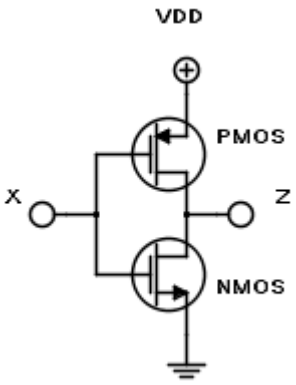
NOTES: Hardware

Hardware

- On the lowest level, we look at only two components: the CPU and the memory
    - All I/O is done on the memory

CMOS

- CMOS gates use two transistors to prevent leakage of current, i.e. idle power consumption
- One set of transistors dictates whether the output is true; the other set is inverted, and connects output to ground if it there is no output



Adders

- Ripple-carry adders are slow because they are sequential
    - 3 gate-delays to compute sum
    - 3 gate-delays to compute carry-out
- Carry-lookahead adders are faster, but are too complicated; usually you use two four-byte CLAs put together
    - 2 gate-delays to compute sum
    - 2 gate-delays to compute carry-out

Definitions

- CPU: Central Processor Unit
- Moore's Law: The # of transistors on a microchip tends to double approx. every two years, leading to an exponential increase in computing power
- Dark silicon: amount of circuitry that cannot be powered on due to computing constraints
    - A chip starts heating up when it's using too much power, so it has to turn off some of its transistors to cool down
    - When transistors get to a critical small size, they create too much heat
- Dennard scaling (look it up)