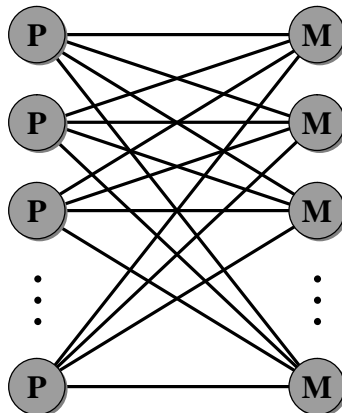


Hypercubic Networks

Charles E. Leiserson
6.895 Theory of Parallel Systems
November 2, 2003

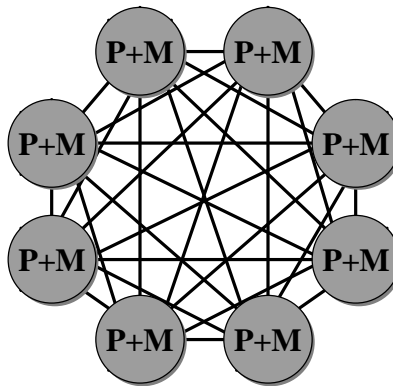
1

“Ideal” Parallel Computer



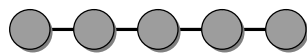
2

“Ideal” Distributed-Memory Parallel Computer

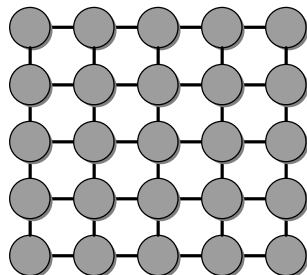


3

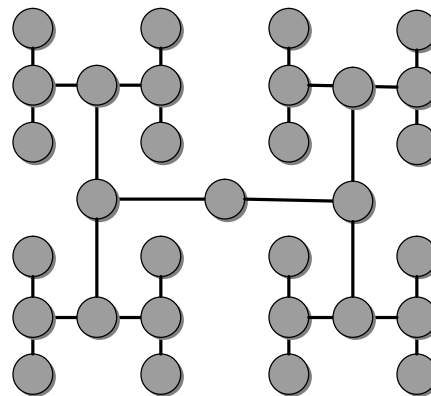
Interconnection Networks



linear array



