EE 7725 Homework 2 Due: 4 November 1996

Problem 1: Show the forward- and reverse-path descriptors for cell $\langle x, i \rangle$ in each of the following networks, all of which use $m \times m$ cells:

- Omega Network
- Recursive Omega Network
- Double Shuffle Network
- Butterfly Network

Show each as a pair of lists *in terms of the cell number.* For example the solution for the baseline network is forward path, $i_{(n-2)}, i_{(n-3)}, \ldots, i_{(n-x-1)}$;
reverse path, $i_{(n-x-2)}, i_{(n-x-3)}, \ldots, i_{(0)}$.

Omega forward path:

$i_{(x-1)}, i_{(x-2)}, \ldots, i_{(0)}$

Omega reverse path:

$i_{(n-2)}, i_{(n-3)}, \ldots, i_{(x+1)}, i_{(x)}$

Recursive omega forward path:

$i_{(n-2)}, i_{(n-3)}, \ldots, i_{(n-x-1)}$

Recursive omega reverse path:

$i_{(n-x-2)}, i_{(n-x-3)}, \ldots, i_{(0)}$

Double shuffle forward path:

$i_{(2x-1)}, i_{(2x-3)}, \ldots, i_{(1)}$ for $x \leq (n-3)/2$.

$i_{(2x-n-1)}, i_{(2x-n-3)}, \ldots, i_{(0)}, i_{(n-2)}, i_{(n-4)}, \ldots, i_{(2x-n+2)}, i_{(2x-n)}, i_{(2x-n-2)}, \ldots, i_{(1)}$ for $x > (n-3)/2$.

Double shuffle reverse path:

$i_{(n-3)}, i_{(n-5)}, \ldots, i_{(2x+2)}, i_{(2x)}, \ldots, i_{(2)}, i_{(0)}, i_{(n-2)}, \ldots, i_{(2x+5)}, i_{(2x+3)}, i_{(2x+1)}$ for $x \leq (n-3)/2$.

$i_{(n-3)}, i_{(n-5)}, \ldots, i_{(2x-n+3)}, i_{(2x-n+1)}$ for $x > (n-3)/2$.

Butterfly forward path:

$i_{(n-2)}, i_{(n-3)}, \ldots, i_{(n-x-1)}$

Butterfly reverse path:

$i_{(n-x-2)}, i_{(n-x-3)}, \ldots, i_{(0)}$