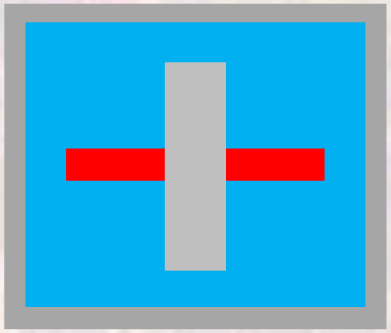
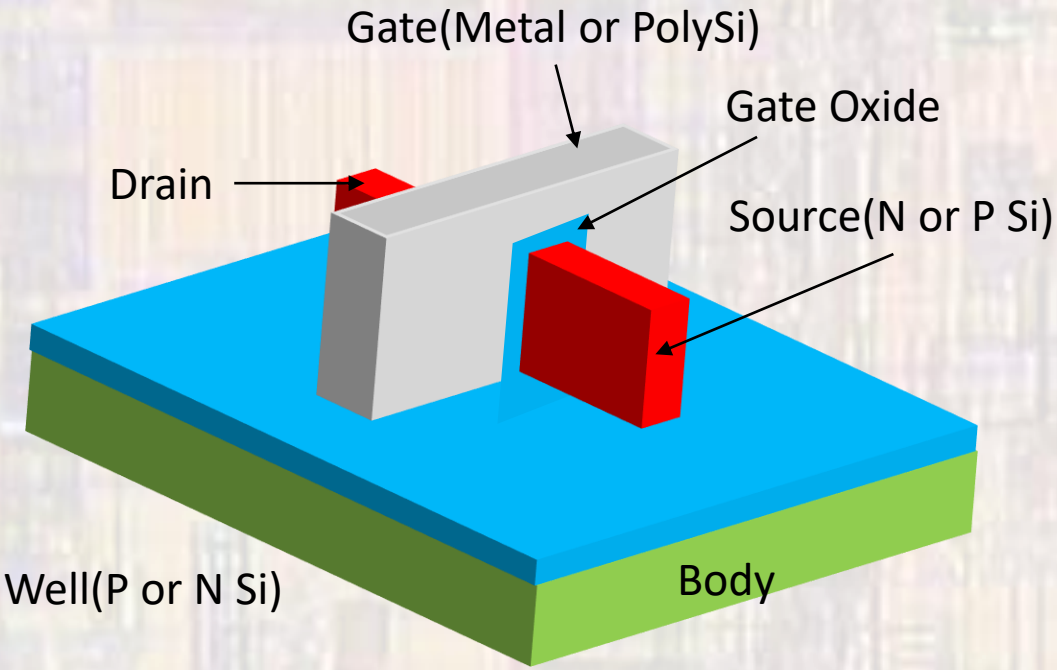
FinFET Processing