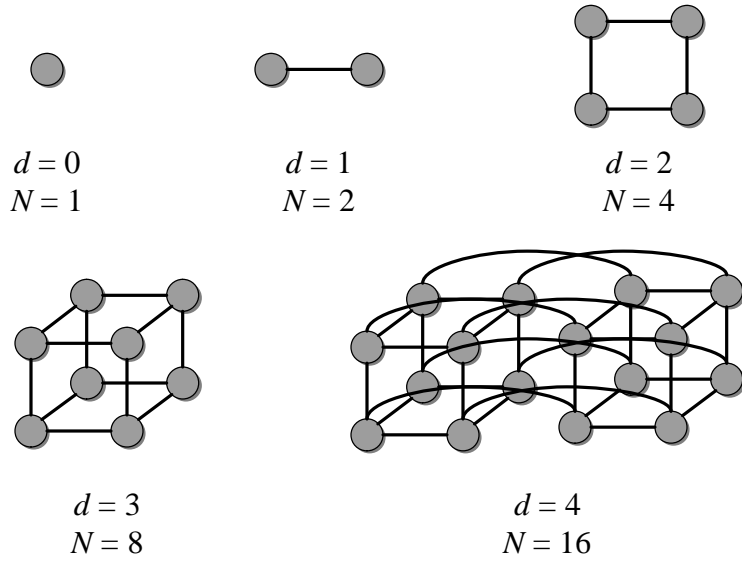
2D mesh



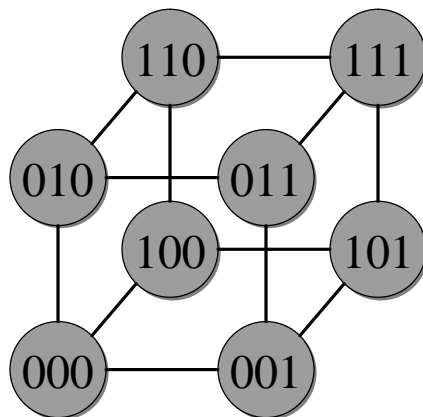
binary tree

4

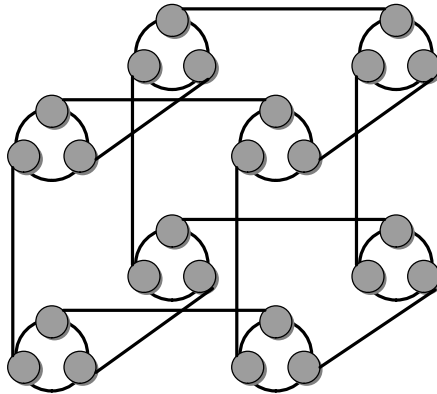
Hypercube



Hypercube

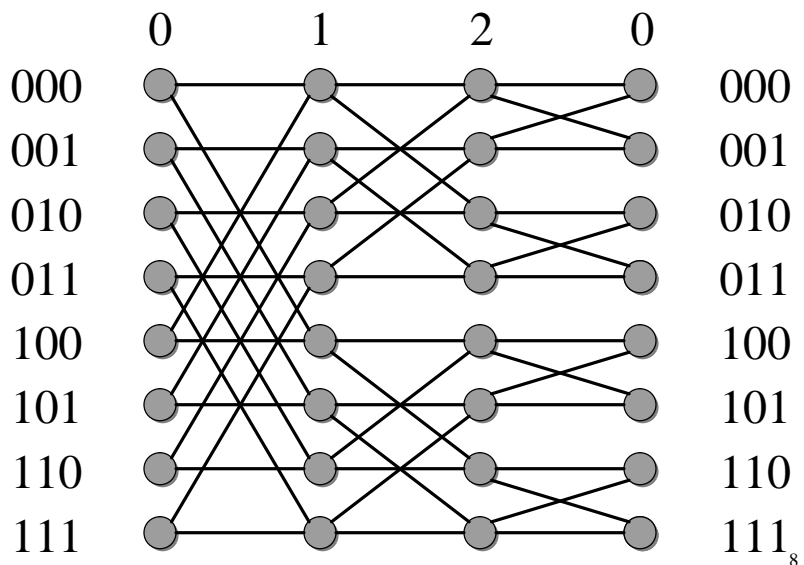


Cube-Connected Cycles

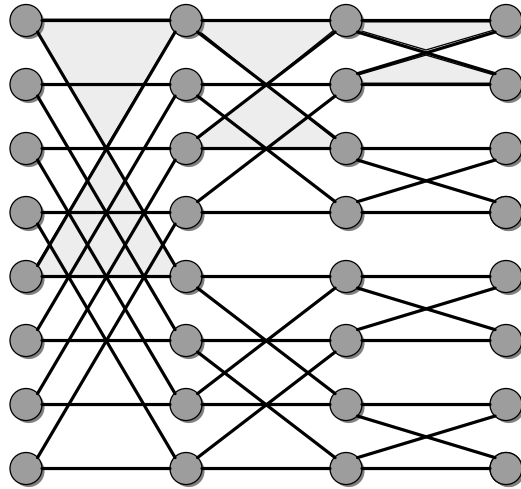


7

Butterfly (FFT) Network

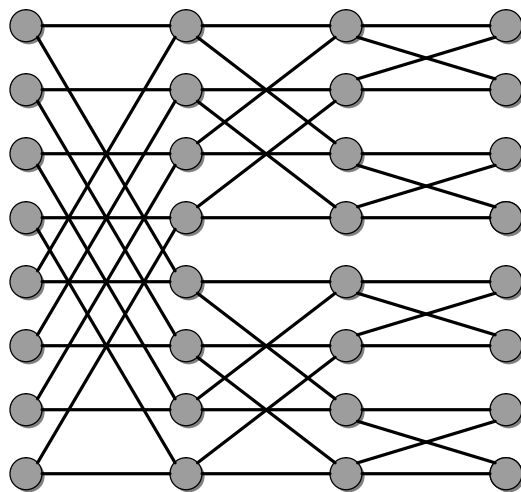


Butterflies



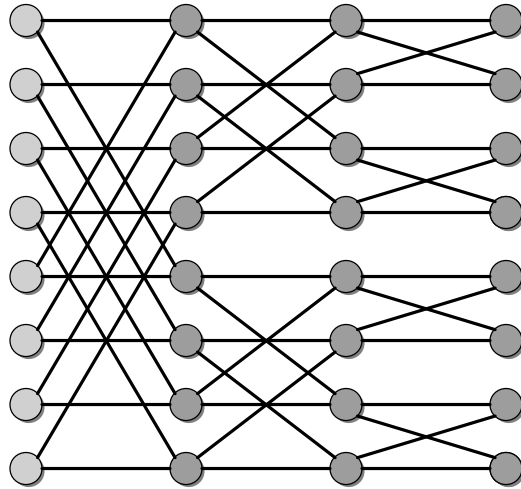
9

Decomposing a Butterfly



