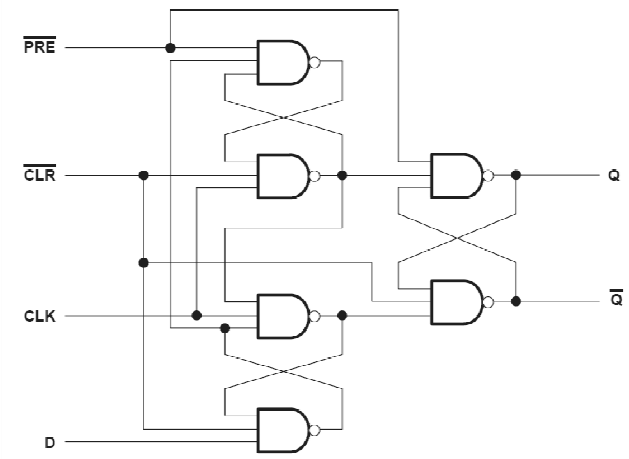
Asynchronous Design Technique in Reverse ➔ Analysis

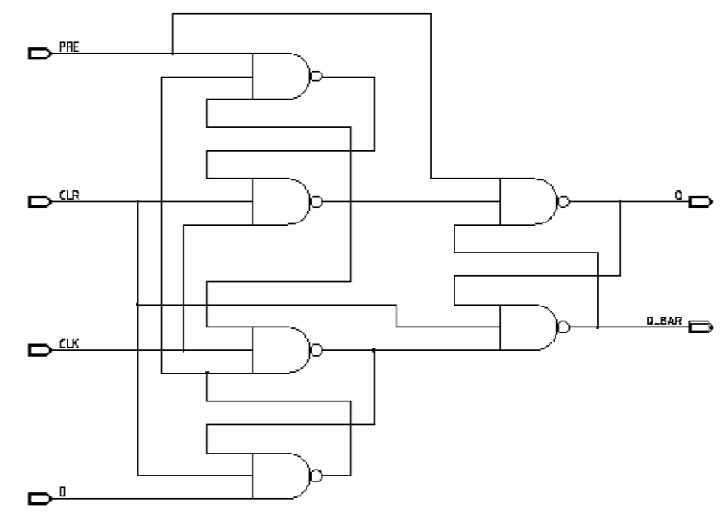
Analysis Technique

- Reverse order for analysis
- Start with logic diagram
- Generate equations
- Put equations in K-Map (Final State Table)
- Determine stable, unstable states
- Generate State Diagram
- Determine behavior