Last updated 7/12/23

FinFET Processing

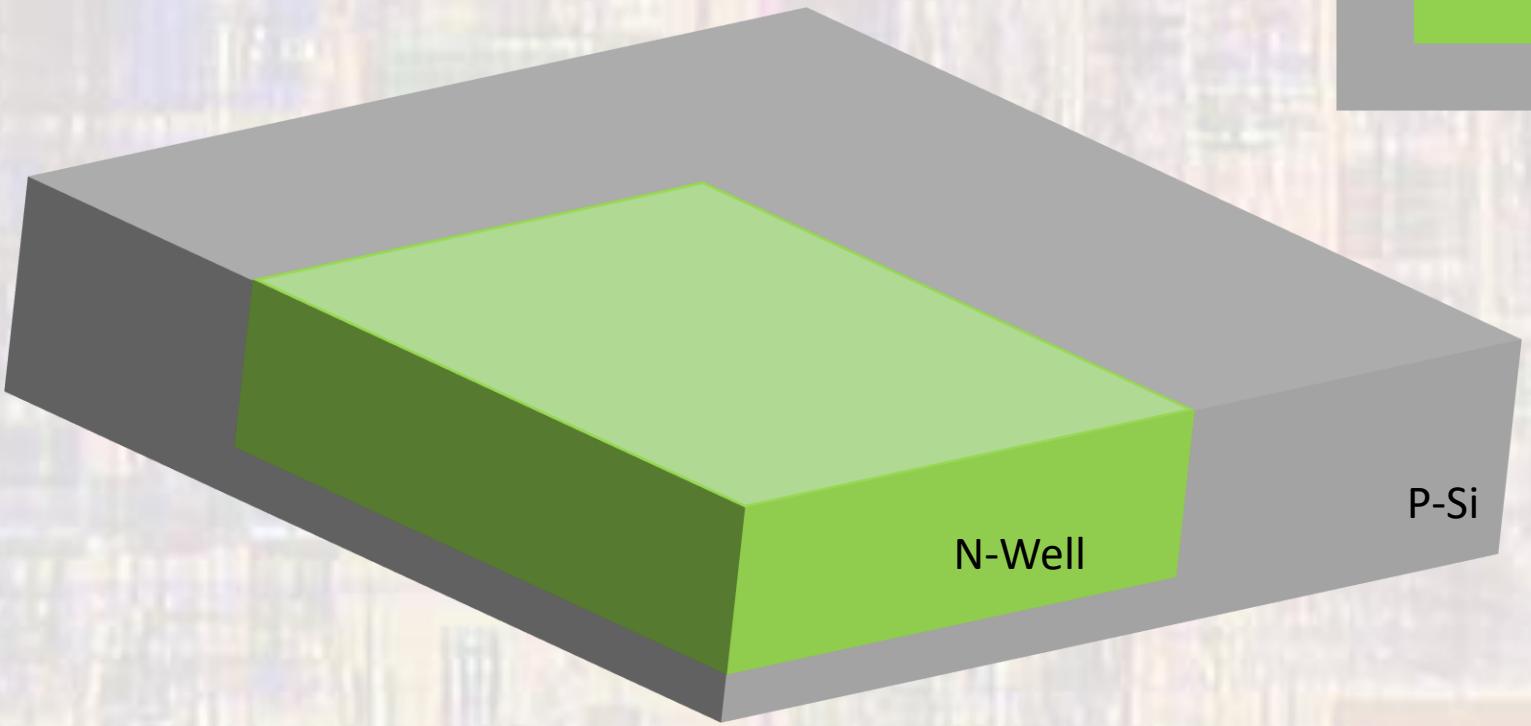
- FinFET
  - Transistors are fin like structures
  - Dominant technology for large digital IC systems





FinFET Processing

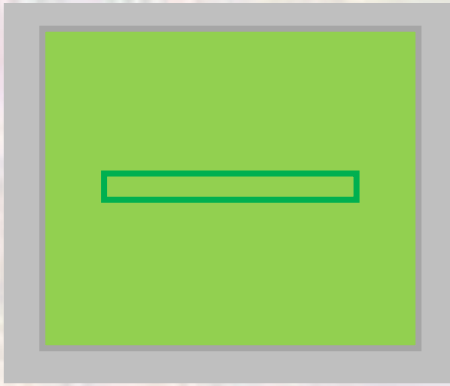
- Create N-Well (or P-Well) in the substrate
  - Ion Implantation