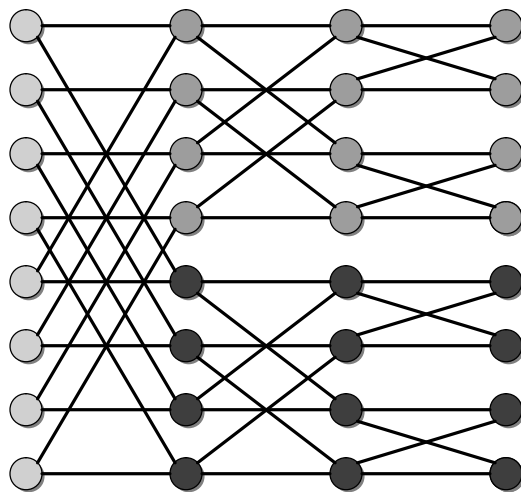
10

Decomposing a Butterfly



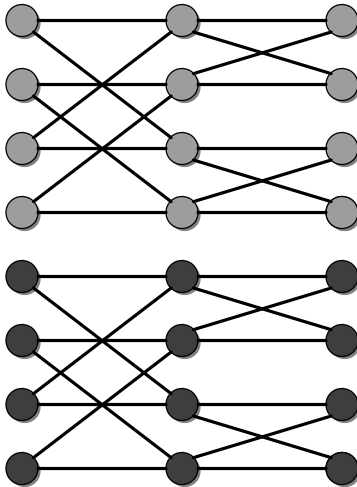
11

Decomposing a Butterfly



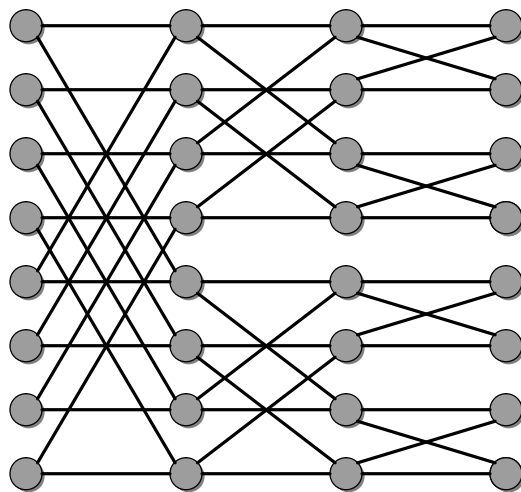
12

Decomposing a Butterfly



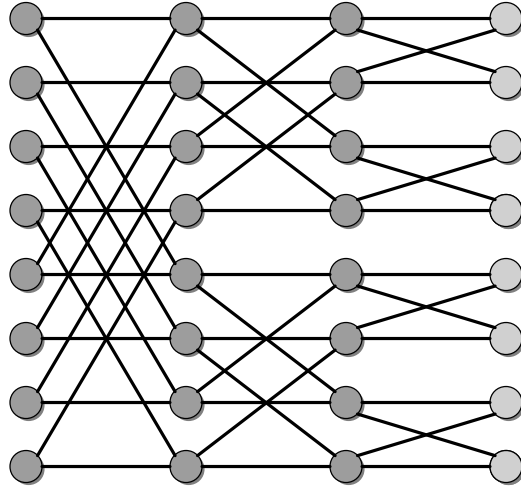
13

Decomposing a Butterfly II



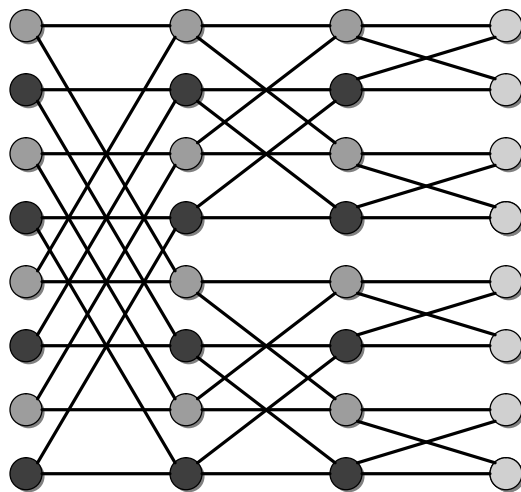
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Decomposing a Butterfly II



