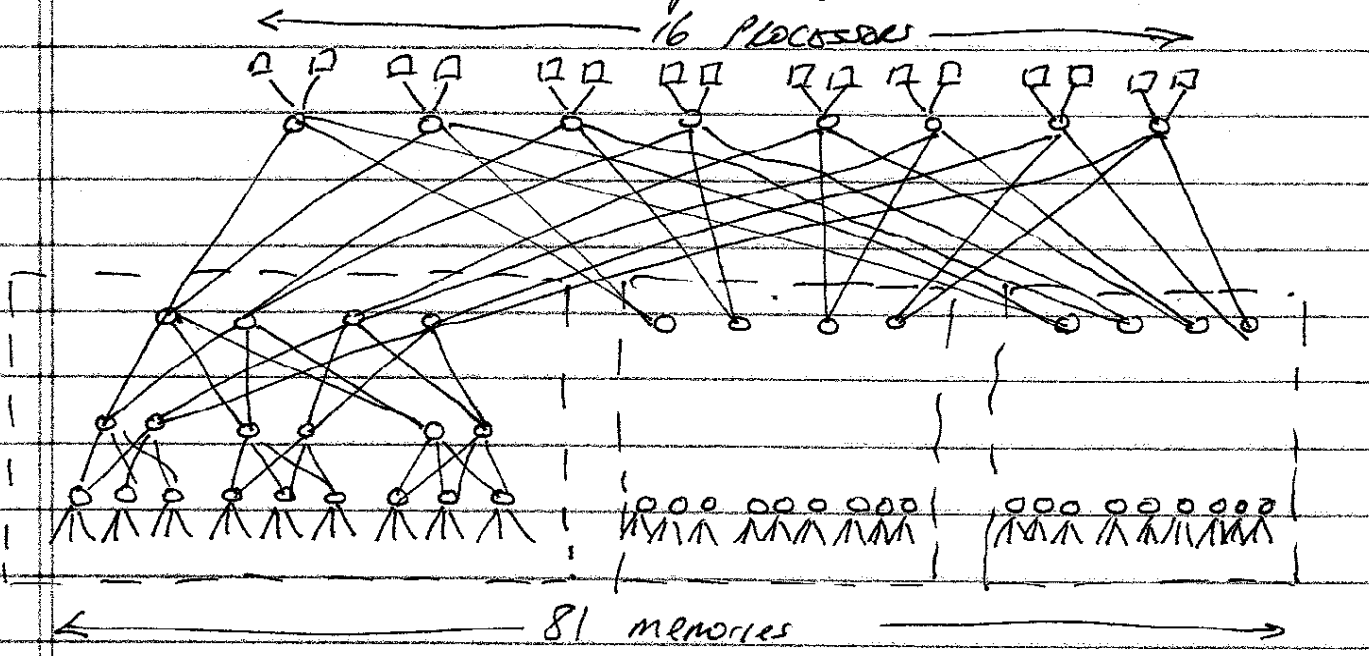


EXAMPLE: $l = 3$, $p = 2$, $m = 3$



BANYAN TREE (CONT.)

EXAMPLE: $l = 4$, $p = 2$, $m = 3$



NOTE: p^l PROCESSORS, m^l MEMORIES

Level 1 SWITCHES: p^{l-1}

" 2 " : $m \cdot p^{l-2}$

" 3 " : $m^2 \cdot p^{l-3}$

⋮

" l " : m^{l-1}

NOTE: FOR BOTH OMEGA AND BANYAN:

A UNIQUE PATH FROM EACH TO EACH.

Omega Networks (Bonus Example)