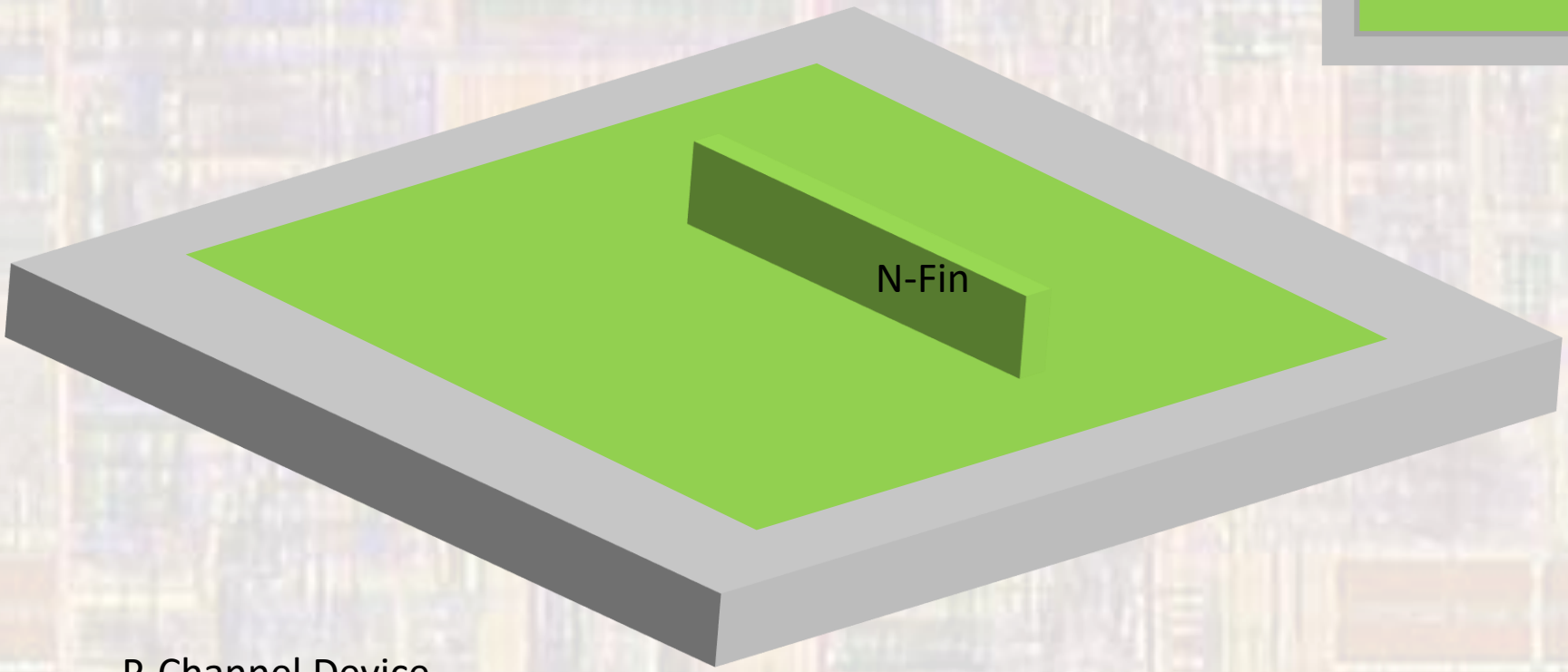


P-Channel Device

FinFET Processing

- Etch trenches into the well
  - Leaving only the Fins remaining

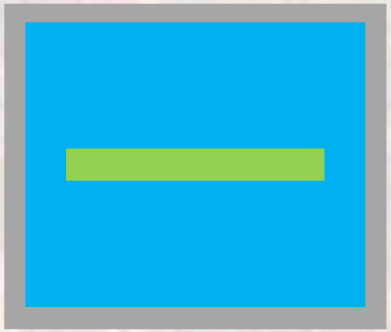


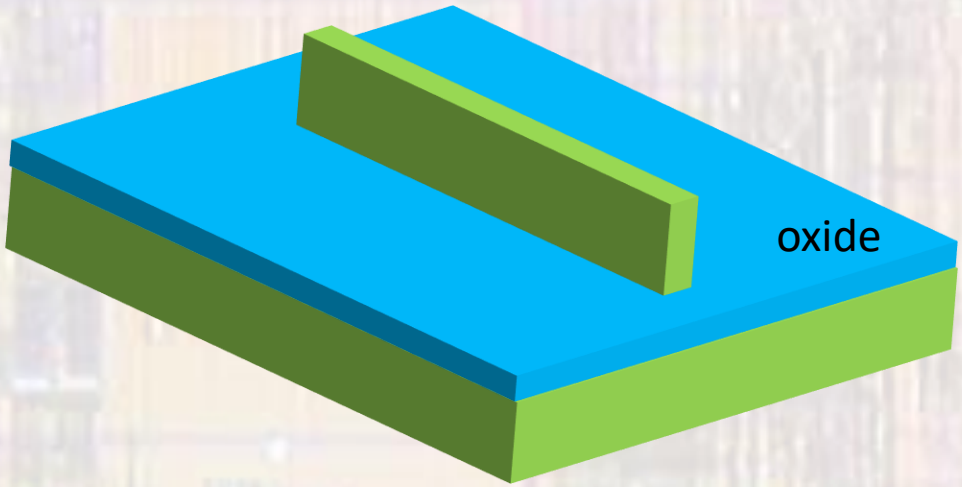


P-Channel Device

FinFET Processing

- Deposit oxide
  - Cover everything with oxide (insulator)
  - Etch back oxide to desired fin height