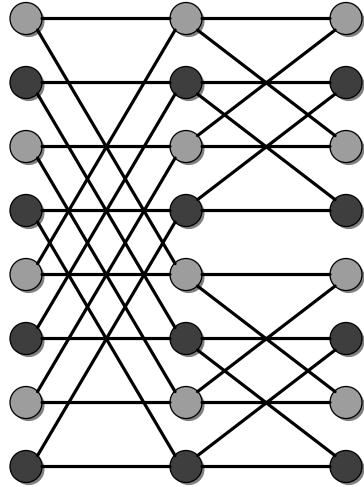
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Decomposing a Butterfly II



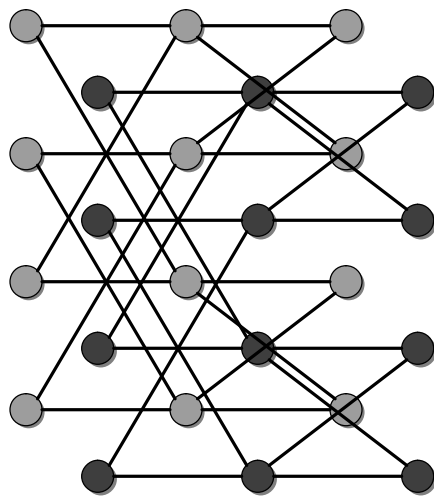
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Decomposing a Butterfly II



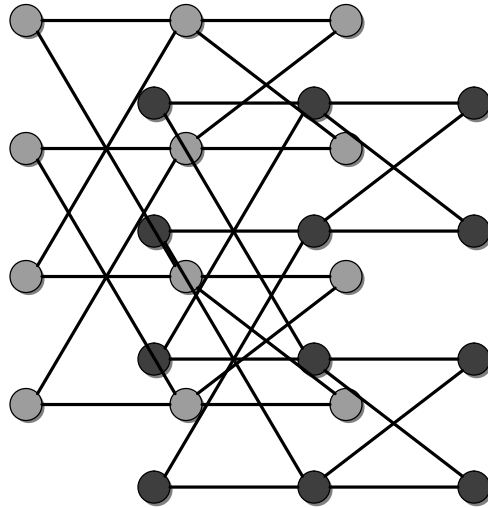
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Decomposing a Butterfly II



