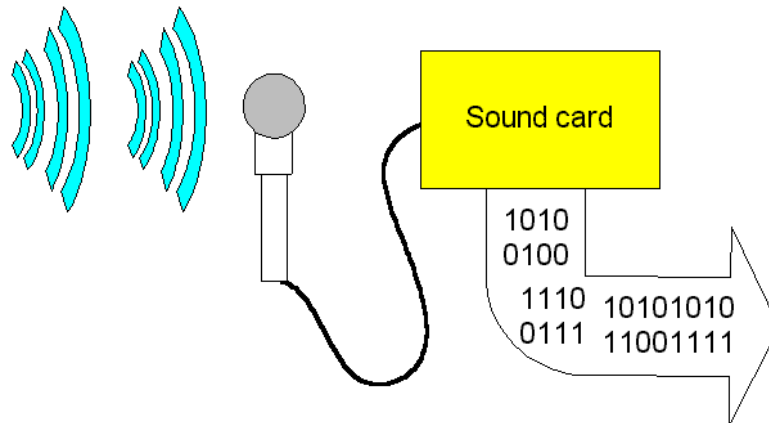
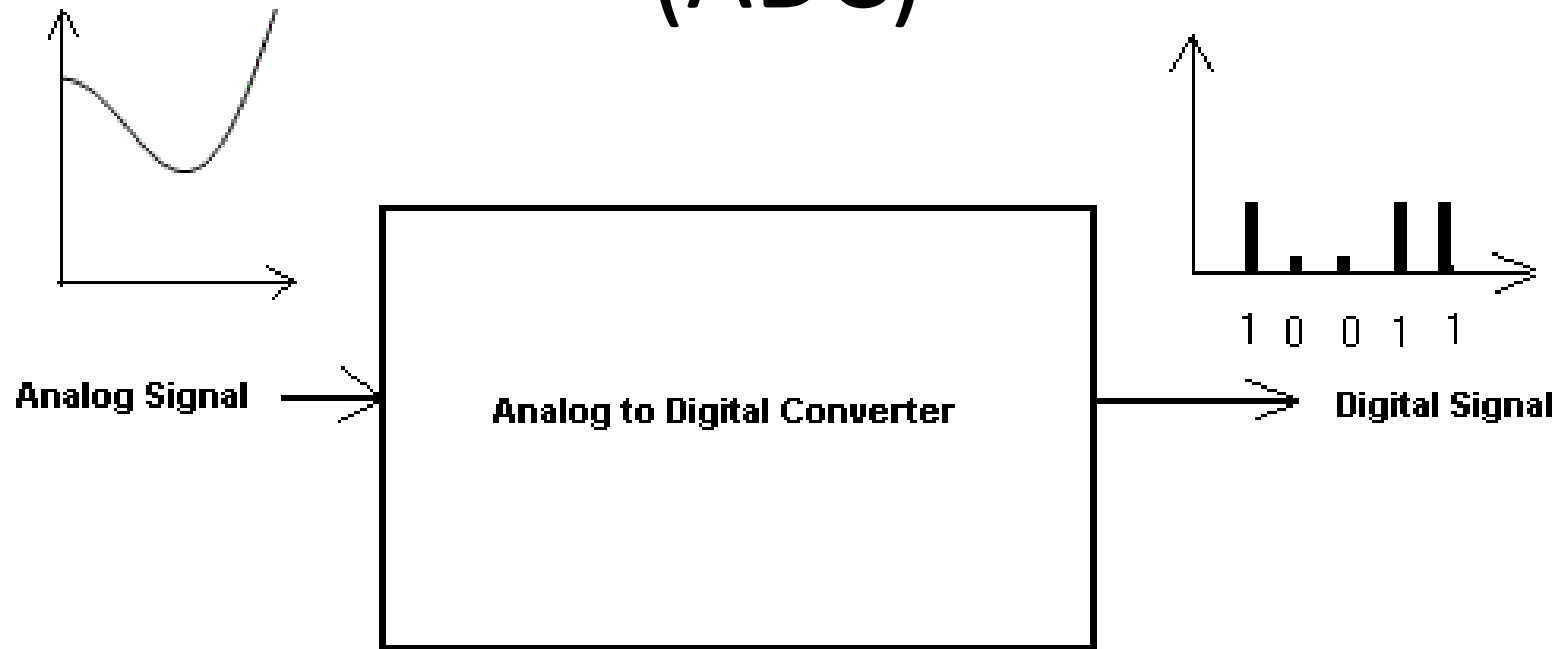