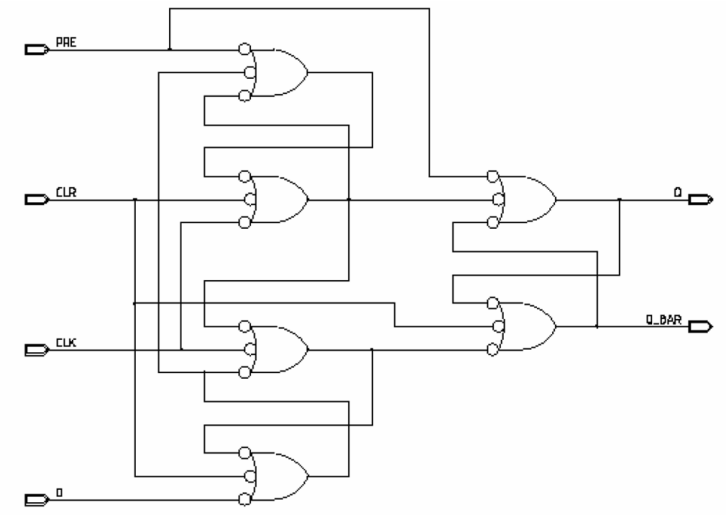
SN7474 – D-FlipFlop



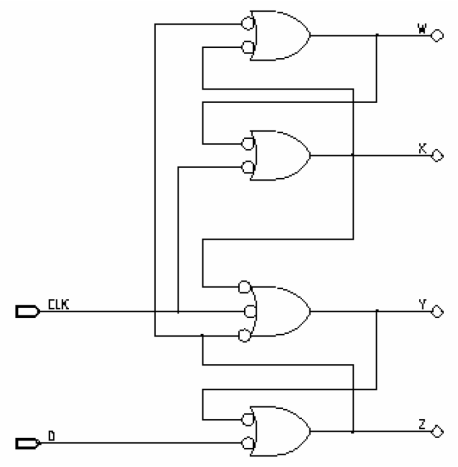
Cleaned Up Schematic



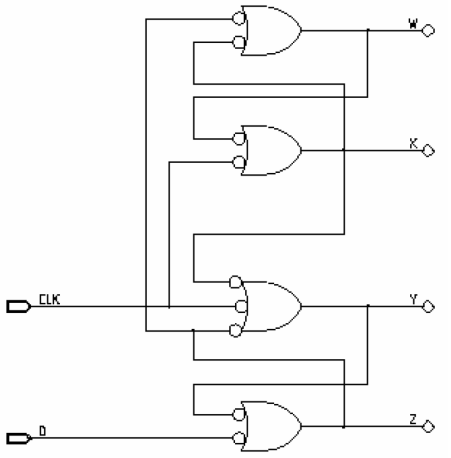
Cleaned Up Schematic (DeMorgan)



Don’t Worry About Cross Coupled Outs



And Generate Equations



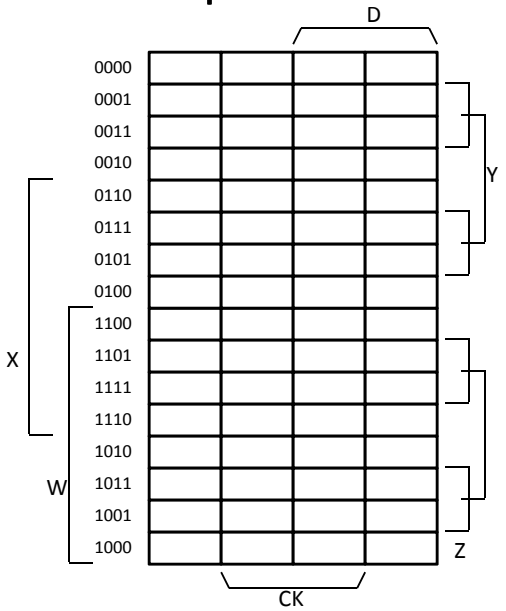
$W = \overline{Z} + \overline{X}$

$X = \overline{W} + \overline{CLK}$

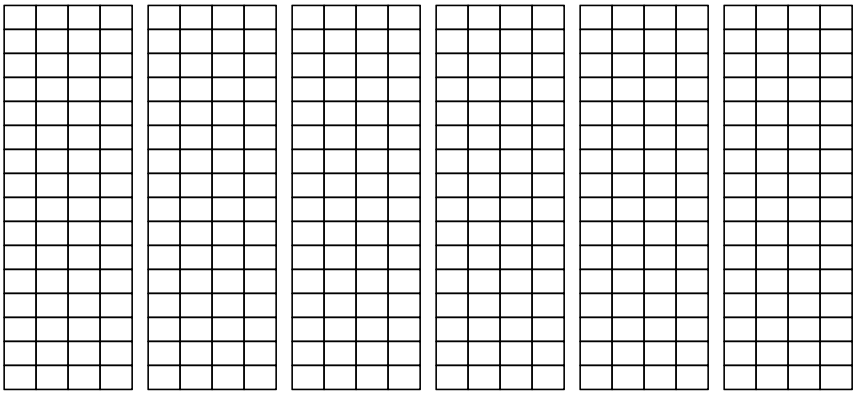
$Y = \overline{X} + \overline{CLK} + \overline{Z}$