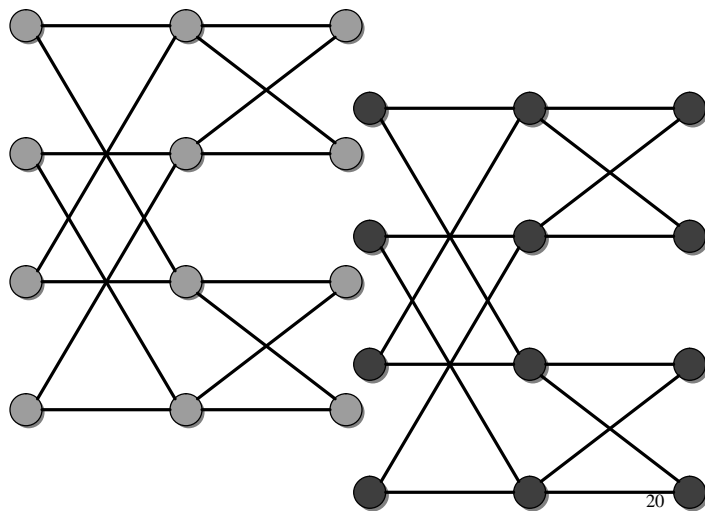
18

Decomposing a Butterfly II



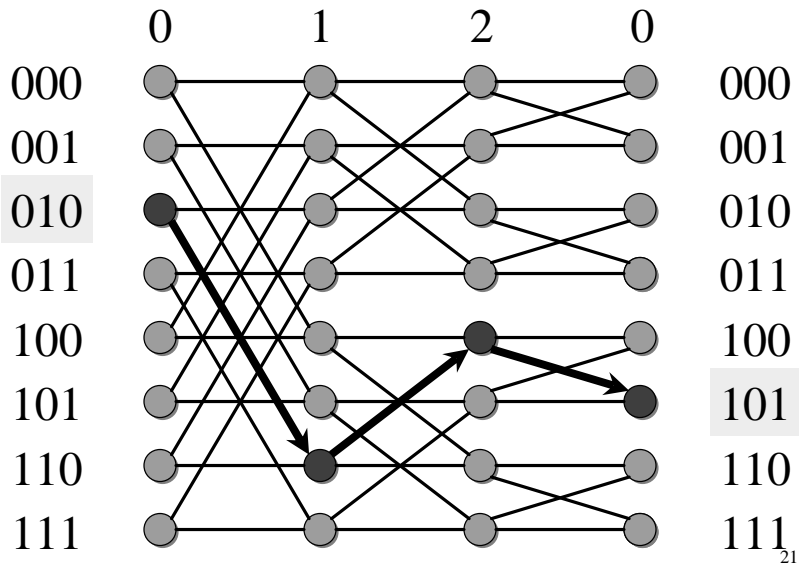
19

Decomposing a Butterfly II

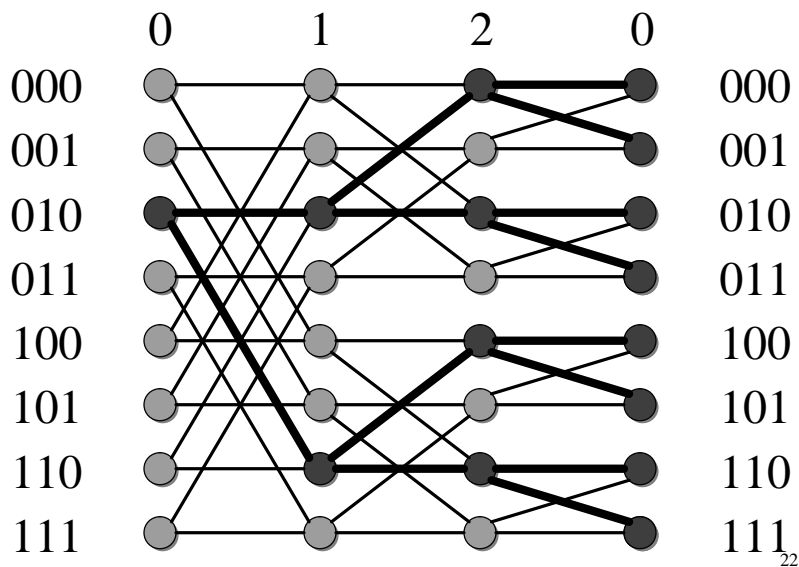


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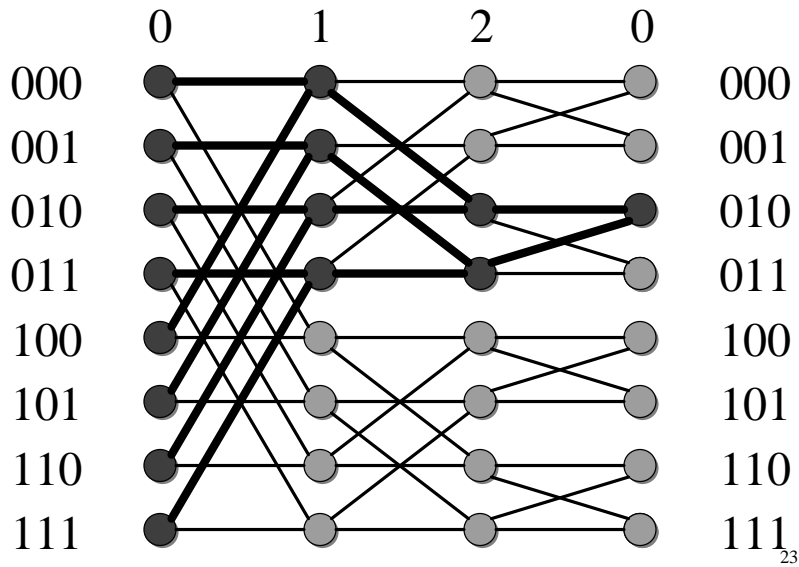
Routing on a Butterfly



