Dr.SNS RAJALAKSHMI COLLEGE OF ARTS AND SCIENCE, (AUTONOMOUS)

COIMBATORE-641049

Accredited by NAAC (Cycle III) with “A+” Grade

Recognized by UGC, Approved by AICTE, New Delhi and

Affiliated to Bharathiar University, Coimbatore.

DEPARTMENT OF COMPUTER APPLICATIONS

Course Code / Course Name: **23UCU403 /Computer System Architecture**

YEAR: **2023-2024**

CLASS: **I BCA “A”**

STAFF NAME: Dr.A.DEVI

UNIT I – Data Representation

Agenda

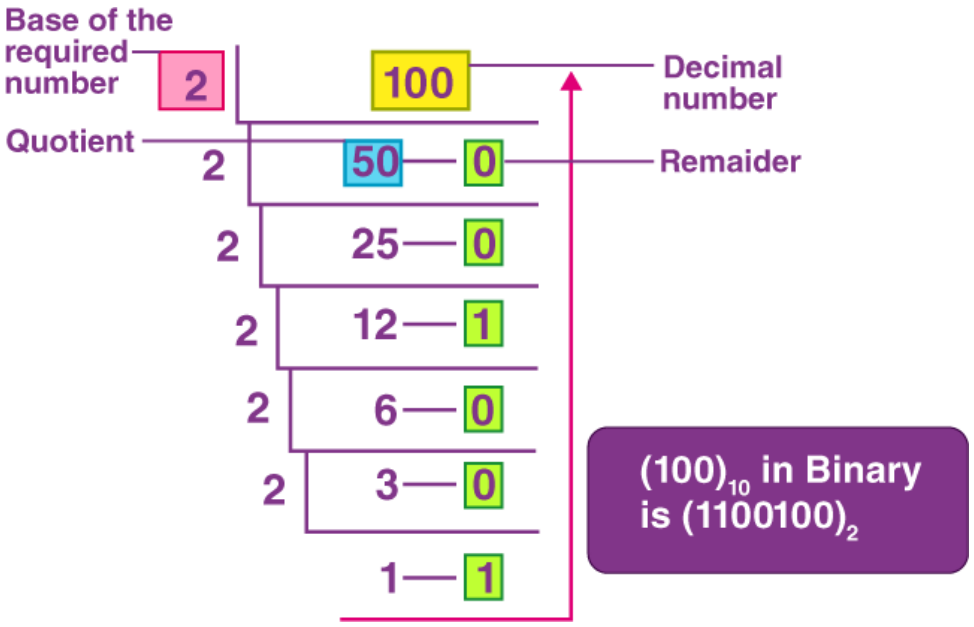
- The Decimal Number System
- The Binary Number System
- The Octal Number System
- The Hexadecimal Number System
- Converting from One Number System format to another

Number Systems

- Decimal (0-9)
- Binary (0 or 1)
- Octal (0-7)
- Hexadecimal. (0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F)

