Hexadecimal

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These slides introduce hexadecimal numbers

Hexadecimal

- Hexadecimal
  - Base 16 number system
  - 0-9
    - Represent them with their decimal values
  - 10-15
    - Represent them with letters of the alphabet
    - 10 <-> A (or a)
    - 11 <-> B (or b)
    - 12 <-> C (or c)
    - 13 <-> D (or d)
    - 14 <-> E (or e)
    - 15 <-> F (or f)

Hexadecimal

- Use hexadecimal (hex) as a shorthand for binary
  - Indicate the number is hexadecimal by using 0x1234
  - Group sets of 4 binary bits and represent them with the hexadecimal equivalent
    - 1011 → 0xB 0110 → 0x6 1110 → 0xE
    - 10110110 → 0xB6 01101110 → 0x6E
    - 1011011001101110 → 0xB66E
  - Often it is easier if a space is inserted when writing these
    - 1011 0110 0110 1110 → 0xB66E

Hexadecimal

- Hexadecimal does not differentiate between signed and unsigned numbers
  - Binary ←→ Hex
    - Just do the conversion
  - Decimal ←→ Hex
    - Must convert to/from signed/unsigned binary first
  - When it is not obvious from the context you need to indicate the binary representation that the hex represents
    - Address = 0xB66E → binary equivalent is unsigned binary → 46,702
    - Data value = 0xB66E → binary equivalent is 2's complement → -18,834

Hexadecimal

- Multiple ways to indicate a hex value
  - 12CDh — h at end
  - h12CD — h at beginning
  - $12CD — $ at beginning
  - 0x12CD — 0x at beginning
- Different processors/people use different shorthand
  - We will use 0x