

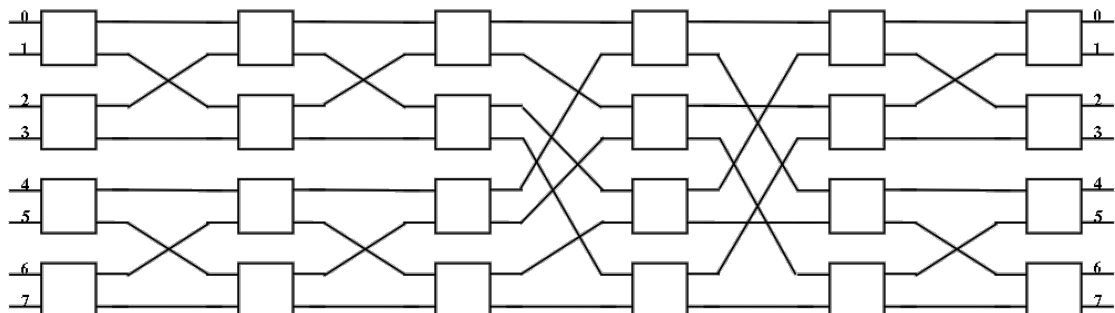
Exercise 1:

1. Build a 8x8 reverse Banyan baseline network.
2. How much Matrices are needed to generate a recursive 64 x 64 reverse Banyan baseline network?
3. Show the status in each matrix for the following permutation. Explain the steps followed to obtain the final status.
 - 0 -> 6 - 1 -> 3
 - 2 -> 0 - 3 -> 5
 - 4 -> 1 - 5 -> 2
 - 6 -> 4 - 7 -> 7
4. Make a horizontal extension of minimum size to make it rearrangeable. Draw the network scheme and show how much switching matrices would be needed to make the same from a 64x64 one.
5. Before the 1) Banyan network propose a sorting network. Draw the whole network scheme and show how much switching matrices would be needed to make the same from a 64x64 one.
6. Show the status of each matrix for the same permutation of 3). Explain the steps followed to obtain the final status.

Exercise 2:

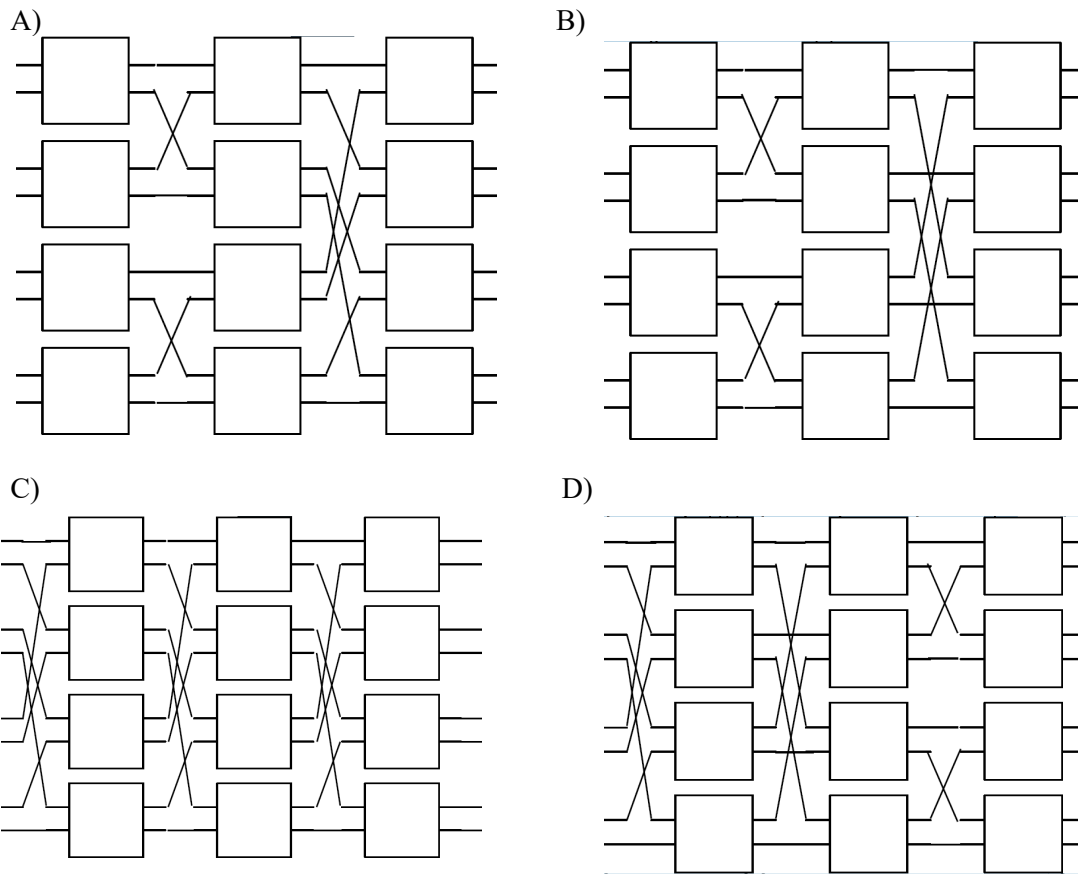
The next figure shows a 8x8 Batcher network.

1. Determine which are the switching elements (2x2 Matrices) that sort in an ascendant order (min in output 0 and max in output 1) and which are the ones that sort is a descendent order.
2. Determine the status of the switching elements ("straight" or "cross") of the whole network with the following input/output interconnection relationship:
0 -> 5, 1 -> 2, 2 -> 6, 3 -> 1, 4 -> 4, 5 -> 7, 6 -> 3, 7 -> 0
3. Add after the Batcher sorting network a Benes network. Draw clearly the network topology, indicating the number of stages, the number of the switching elements (SE) and the total network cost.
4. Determine the status of the matrices in this EBN if all the inputs are connected to the output with the same number (0-> 0; 1 -> 1; ...). Use the looping algorithm, showing all the details of the process (for instance, for each path which is the middle stage chosen). Take into account that the EBN inputs are the outputs of the Batcher network



Exercise 3

Let us consider the four interconnection networks that are shown next:



- Which of them is valid to build a Benes Network? How many stages do we have to add to build this network?
- Draw the Benes network.
- Suppose that we want to make the following permutation: $0 \rightarrow 0, 1 \rightarrow 2, 2 \rightarrow 7, 3 \rightarrow 4, 4 \rightarrow 6, 5 \rightarrow 3, 6 \rightarrow 1, 7 \rightarrow 5$. Use the Looping algorithm to implement it. If you have to choose an input randomly, choose always the one with the least index. If you have to choose randomly between the upper and lower submatrices, always choose the upper one.

Another interesting option to implement an interconnection network is the Batcher-Banyan network.

- Build an 8x8 bitonic sorting Batcher network.
- What types of Banyan networks can have a Batcher Network prepended to it in order to get a non-blocking reconfigurable network?
- Choose a network from the previous 4 that you can combine with the Batcher network.
- Do the same permutation from section c) with the new interconnection network.