2.3 Improving the Data Layout

One efficient data placement which minimizes the communication requirements is to use different data layouts so that all compare-exchange operations execute locally.

Since under a cyclic layout the first k steps of the stage $\lg n + k$ are completely local, we can reduce the communication requirements by periodically remapping the data from a blocked layout to a cyclic layout and vice versa. This approach was first suggested in [CKP+93, CDMS94] and used for efficient implementations of parallel algorithms based on the butterfly network such as FFT [CKP+93] or bitonic sort [CDMS94].

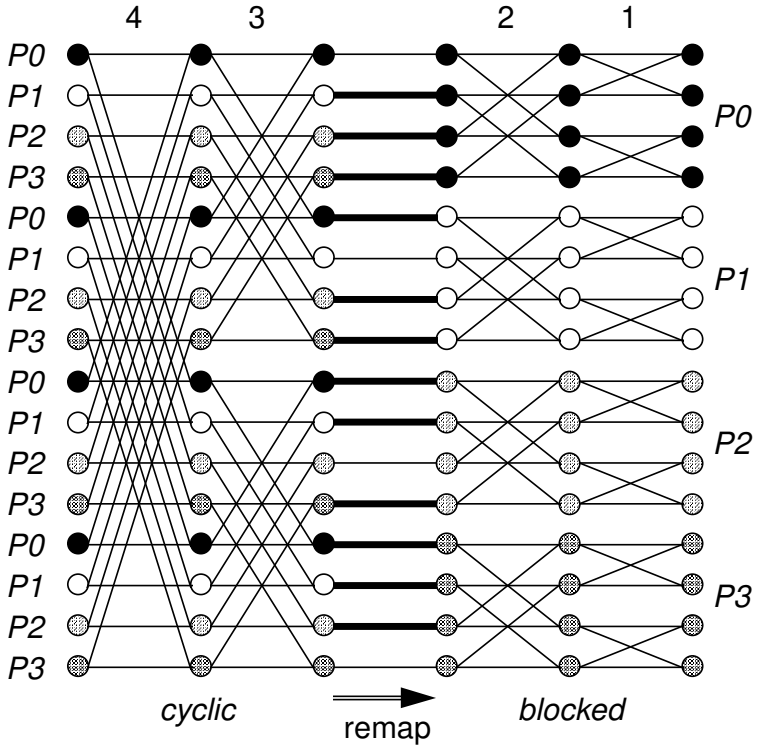

Figure 2.7: *Remap from a cyclic to a blocked layout ($N = 16$ nodes, $P = 4$ processors). Thick arcs highlight where communication occurs, normal arcs indicate local accesses.*

Under this remapping strategy the algorithm starts with a blocked layout. There-