

Command Line Tools

(CLI)

→ Command Prompt

→ Terminal

- 1) cd <path> → change directory
- 2) mkdir <dir_name> → make folder / directory
- 3). touch <filename.txt> → new file → Unix (mac or linux)
echo → windows
- 4). ls → list all files / dir in a dir
dir → windows

Functions Summary

methods

- 1). Syntax
- 2). Scope of fn
- 3). Void type & return types
- 4). Params vs arguments
- 5). Local var vs global var



Reduce your
code



Methods \rightarrow Single
Responsibility



$\text{sum}(a, b) \rightarrow a + b$

Decimal \rightarrow 10

0	16
1	11
2	12
3	13
4	14
5	15
6	16
7	17
8	18
9	19

--- sum

Number Systems

- 1) Base
- 2) Digits
- 3) Plus

- (1) Decimal
- (2) Binary
- (3) Octal
- (4) Hexadecimal

1) Decimal Number System \rightarrow Human Readable

Base = 10

0	10	20
1	11	21
2	12	22
3	13	23
4	14	24
5	15	25
6	16	26
7	17	27
8	18	28
9	19	29

70	80	90	100	110	120
71	81	91	101	,	,
72	82	92	102	,	,
73	83	93	103	,	,
74	84	94	,	,	,
75	85	95	,	,	,
76	86	96	,	,	,
77	87	97	,	,	,
78	88	98	,	,	,
79	89	99	109	119	129

1000



gggg



100000

gggg

Plaus

$$\left[\begin{array}{cccc} 10^3 & 10^2 & 10^1 & 10^0 \\ 8 & 2 & 6 & 3 \end{array} \right]_{10} \rightarrow \text{Base} = 10$$

$$8 \times 10^3 + 2 \times 10^2 + 6 \times 10^1 + 3 \times 10^0$$

$$8000 + 200 + 60 + 3$$



$$8263$$

$$\text{Low} = \left[\begin{array}{cccccc} - & - & - & - & - \\ 10^4 & 10^3 & 10^2 & 10^1 & 10^0 \end{array} \right]_{10} \rightarrow 0$$

$$\text{high} = [\underline{\underline{9}} \quad \underline{\underline{9}} \quad \underline{\underline{9}} \quad \underline{\underline{9}} \quad \underline{\underline{9}}]_{10}$$

$$\text{How many} = \left[\begin{array}{ccccc} \downarrow & \downarrow & \downarrow & \downarrow & \downarrow \\ 10 & 10 & 10 & 10 & 10 \end{array} \right]_{10} \rightarrow 10^5$$

100000

Binary System → Machine

Box = $2^0 \rightarrow 2^1$

0	10
1	11

$\frac{2}{2}.$

100
101
110
111

\rightarrow_0] → only
 \rightarrow_1

$\frac{2}{2}$

1000	10000	11000
1001	10001	11001
1010	10010	11010
1011	10011	11011
1100	10100	110101
1101	10101	11100
1110	10110	11101
1111	10111	11111

P1005 \rightarrow

$$\begin{matrix} 2^4 & 2^3 & 2^2 & 2^1 & 2^0 \\ [1 \ 1 \ 0 \ 1 \ 1]_2 \end{matrix}$$

MSB

$$1 \times 2^4 + 1 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 1 \times 2^0$$

$$16 + 8 + 0 + 2 + 1$$

$$\begin{matrix} 11 \\ 27 \end{matrix}$$

$$[- - - -]$$

Low

$$[0 0 0 0]_2$$

high

$$[1 1 1 1]_2$$

Count

$$\left[\begin{array}{c} 2 \times 2 \\ 2 \times 2 \end{array} \right]_2 \rightarrow 2^4$$

Octal

Base = 8

0	10	20	70	100
1	11	21	71	110
2	12	22	72	111
3	13	23	73	1000
4	14	24	74	10000
5	15	25	75	100000
6	16	26	76	1000000
7	17	27	77	10000000

$$\left[\begin{smallmatrix} 8^2 & 8^1 & 8^0 \\ 6 & 3 & 8 \end{smallmatrix} \right]_8 \rightarrow 6 \times 8^2 + 3 \times 8^1 + 8 \times 8^0$$

$$\left[\underline{\quad} \quad \underline{\quad} \quad \underline{\quad} \quad \underline{\quad} \right]_8$$

Low $\left[\underline{0} \quad \underline{0} \quad \underline{0} \quad \underline{0} \right]_8$

high $\left[\underline{2} \quad \underline{2} \quad \underline{2} \quad \underline{2} \right]_8$