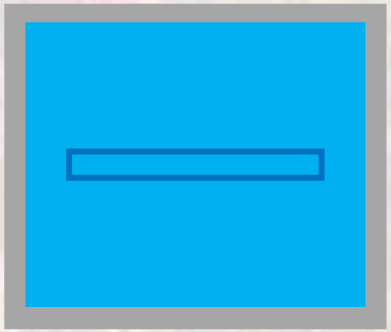


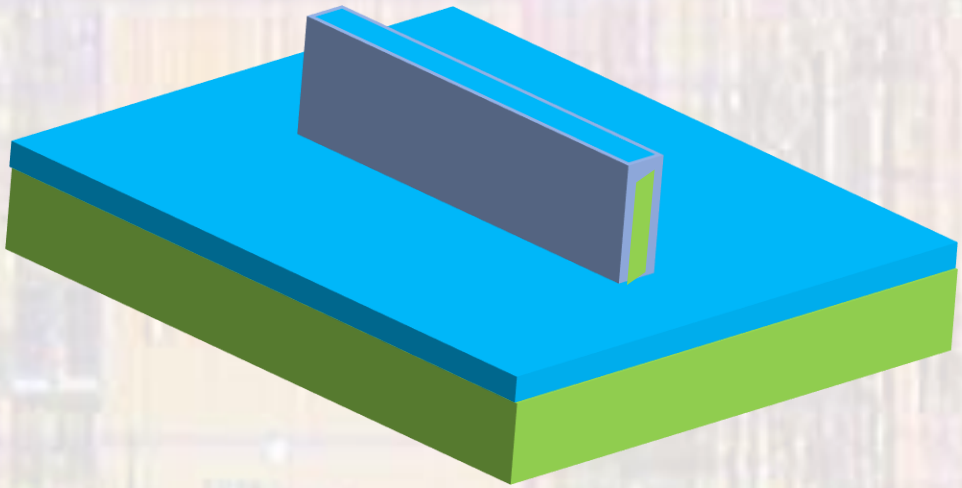


P-Channel Device

FinFET Processing

- Grow a thin layer of oxide everywhere
  - Gate Oxide

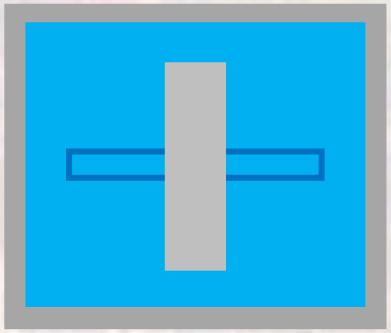


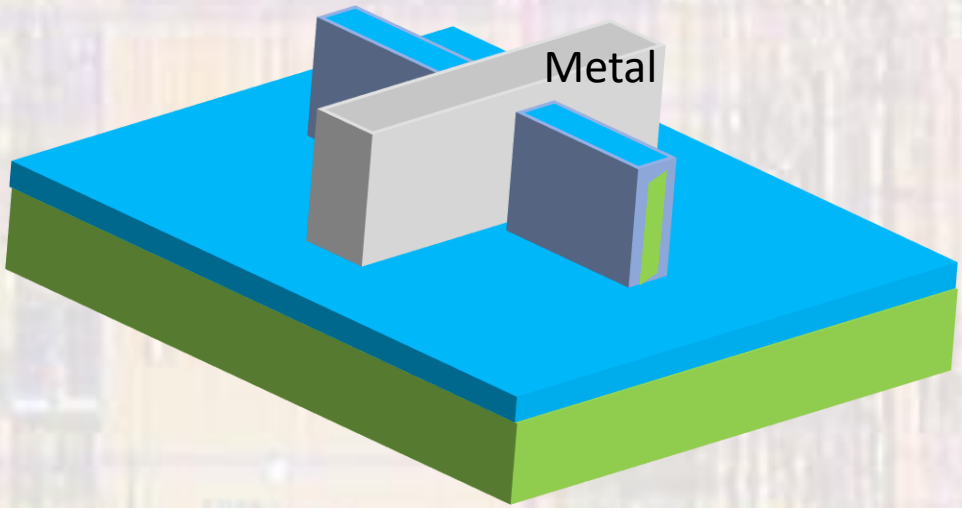


P-Channel Device

FinFET Processing

