

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

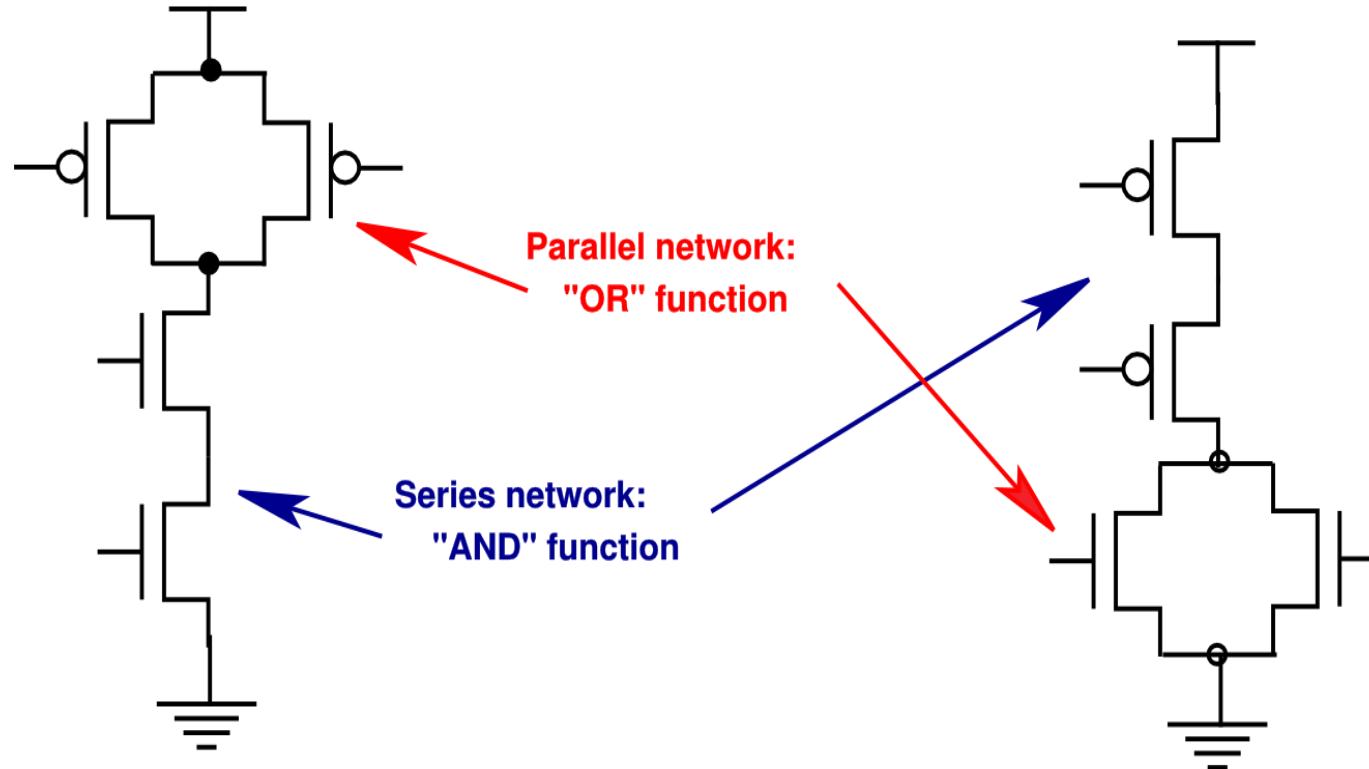
Logic Implementation using CMOS Circuits