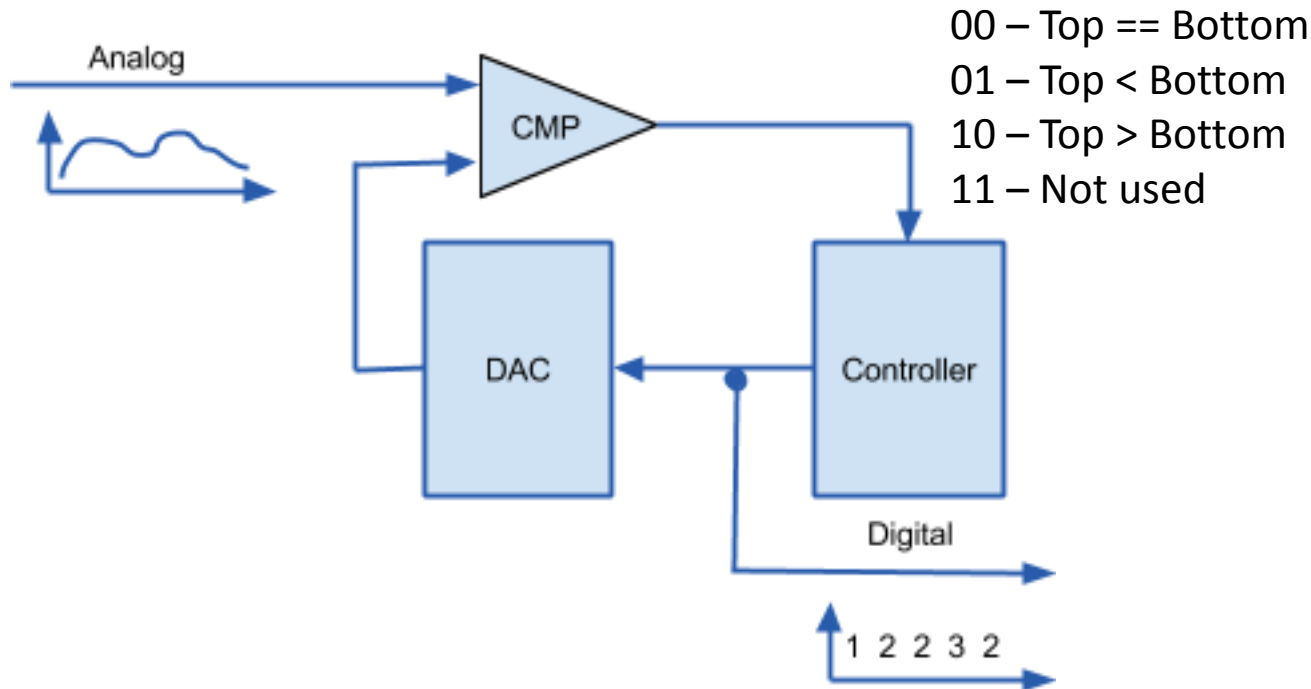
Analog to Digital Conversion (ADC)