- Define the gate layer
  - Deposit Metal or Polysilicon and pattern

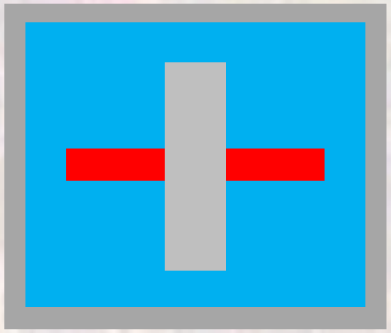


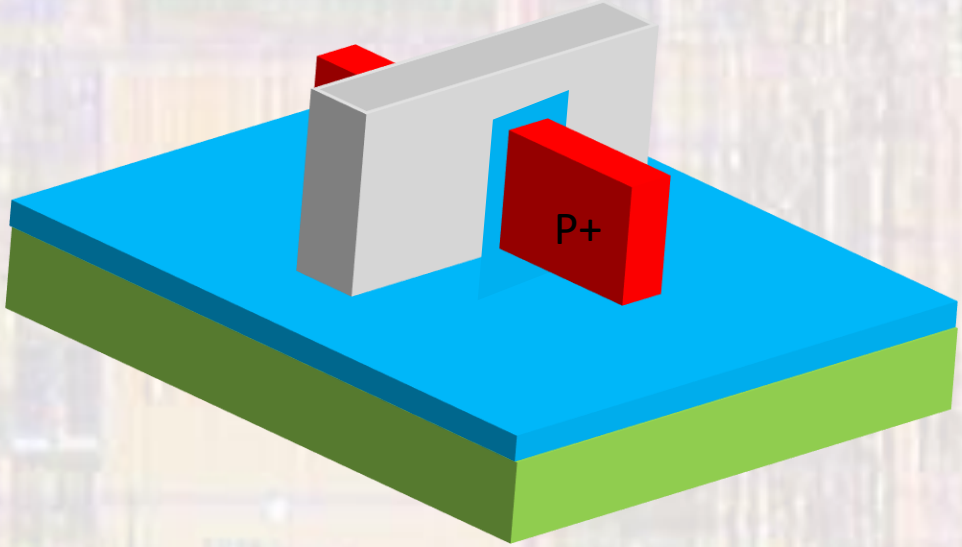


P-Channel Device

FinFET Processing

- Define the Source/Drain
  - Strip the thin oxide
    - Gate oxide protected by the gate metal
  - Implant with P+