Decimal to Binary

$(100.75)_{10}$



0.75 x 2=1.50

0.50 x 2=1.00

$(100.75)_{10} = (1100100.11)_2$

Decimal to Binary

195 / 2 = 97 with remainder 1

97 / 2 = 48 with remainder 1

48 / 2 = 24 with remainder 0

24 / 2 = 12 with remainder 0

12 / 2 = 6 with remainder 0

6 / 2 = 3 with remainder 0

3 / 2 = 1 with remainder 1

1 / 2 = 0 with remainder 1

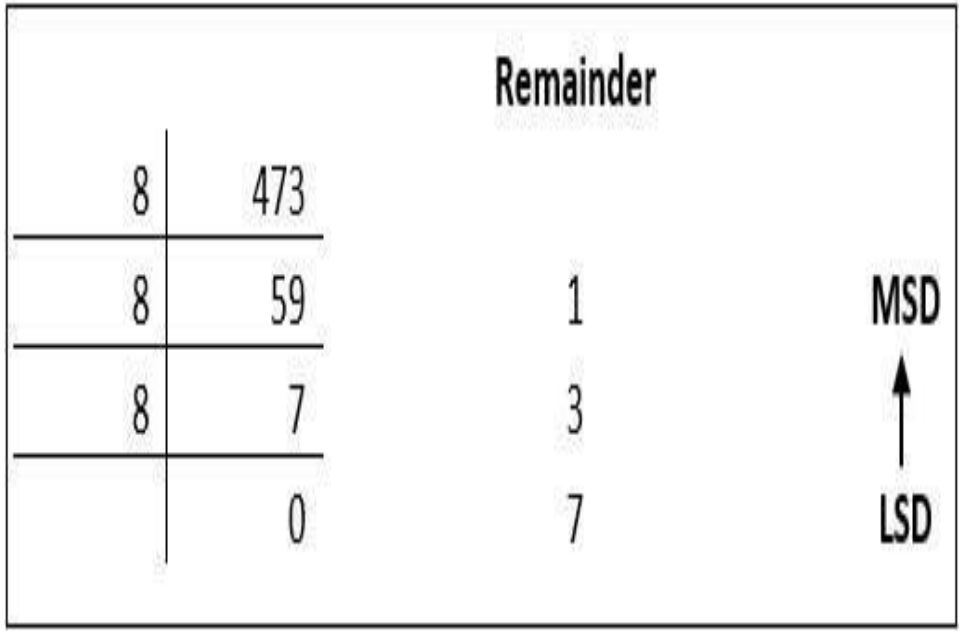
$(195.25)_{10}$

$(195.25)_{10} = (11000011.01)_2$

0.25 x 2=0.50

0.50 x 2=1.00

Decimal to Octal



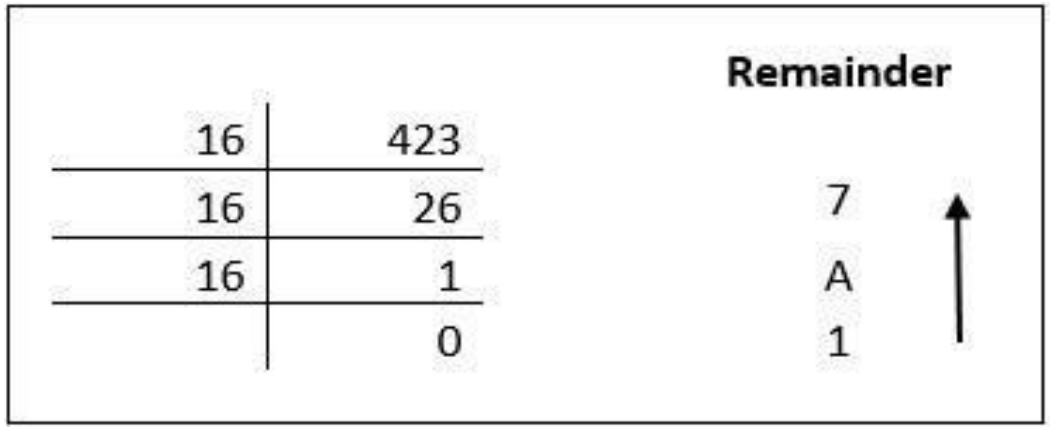
Decimal Number	Operation	Quotient	Remainder	Octal Number
1792	÷ 8	224	0	0
224	÷ 8	28	0	00
28	÷ 8	3	4	400
3	÷ 8	0	3	3400

$(473)_{10}=(731)_8$

$(1792)_{10}=(3400)_8$

Decimal to Hexadecimal

Decimal Number	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Equivalent Hexadecimal	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F



Divide by 16	Quotient	Remainder	Hex Value
1228 ÷ 16	76	12	C
76 ÷ 16	4	12	C
4 ÷ 16	0	4	4

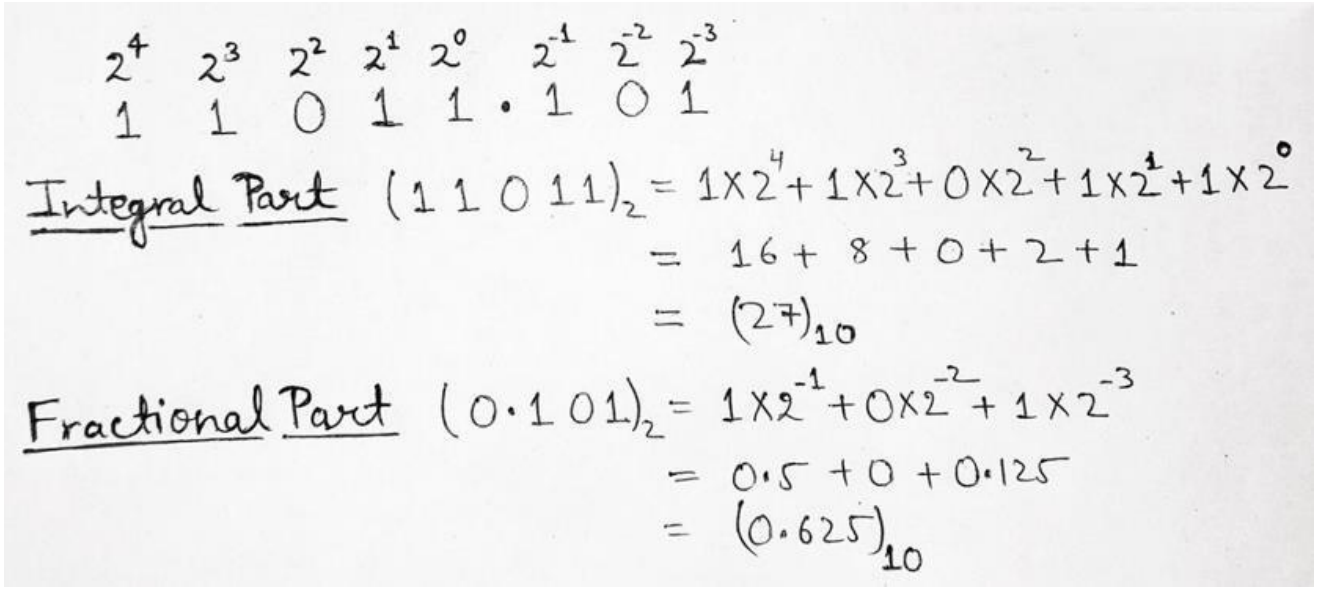
$(423)_{10}=(1A7)_{16}$

$(1228)_{10}=(4CC)_{16}$

Binary to Decimal

Binary	0	1	10	11	100	101	110	111	1000	1001	1010	1011	1100	1101	1110	1111
Decimal	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

