Number Systems Hexadecimal

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Number Systems

- Hexadecimal
  - Group sets of 4 binary bits
  - 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)

Number Systems

- Use hexadecimal (hex) as a shorthand for binary

  - Group sets of 4 binary bits and represent them with the hexadecimal equivalent
    - 1011 → B   0110 → 6   1110 → E
    - 10110110 → B6   01101110 → 6E
    - 1011011001101110 → B66E

  - Often it is easier if a space is inserted when writing these
    - 1011 0110 0110 1110 → B66E

  - When it is not obvious from the context you need to indicate the binary representation that the hex represents
    - Address = B66E → binary equivalent is unsigned binary → 46,702
    - Data value = B66E → binary equivalent is 2's complement → -18,834

Number Systems

- Use hexadecimal (hex) as a shorthand for binary

  - 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

Number Systems

- Use hexadecimal (hex) as a shorthand for binary

	Unsigned Binary	Signed Magnitude	1's Complement	2's Complement	BCD
50	0011 0010	0011 0010	0011 0010	0011 0010	0101 0000
	h32	32h	$32	0x32	32h
-50	N/A	1011 0010	1100 1101	1100 1110	N/A
		B2h	$CD	0xCE	

h96 Unsigned Binary	96h Signed Magnitude	$96 1's Complement	0x96 2's Complement	96 BCD
150	-22	-105	-106	96