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Courtesy: Jacob Abraham

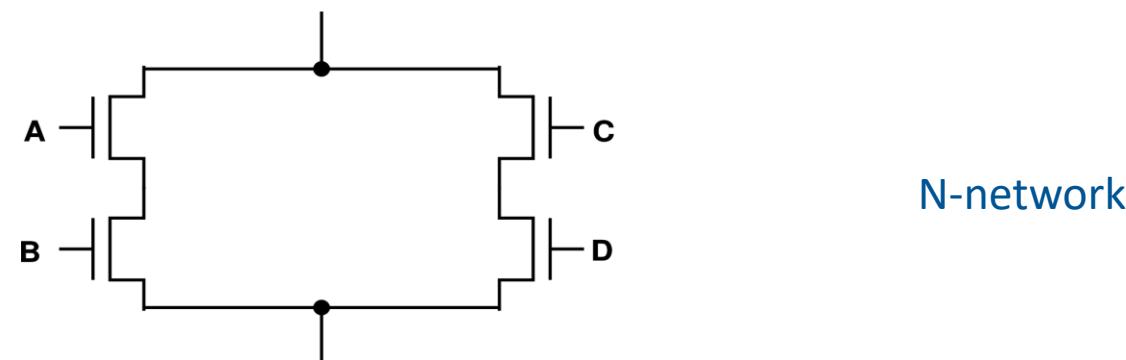
Insights



- N and P networks must implement complementary functions

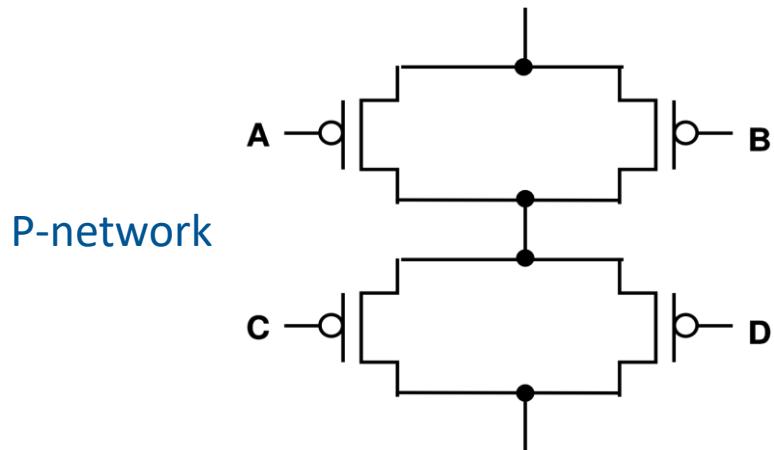
Example 1

- $F = \overline{(A \cdot B) + (C \cdot D)}$
- Take uninverted function $F = (A \cdot B) + (C \cdot D)$ and derive N-network
- Identify AND, OR operation: F is OR of AB, CD
- Make connections of transistors

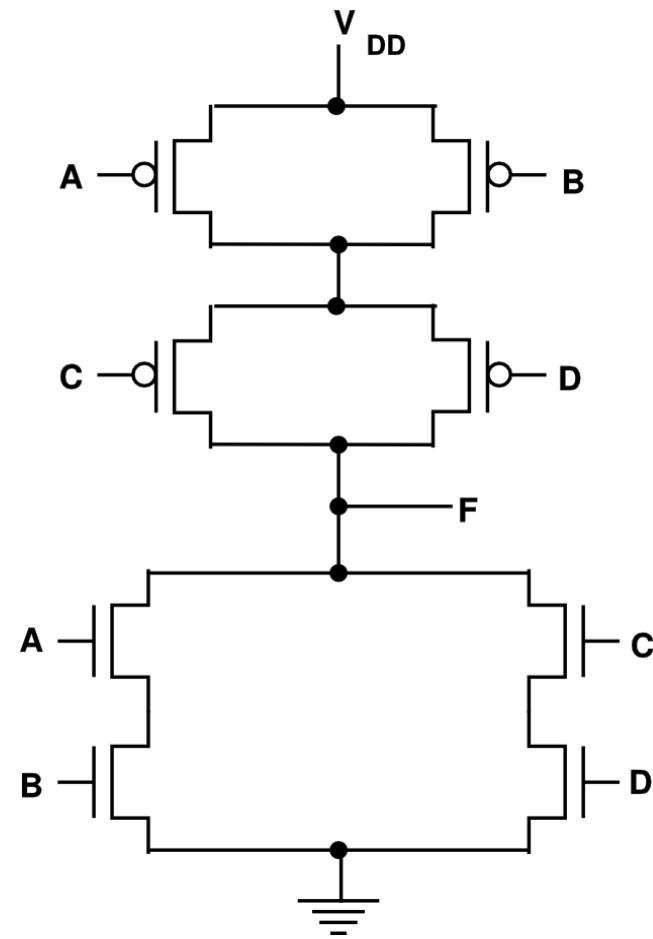


N-network

- Construct P-network by taking complement of N-expression ($AB + CD$), which gives the expression $(A' + B') \cdot (C' + D')$.

