Given the structure of the bitonic merger, the total number of sorting elements of a bitonic sorting network is simply

$$S_N = \frac{N}{4}[\log_2^2 N + \log_2 N]$$

and all the I/O paths in a bitonic sorting network cross the same number of elements s_N given by Equation 2.4.

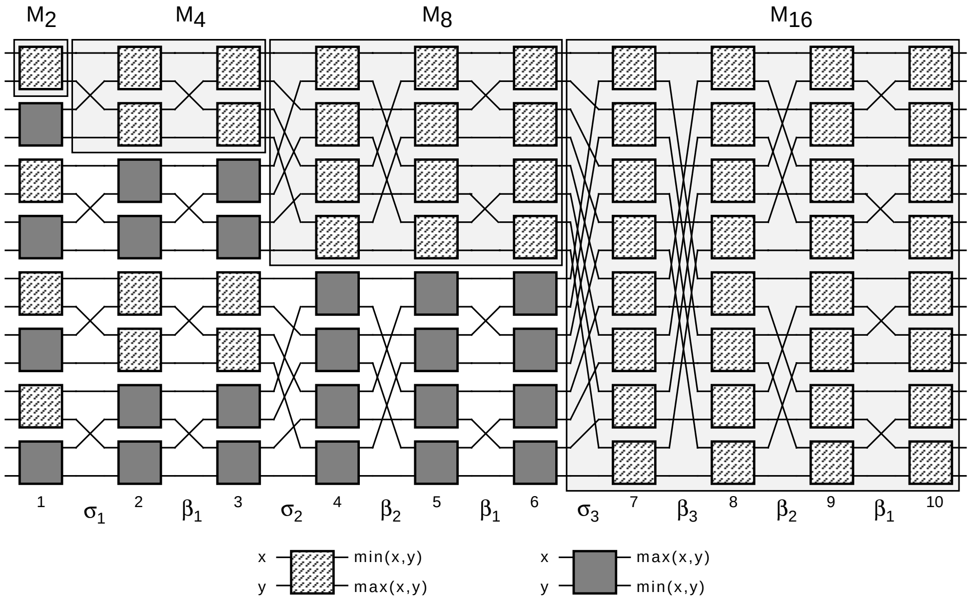

Figure 2.1. Bitonic sorting network for *N*=16

A more complex computation is required to obtain the sorting elements count for a sorting network based on odd–even merge sorters. In fact owing to the recursive construction of the sorting network, and using Equation 2.3 for the sorting elements count of an odd–even merger with size $(N/2^i) \times (N/2^i)$, we have

$$S_N = \sum_{i=0}^{\log_2 N - 1} 2^i S[M_{N/2^i}] = \sum_{i=0}^{\log_2 N - 1} 2^i \left[\frac{N}{2^{i+1}} \left(\log \frac{N}{2^i} - 1 \right) + 1 \right]$$

$$= \sum_{i=0}^{\log_2 N - 1} \frac{N}{2} (\log_2 N - 1 - i) + 2^i = \frac{N}{2} \left[\log_2 N (\log_2 N - 1) - \sum_{i=0}^{\log_2 N - 1} i \right] + \sum_{i=0}^{\log_2 N - 1} 2^i$$

$$= \frac{N}{2} \frac{\log_2 N (\log_2 N - 1)}{2} + N - 1 = \frac{N}{4} [\log_2^2 N - \log_2 N + 4] - 1$$