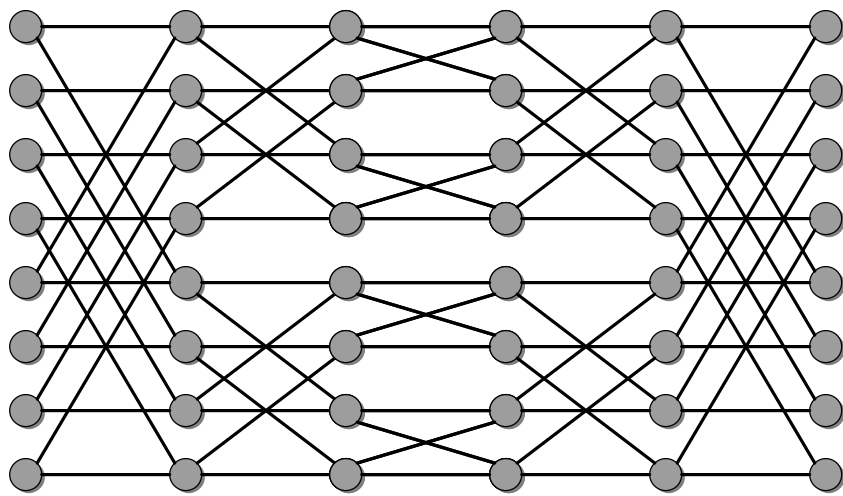
Tree in Butterfly



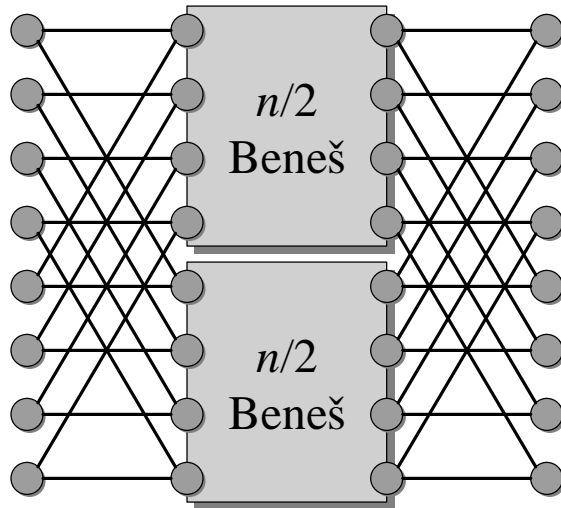
Tree in Butterfly



Beneš Network

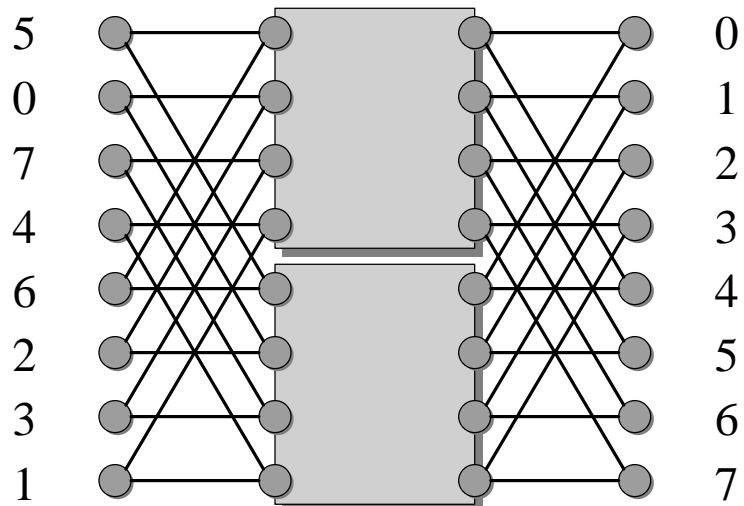


Decomposing a Beneš Network



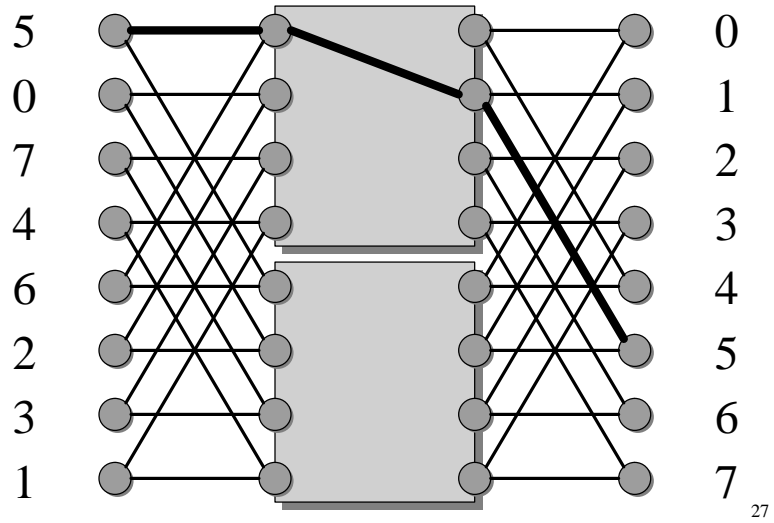
25

Routing on a Beneš Network