$Z = \overline{D} + \overline{Y}$

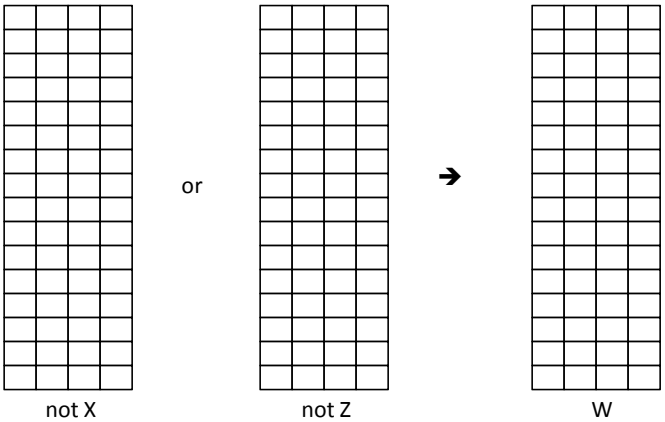
From Equations – K-Maps



Patterns for Logic Areas in Map

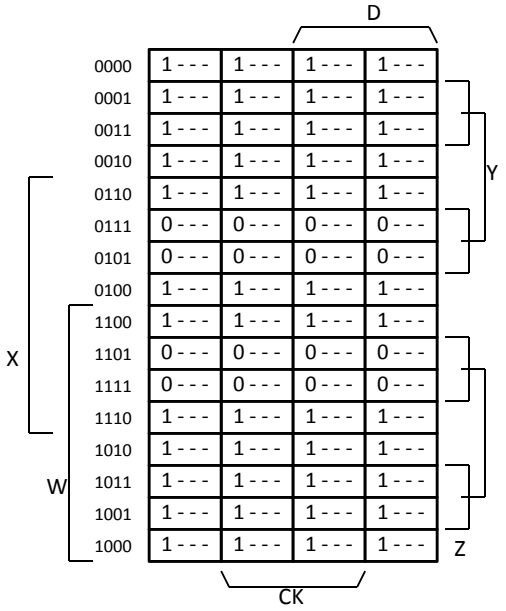


So, Map for W

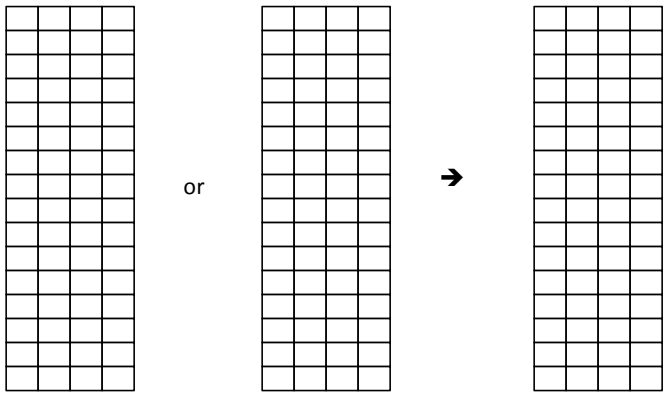


$$W = \overline{Z} + \overline{X}$$

Put W in the Map

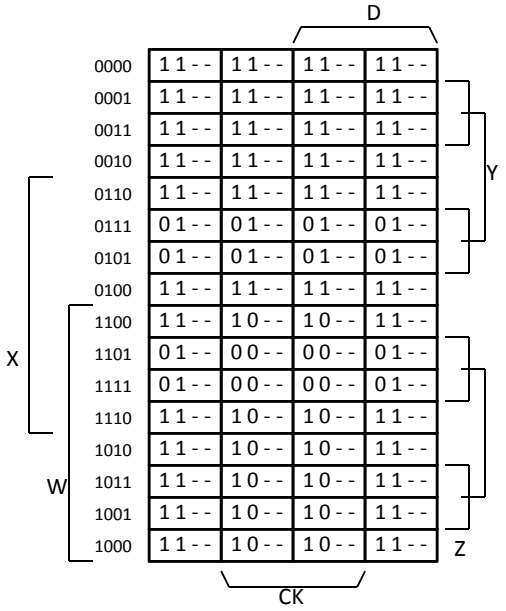


