











**Reducing Static Power (review)** • As mentioned before, V<sub>th</sub> has an exponential effect on leakage current  $I_D \approx I_S e^{\frac{V_{GS} - V_T}{nkT/q}} \left(1 - e^{-\frac{V_{DS}}{kT/q}}\right)$ • Increasing V<sub>th</sub> will lower static power dissipation • Control indirectly (taking advantage of circuit topology and input values)

• Control directly (using low Vth devices)









