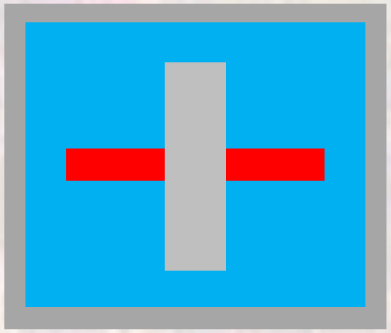


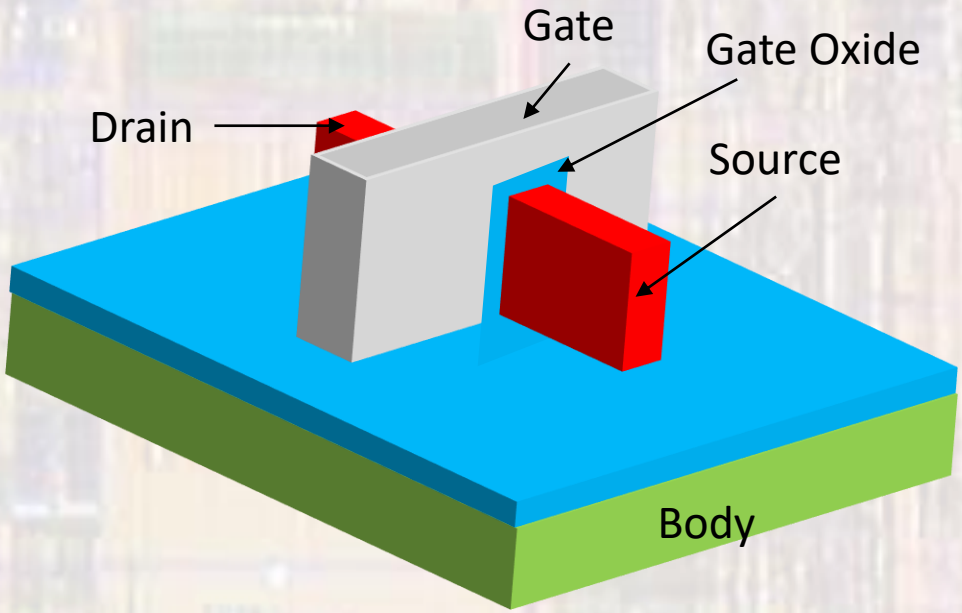


P-Channel Device

FinFET Processing

- Finished P-Channel Transistor

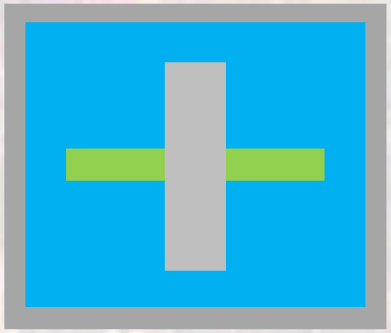


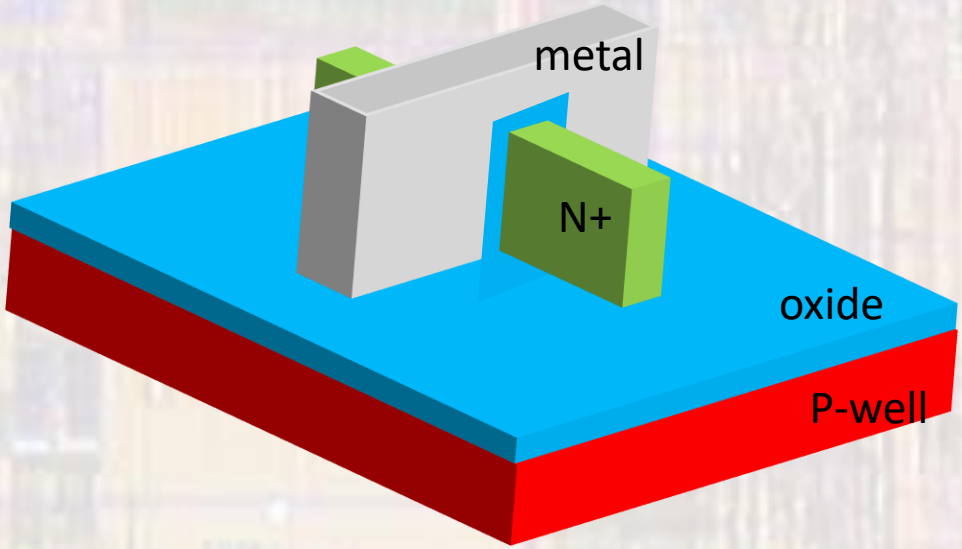


P-Channel Device

FinFET Processing

- Final N-channel Transistor