And, Map for X

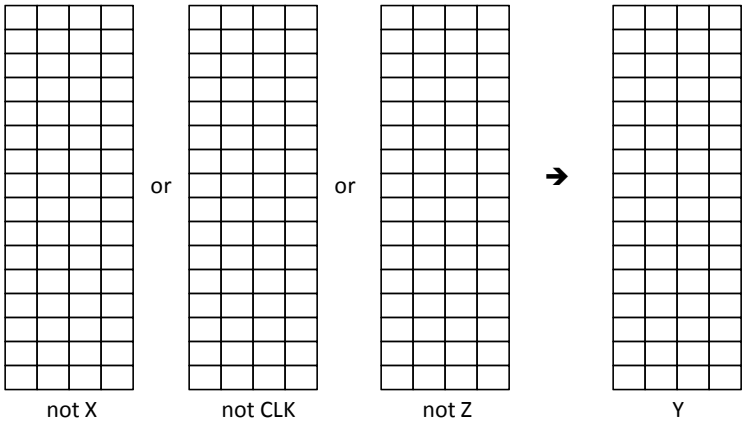


$$X = \overline{W} + \overline{CLK}$$

Add X to the W Map

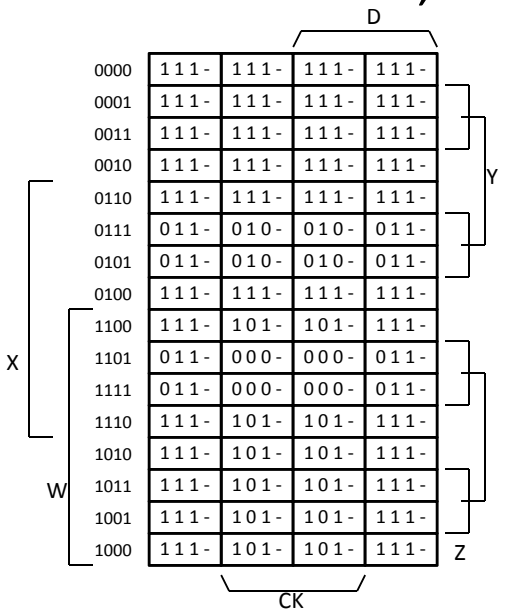


Now, Map for Y

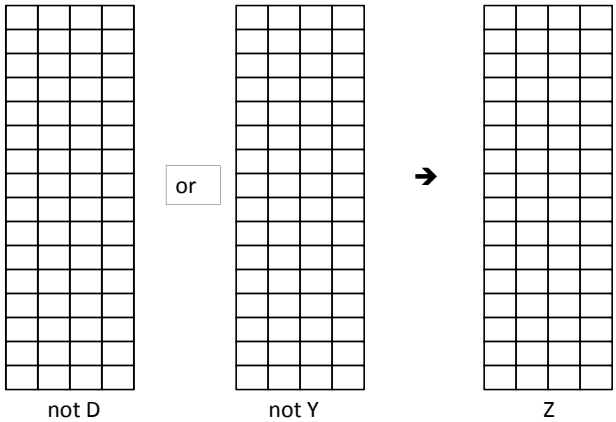


$$Y = \overline{X} + \overline{CLK} + \overline{Z}$$

Add Y to the W,X Map

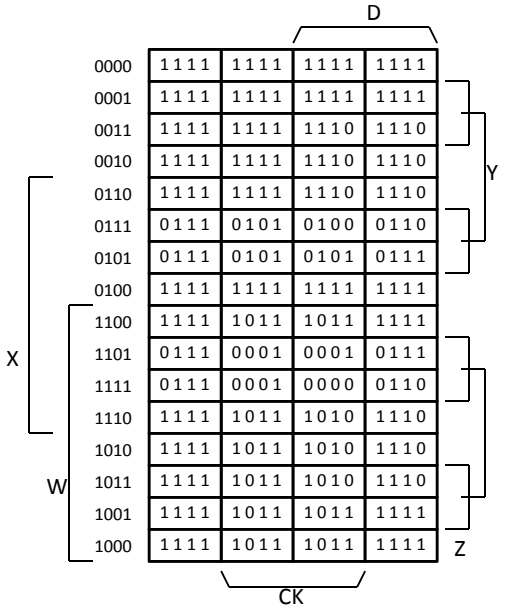