$(11011.101)_2$



$(11011.101)_2=(27.625)_{10}$

Binary to Octal

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

$(1010111100)_2$

1 010 111 100

001 010 111 100

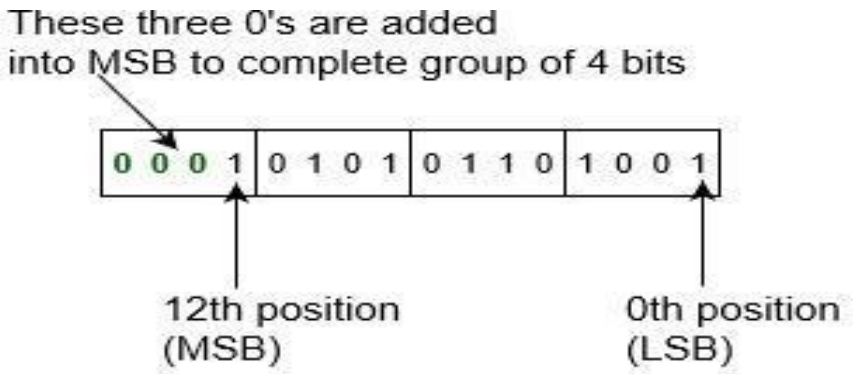
1 2 7 4

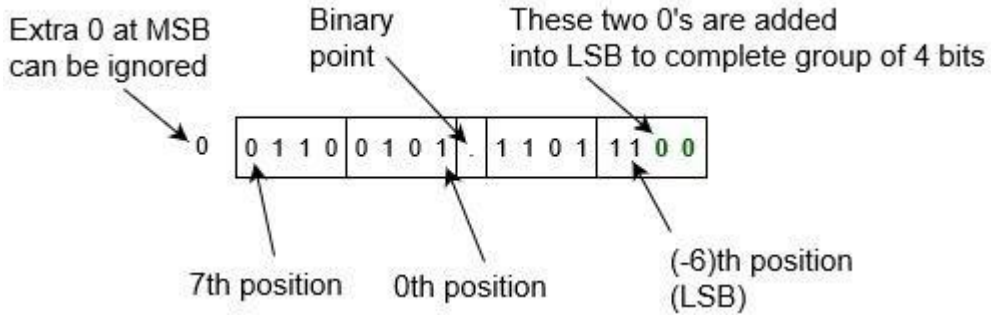
$(1010111100)_2 = (1274)_2$

Binary to Hexadecimal

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

$(1010101101001)_2 = (1569)_{16}$ $(0110.0101.110111)_2 = (65.DC)_{16}$





Octal to Decimal and Binary

41_8

$41_8 = (4 * 8^1) + (1 * 8^0)$
$= 4 * 8 + 1 * 1$
$= 32+1$
$= \mathbf{33_{10}}$

2	33	
2	16	1
2	8	0
2	4	0
2	2	0
2	1	0

$33_{10} = 100001_2$

$41_8 = 100001_2$

Octal to Binary

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

Example :72_8 =(?)$_2$

72_8 =

7	2
111	010

$72_8 = 111010_2$

Octal to Hexadecimal

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

Example :72_8 =(?)$_{16}$ **72_8 =** **7 2**

111 010

$72_8 = 111010_2$

111010_2 = 11 1010

= 0011 1010

= 3 A

$72_8 = 3A_{16}$

Hexa to Binary, Octal

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

$1BC_{16}$ = $0001\ 1011\ 1100_2$

$0001\ 1011\ 1100_2$ = 000 110 111 100

= 0 6 7 4

$1BC_{16} = 674_2$

Hexa to Decimal

7CA.12

$(7CA)_{16} = (7 \times 16^2) + (12 \times 16^1) + (10 \times 16^0)$

$(7CA)_{16} = (7 \times 256) + (12 \times 16) + (10 \times 1)$

$(7CA)_{16} = 1792+192+10$

$(7CA)_{16} = (1994)_{10}$

$(12)_{16} = (1 \times 16^{-1}) + (2 \times 16^{-2})$

$(12)_{16} = (1 \times 1/16) + (2\times 1/256)$

$(12)_{16} =(1 \text{ x } 0.0625) + (2 \text{ x } 0.0390625)$

$(12)_{16} = (0.0625 + (0.0078125)$

$(12)_{16} = 0.0703125_{10}$

$(7CA)_{16} = (1994.07030125)_{10}$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Thank You