ADC Concepts

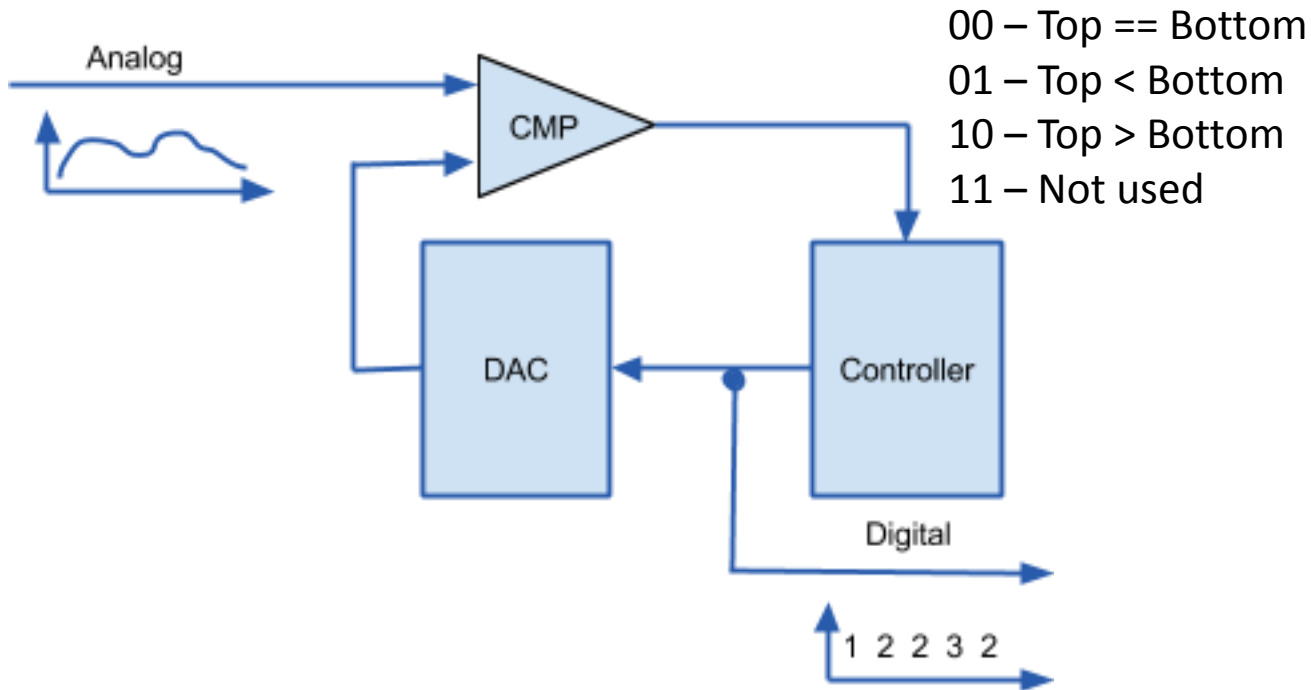
- Voltage Range: [-2.0V, +2.0V]
- Digital Output Range [-128, +127] (in bits)
- ADC Precision # bits
- Quantization Error
 - Continuous → Discrete
 - A voltage in range [-2.000000, -1.984375) maps to -128,
 - A voltage in range [-1.984375, -1.968750) maps to -127
 - Etc.

Successive Approximation



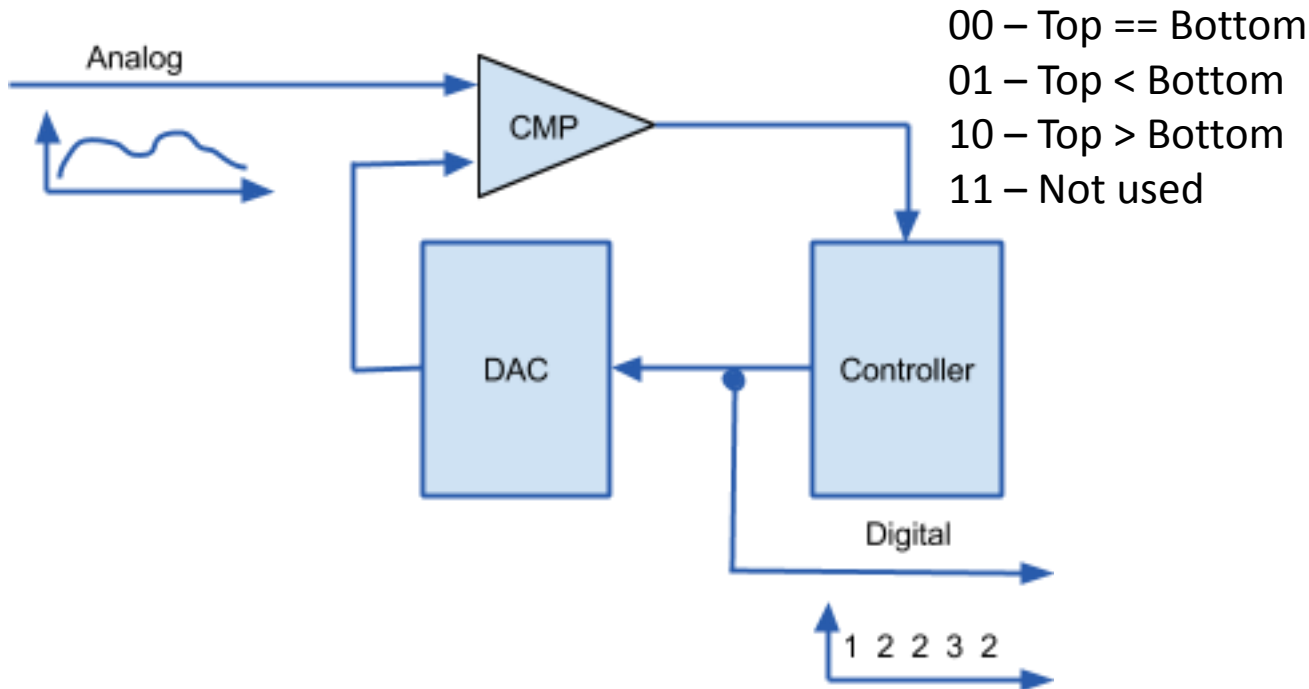
- Repeatedly guess a digital value
- Refine guess
- Eventually converge