  - Uses the same processes

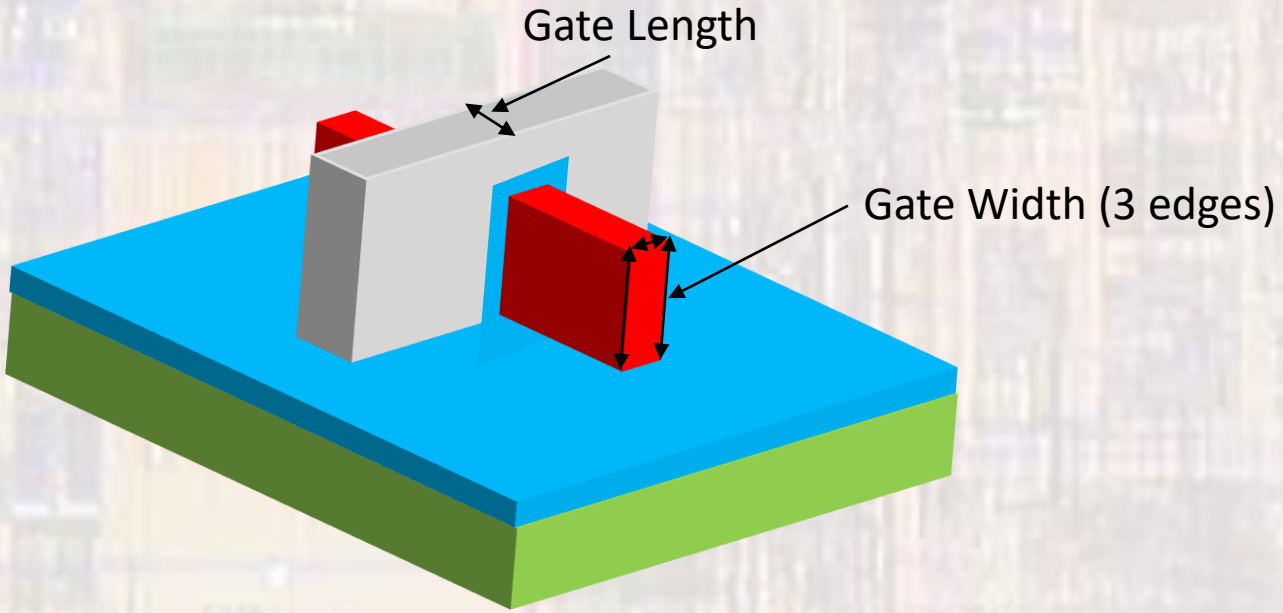




N-Channel Device

FinFET Processing

- Design Dimensions
  - Gate Width and Gate Length are Fixed
    - Part of the process technology



  - Device sizing is restricted to integral multiples of the standard size device

