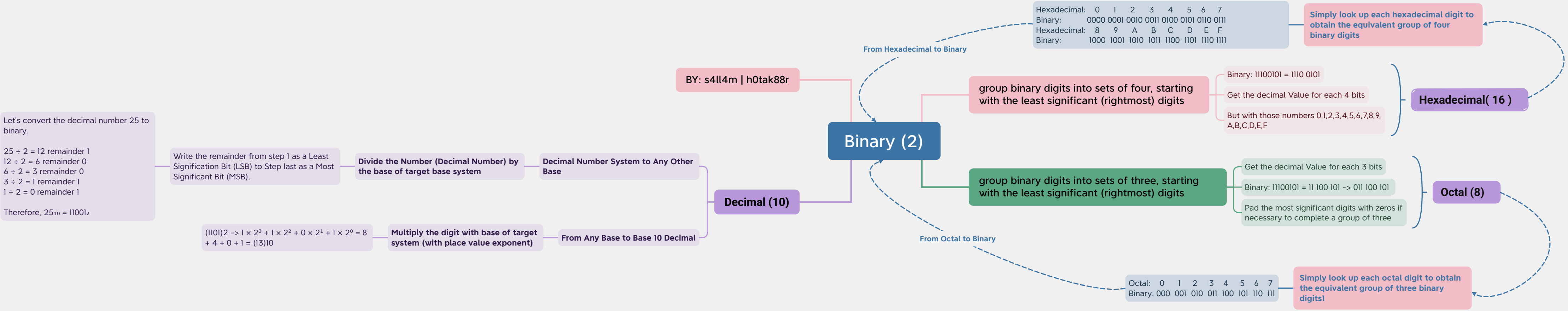

Binary (2)

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Decimal (10)

- **Decimal Number System to Any Other Base**
  - **Divide the Number (Decimal Number) by the base of target base system**
    - Write the remainder from step 1 as a Least Signification Bit (LSB) to Step last as a Most Significant Bit (MSB).
      - Let's convert the decimal number 25 to binary.

        25 ÷ 2 = 12 remainder 1
        12 ÷ 2 = 6 remainder 0
        6 ÷ 2 = 3 remainder 0
        3 ÷ 2 = 1 remainder 1
        1 ÷ 2 = 0 remainder 1

        Therefore, $25_{10} = 11001_2$
- **From Any Base to Base 10 Decimal**
  - **Multiply the digit with base of target system (with place value exponent)**
    - $(1101)2 \rightarrow 1 \times 2^3 + 1 \times 2^2 + 0 \times 2^1 + 1 \times 2^0 = 8 + 4 + 0 + 1 = (13)10$

Hexadecimal(16)

- group binary digits into sets of four, starting with the least significant (rightmost) digits
  - Binary: 11100101 = 1110 0101
  - Get the decimal Value for each 4 bits
  - But with those numbers 0,1,2,3,4,5,6,7,8,9, A,B,C,D,E,F

Simply look up each hexadecimal digit to obtain the equivalent group of four binary digits

Hexadecimal:	0	1	2	3	4	5	6	7
Binary:	0000	0001	0010	0011	0100	0101	0110	0111
Hexadecimal:	8	9	A	B	C	D	E	F
Binary:	1000	1001	1010	1011	1100	1101	1110	1111

From Hexadecimal to Binary

Octal (8)

- group binary digits into sets of three, starting with the least significant (rightmost) digits
  - Get the decimal Value for each 3 bits
  - Binary: 11100101 = 11 100 101 -> 011 100 101
  - Pad the most significant digits with zeros if necessary to complete a group of three

Simply look up each octal digit to obtain the equivalent group of three binary digits1

Octal:	0	1	2	3	4	5	6	7
Binary:	000	001	010	011	100	101	110	111

From Octal to Binary

Presented with xmind