Linear Search



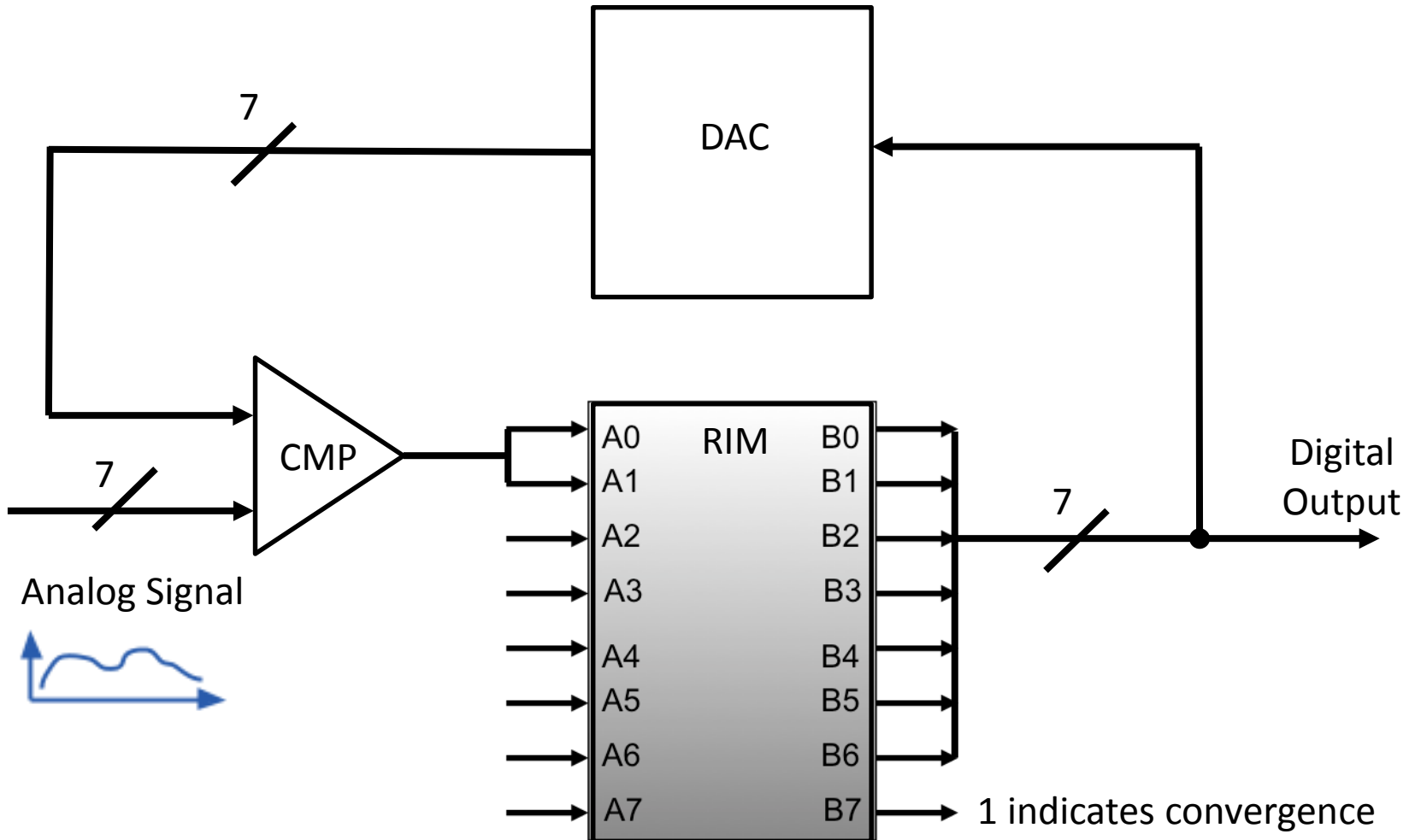
- Repeatedly guess a digital value
- Refine guess (+1, -1)
- Eventually converge