Finally, Map for Z

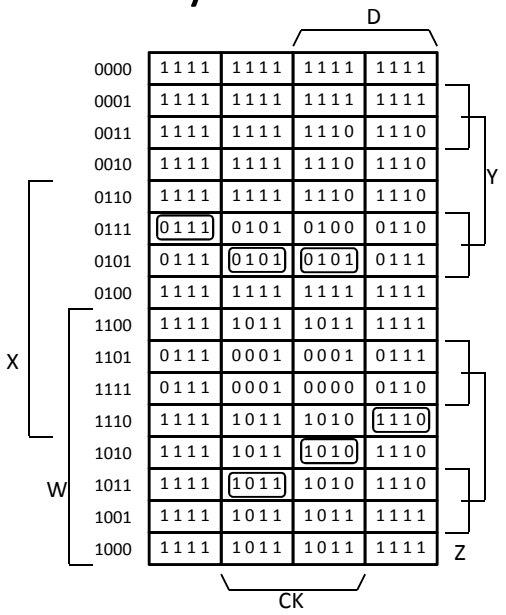


$$Z = \overline{D} + \overline{Y}$$

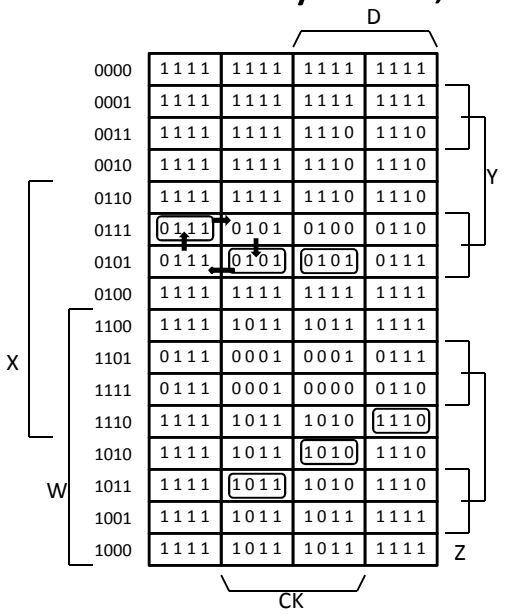
And At Last, Add Z to the W,X,Y Map



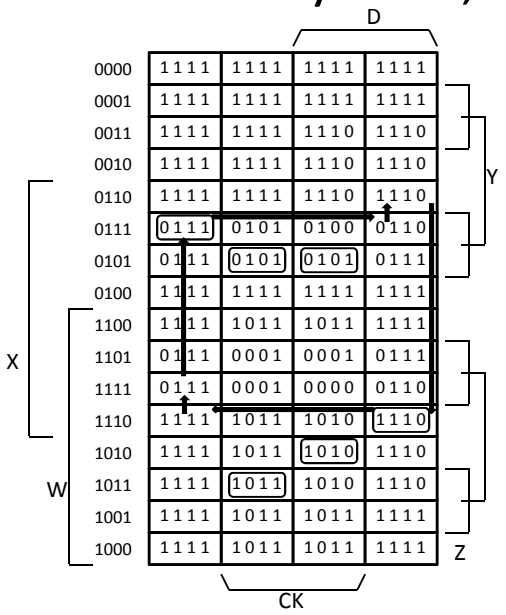
Identify the Stable States



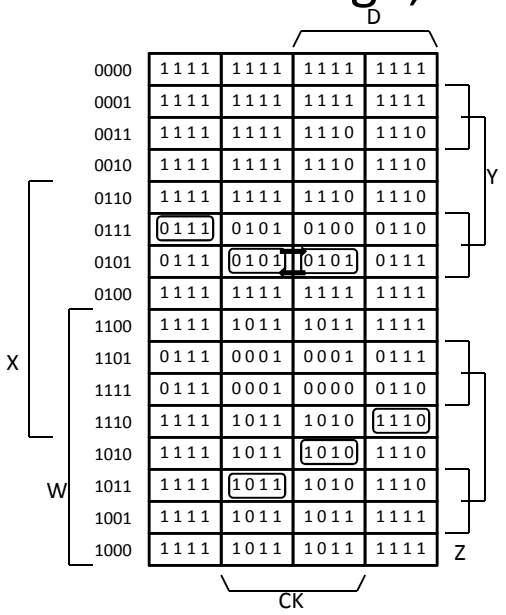
Situation 1: D Stays Low, CK Up,Down