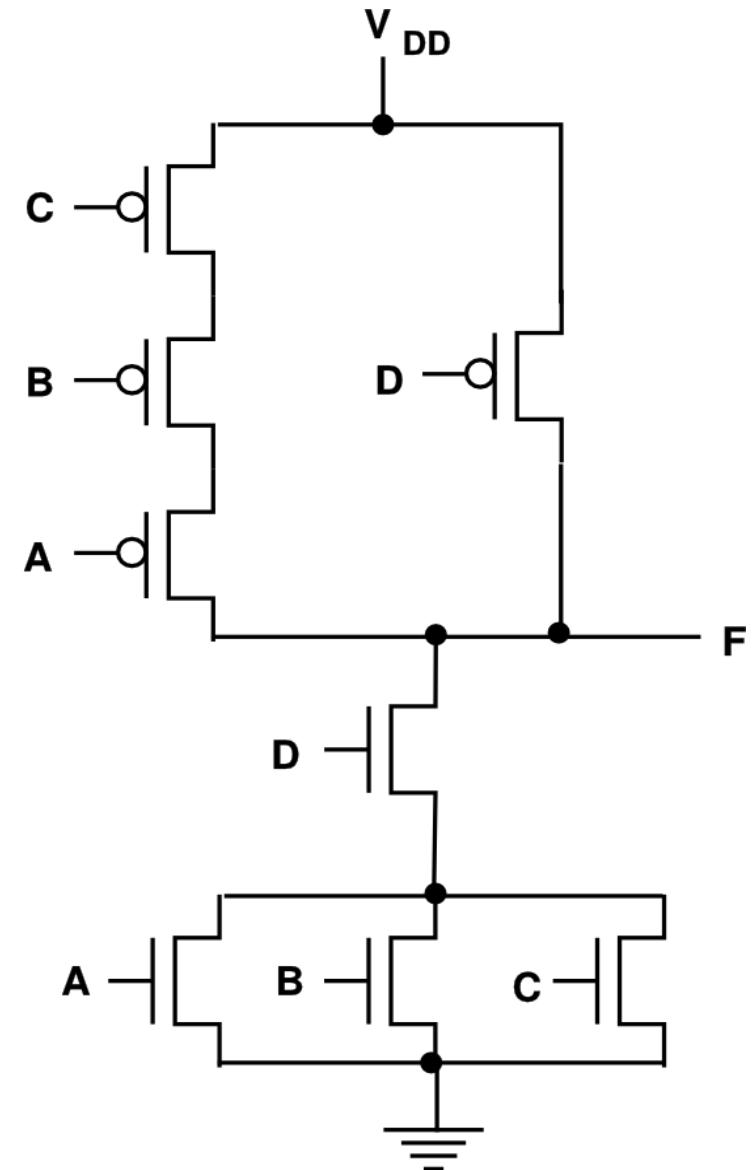


Combine P and N circuits



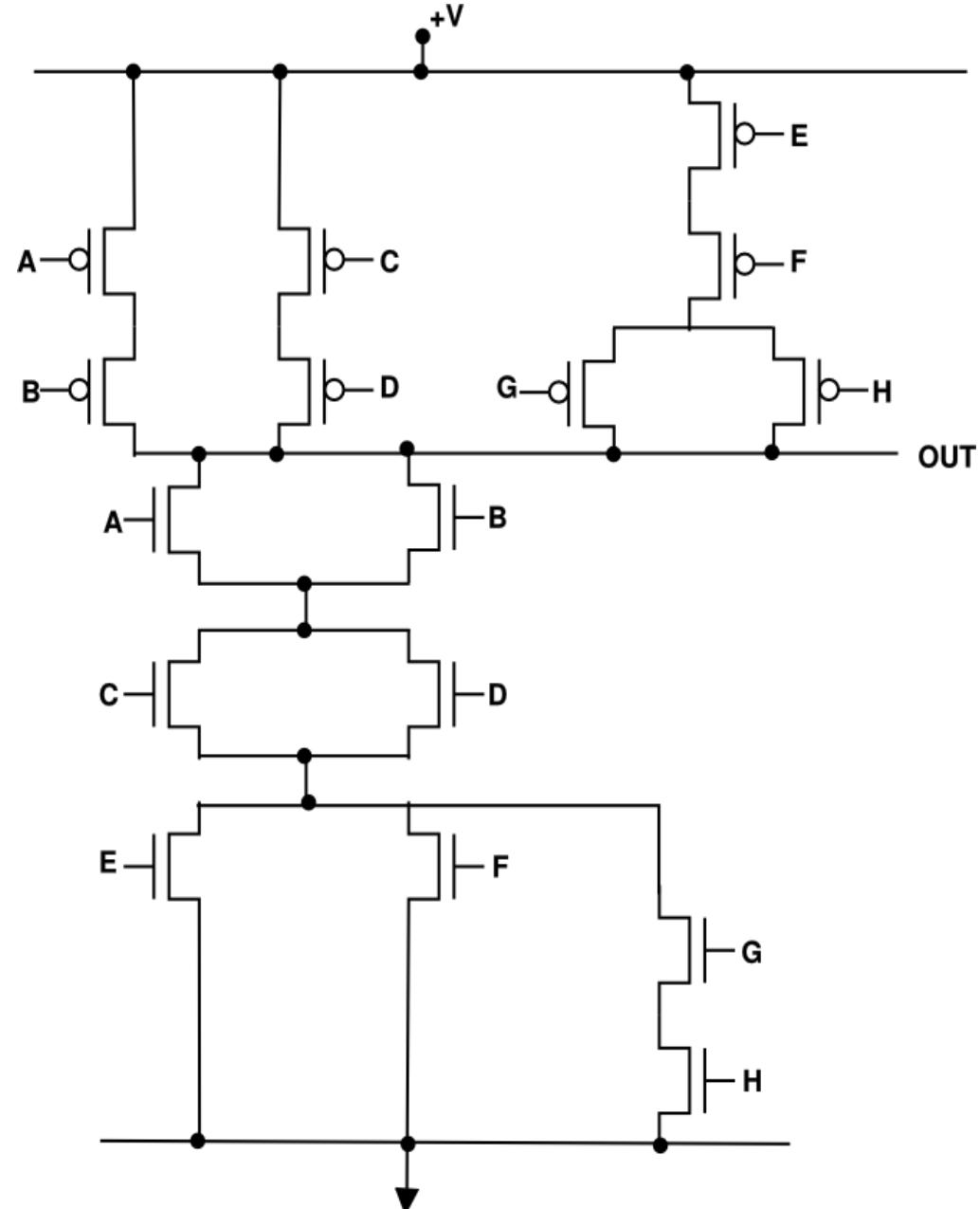
Example 2

- $F = \overline{((A+B+C).D)}$



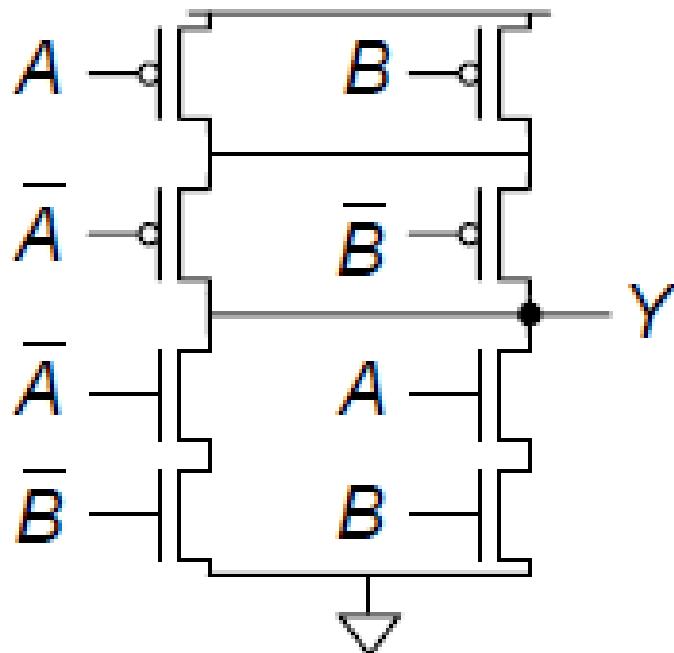