Binary Search

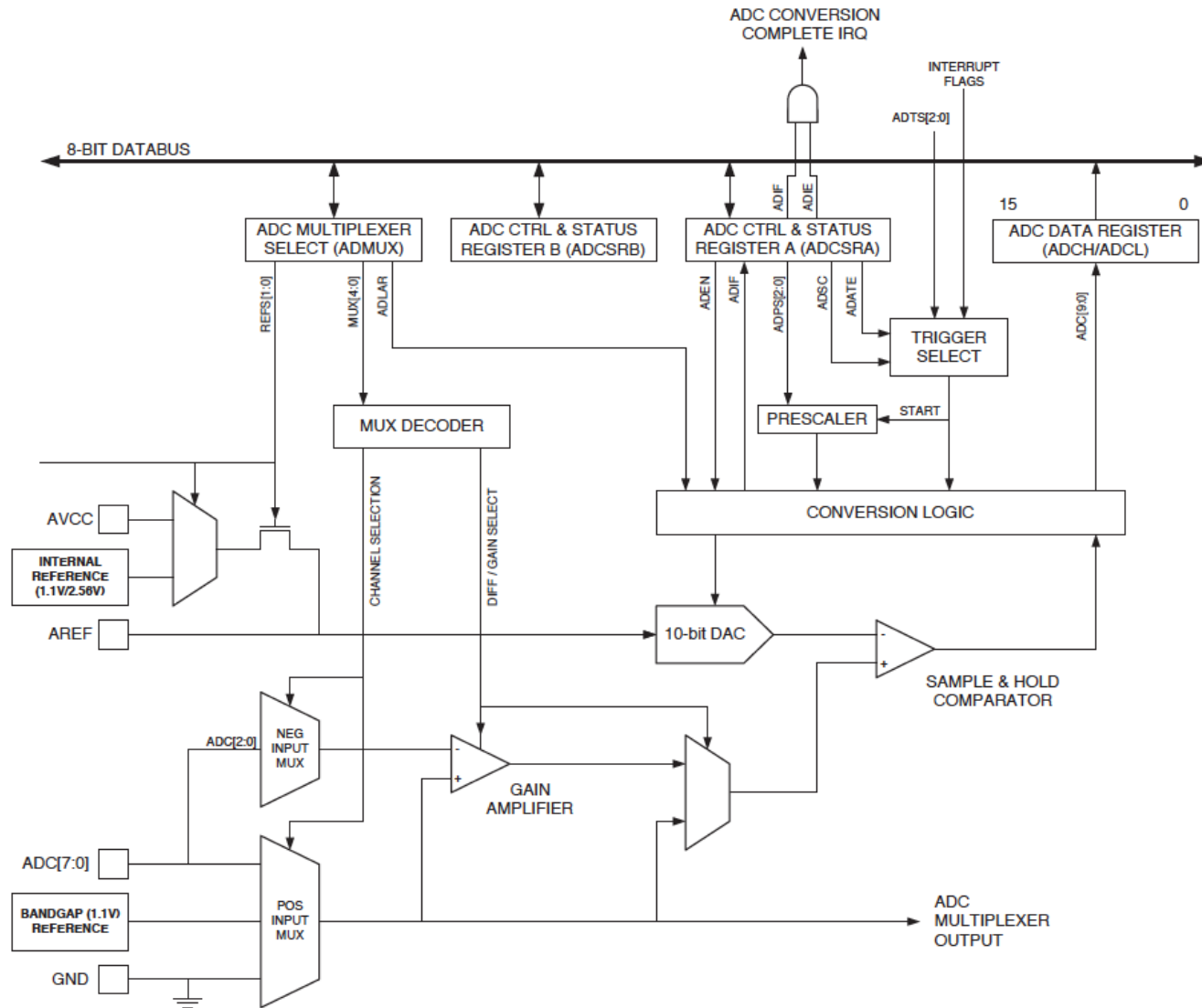


- Repeatedly guess a digital value
- Maintain a window [MIN, MAX] of possible values
- Guess the middle of the window, and discard the upper/lower half
- Eventually converge when the window size is 1

RIMS Setup



ATmega1284 ADC



Implementation Issues

- Is ADC a synchSM Design Issue, or something you do in straight-line code?
 - SynchSM: Sample from the CMP every Tick()
 - Straight-line code: Multiple CMP samples per Tick()
- Depends on many factors
 - How aggressive is your synchSM period?
 - How fast is the DAC?
 - How fast is the control logic (HW or SW)?
 - What is the precision of the sampled value?