

Computer Information Systems

Basics of Computing

Conversion Rules

Binary

Values of each position are:

2048 1024 512 256 128 64 32 16 8 4 2 1

Binary to Decimal

Add the value of each position where there is a one.

For example

101010 would be $32 + 8 + 2$ or 42

Decimal to Binary

Method 1

Find the highest binary position that is less than the number. Put a one there. Subtract that number from the original number. Repeat until you get to zero

Method 2

If the number can be divided by 2, put a 0. If the number cannot be divided by 2, subtract 1 and put a 1. Now divide the number by 2. Take the result and start over.

Binary Addition and Multiplication

Remember that in binary you carry 1's and 0's.

1	11	11
+1	+11	11
10	110	+ 11
		1001

Hexadecimal

Values of each position are:

65536 4096 256 16 1

Hexadecimal values

0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F A=10 B=11 C=12 D=13 E=14 F=15

Hexadecimal to Decimal

Multiply each position by the position value and the hex value. Then add them together.

For example

$$2A3 = (2 \times 256) + (10 \times 16) + (3 \times 1) = 512 + 160 + 3 = 675$$

Decimal to Hexadecimal

If the number is greater than 65536, divide by 65536, convert the number to hex value. This is the left #.

If the number or the remainder is 65535 to 4096, divide by 4096, convert the number to hex value. This is the next number.

If the number or remainder is 4095 to 256, divide by 256, convert the number to hex value. This is the next number.

If the number or remainder is 255 to 16, divide by 16, convert the number to hex value. This is the next number.

If the number or remainder is less than 16, convert it to hex value. This is the right most position.

If a remainder is 0, you must put a 0.