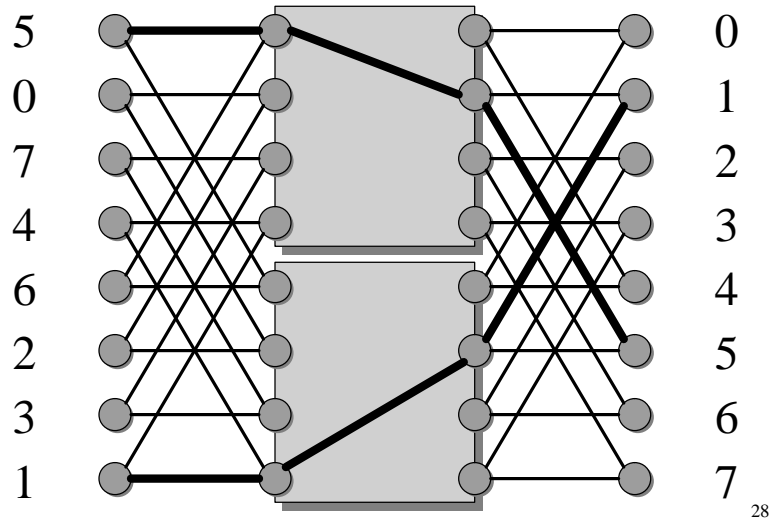


26

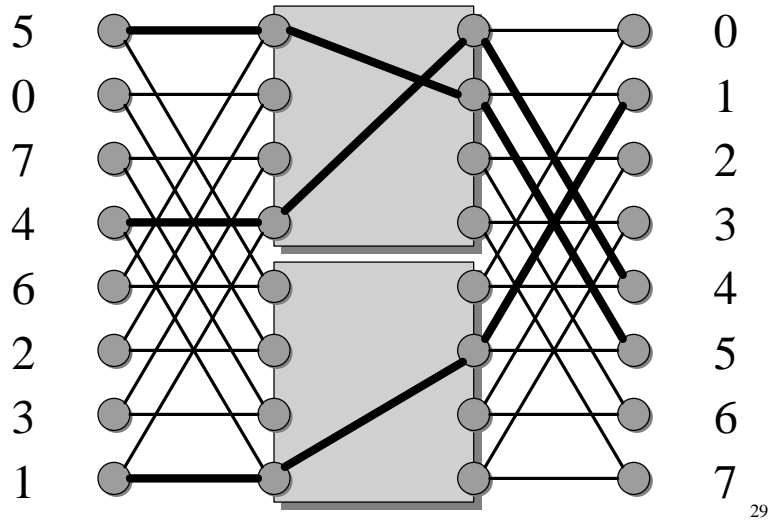
Routing on a Beneš Network



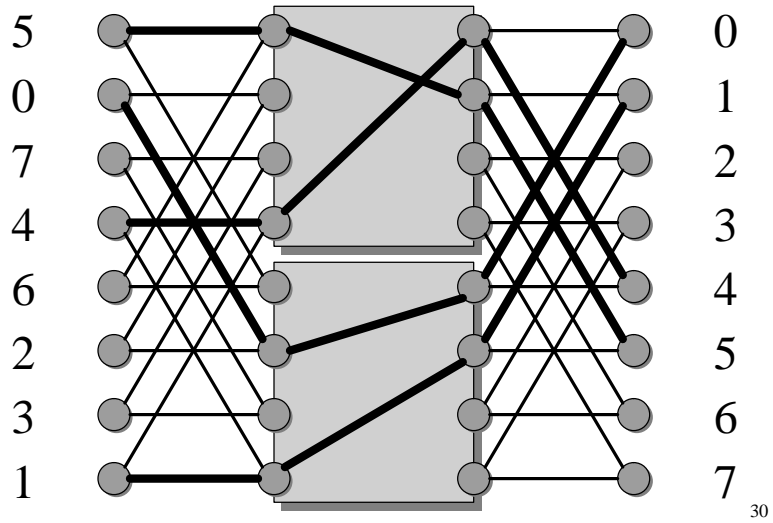
Routing on a Beneš Network



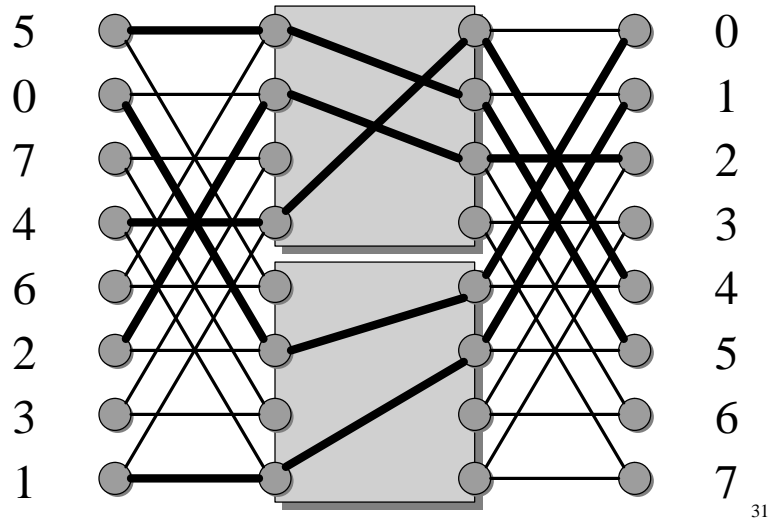
Routing on a Beneš Network