Example 3

$$OUT = (A + B) \cdot (C + D) \cdot (E + F + (G \cdot H))$$

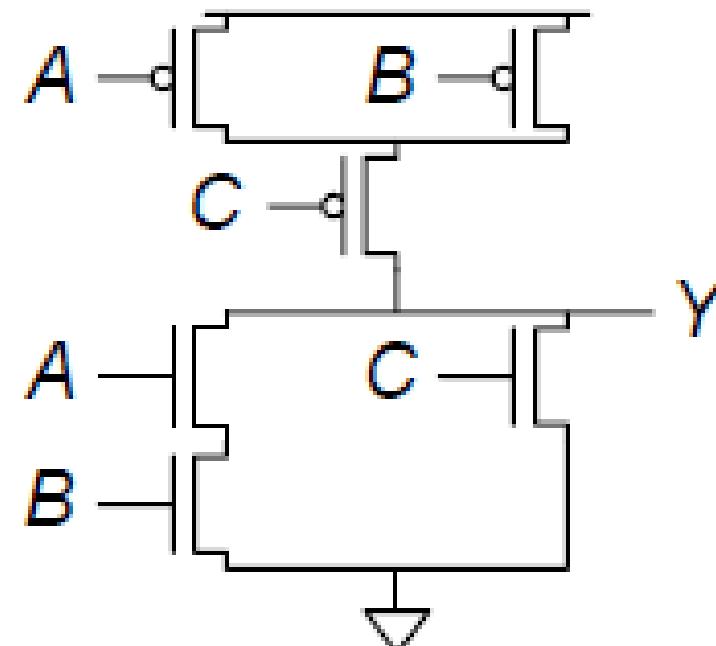


Exercise

- Find Boolean logic for these circuits



$$Y = (A'B' + AB)'$$



$$Y = (AB+C)''$$