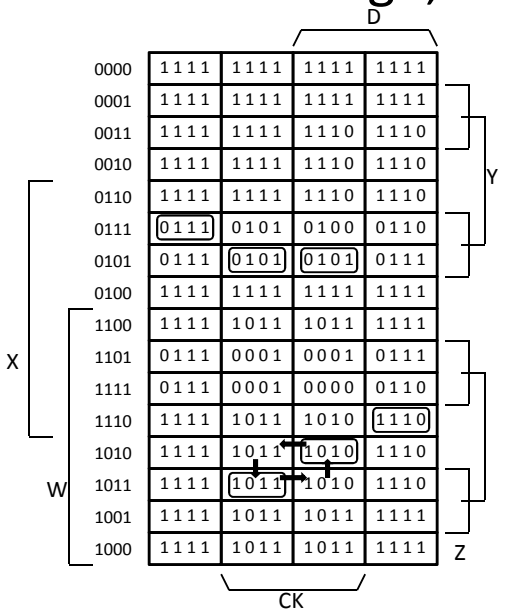
Situation 2: CK Stays Low, D Up, Down



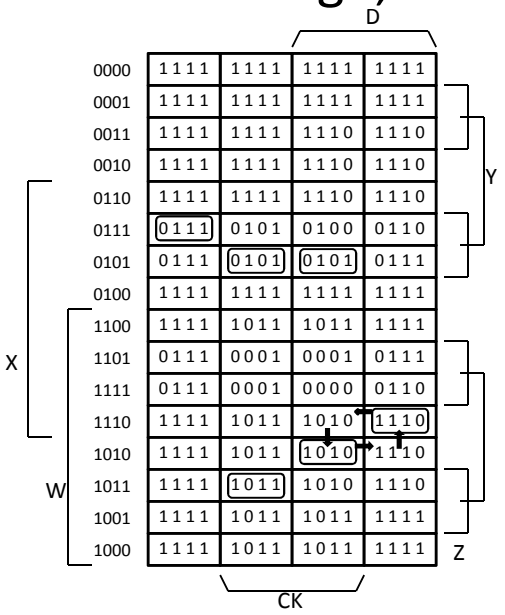
Situation 3: CK High, D Up,Down



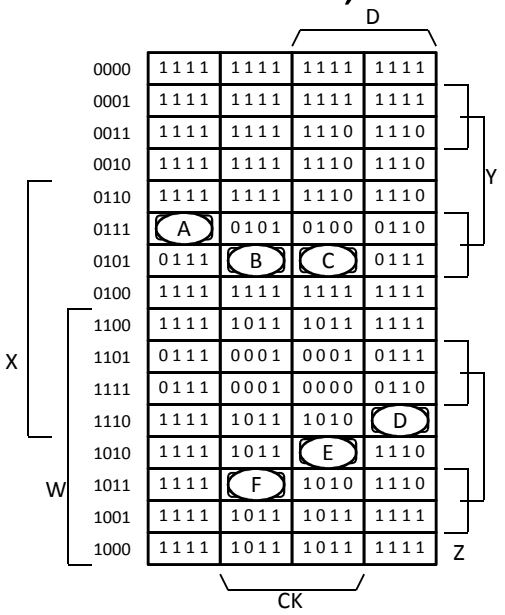
Situation 3A: CK High, D Up,Down



Situation 4: D High, CK Up, Down



So – Name States, Make Diagram



State Diagram