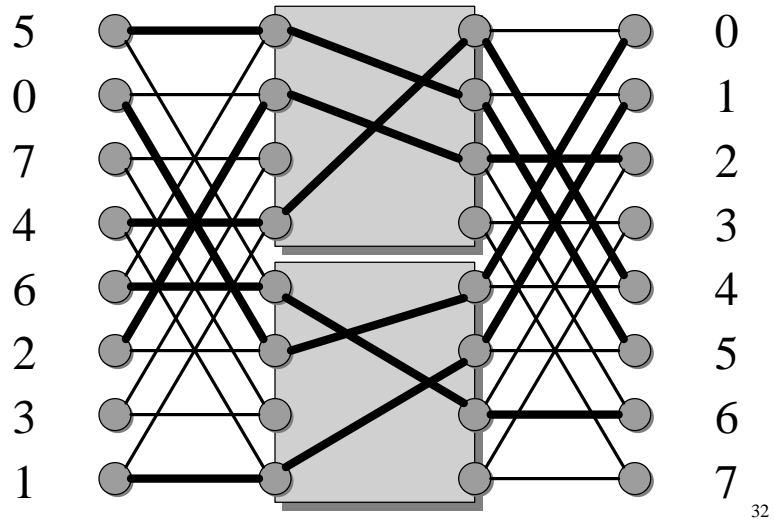
Routing on a Beneš Network



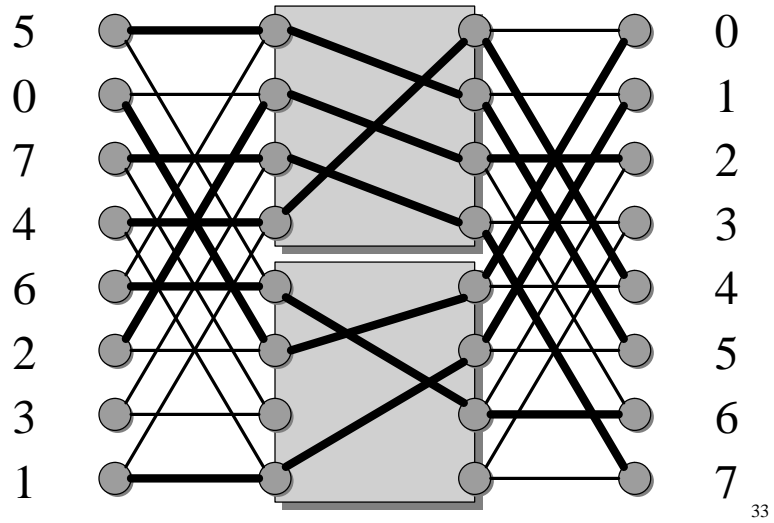
Routing on a Beneš Network



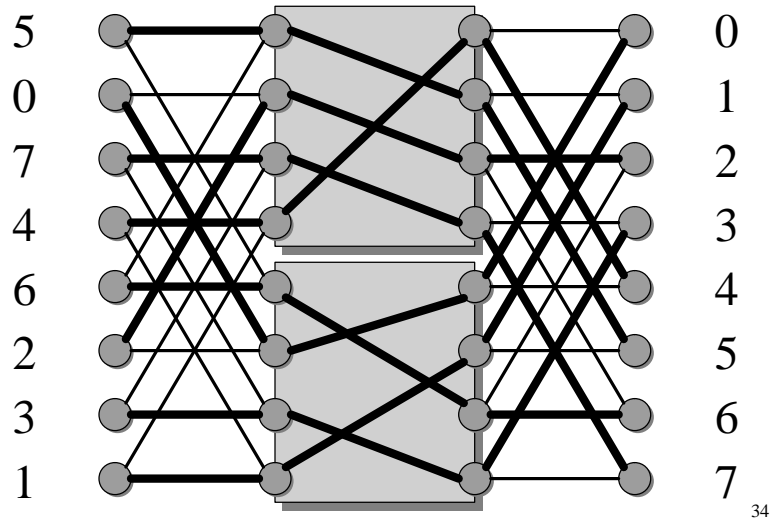
Routing on a Beneš Network



Routing on a Beneš Network



Routing on a Beneš Network



Routing on a Beneš Network

