

Number Base Charts

CSE 410 - Computer Systems

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Unsigned binary numbers

- Each bit represents a power of 2
- For unsigned numbers in a fixed width field
 - the minimum value is 0
 - the maximum value is $2^n - 1$, where n is the number of bits in the field
- Fixed field widths determine many limits
 - 5 bits = 32 possible values ($2^5 = 32$)
 - 10 bits = 1024 possible values ($2^{10} = 1024$)

Binary, Hex, and Decimal

$2^8=256_{10}$	$2^7=128_{10}$	$2^6=64_{10}$	$2^5=32_{10}$	$2^4=16_{10}$	$2^3=8_{10}$	$2^2=4_{10}$	$2^1=2_{10}$	$2^0=1_{10}$	Hex ₁₆	Decimal ₁₀
							1	1	0x3	3
					1	0	0	1	0x9	9
					1	0	1	0	0xA	10
					1	1	1	1	0xF	15
				1	0	0	0	0	0x10	16
				1	1	1	1	1	0x1F	31
		1	1	1	1	1	1	1	0x7F	127
	1	1	1	1	1	1	1	1	0xFF	255

Binary, Hex, and Decimal

Binary ₂	$16^4=65536_{10}$ $16^3=4096_{10}$ $16^2=256_{10}$ $16^1=16_{10}$ $16^0=1_{10}$					Decimal ₁₀
11					3	3
1001					9	9
1010					A	10
1111					F	15
1 0000				1	0	16
1 1111				1	F	31
111 1111				7	F	127
1111 1111				F	F	255

Binary, Hex, and Decimal

Binary ₂	Hex ₁₆	$10^3=1000_{10}$ $10^2=100_{10}$ $10^1=10_{10}$ $10^0=1_{10}$			
11	0x3				3
1001	0x9				9
1010	0xA			1	0
1111	0xF			1	5
1 0000	0x10			1	6
1 1111	0x1F			3	1
111 1111	0x7F		1	2	7
1111 1111	0xFF		2	5	5