Count $\left[\underline{8} \times \underline{8} \quad \underline{+ 8} \times \underline{1} \right]_8$

Base Conversion

$$[57]_{10} \rightarrow [11001]_2$$

decimal → Binary

Algo

Step 1 → Start divide your number with 2

2	57	1	$\rightarrow 2^0$
2	28	0	$\rightarrow 2^1$
2	14	0	$\rightarrow 2^2$
2	7	0	$\rightarrow 2^3$
2	3	1	$\rightarrow 2^4$
2	1	1	$\rightarrow 2^5$
0	0	1	

$$[1 \ 11 \ 00 \ 1]_2 \rightarrow [57]_{10}$$

10	111001	
10	11100	1 → 2^0 → 1 × 1 → 1
10	1110	0 → 2^1 → 0 × 2 → 0
10	111	0 → 2^2 → 0 × 4 → 0
10	11	1 → 2^3 → 1 × 8 → 8
10	1	1 → 2^4 → 1 × 16 → 16
		1 → 2^5 → 1 × 32 → 32

$$32 + 16 + 8 + 0 + 0 + 1 = 57$$

$$[798]_{10} \rightarrow [1436]_8$$

8	7 9 8	
8	9 9	6 → 10 ⁰
8	1 2	3 → 10 ¹
8	1	4 → 10 ²
0	1	1 → 10 ³

$$[1436]_8 \rightarrow [798]_{10}$$

10	1	4	3	6				
10	1	4	3	6	$\rightarrow 8^6 \Rightarrow 6 \times 1 = 6$			512
10		(4)		3	$\rightarrow 8^1 \rightarrow 3 \times 8 = 24$		256	24
10			1	4	$4 \rightarrow 8^2 \rightarrow 4 \times 64 \rightarrow 256$			6
				0	$1 \rightarrow 8^3 \rightarrow 1 \times 512 \rightarrow 512$			798

$$[68]_{10} \rightarrow []_2$$

Code \rightarrow Decimal \rightarrow Binary

$$n \Rightarrow [6.8]_{10} \rightarrow []$$

2	6 8	
2	3 4	$0 \rightarrow 10^0 \rightarrow 0$
2	1 7	$0 \rightarrow 10^1 \rightarrow 0$
2	8	$1 \rightarrow 10^2 \rightarrow 100$
2	4	$0 \rightarrow 10^3 \rightarrow 0$
2	2	$0 \rightarrow 10^4 \rightarrow 0$
2	1	$0 \rightarrow 10^5 \rightarrow 0$
	0	$1 \rightarrow 10^6 \rightarrow 1000000$

$$\rightarrow \begin{pmatrix} 1 & 0 & 0 & 0 & 1 & 0 & 0 \end{pmatrix}_2$$

2	6 8		
2	3 4	<u>0</u> $\rightarrow 10^0 \rightarrow 0$	
2	1 7	<u>0</u> $\rightarrow 10^1 \rightarrow 0$	
2	8	<u>1</u> $\rightarrow 10^2 \rightarrow 100$	
2	4	<u>2</u> $\rightarrow 10^3 \rightarrow 0$	
2	2	<u>5</u> $\rightarrow 10^4 \rightarrow 0$	
2	1	<u>0</u> $\rightarrow 10^5 \rightarrow 0$	
	0	<u>1</u> $\rightarrow 10^6 \rightarrow 1000000$	

$$\alpha_m = 0$$

$$p_{\text{Lad}} = 1$$

whw ($n > 0$) {

$$\alpha_m = 680/2$$

$$n = 68/2$$

$$\alpha_s = \alpha_m + \alpha_m \times p_{\text{Lad}}$$

$$p_{\text{Lad}} = p_{\text{Vad}} \times 10^{\frac{n}{2}}$$

}

$$cm = 0$$

$$Plau = 1$$

whv ($n > 0$) {

$$cm = 68/2$$

$$n = 68/2$$

$$cm = cm + cm \times Plau$$

$$Plau = Plau \times 10$$

}

1st

$$n = 68 \rightarrow 4$$

$$cm = 0$$

$$cm = 0 + 0 \times 1 = 0$$

$$Plau = 1 \times 10 = 10$$

2nd

$$n = 17 \rightarrow 8$$

$$cm = 1$$

$$cm = 0 + 1 \times 100 = 100$$

$$Plau = 100 \times 10 = 1000$$

2nd

$$n = 34 \rightarrow 17$$

$$cm = 0$$

$$cm = 0 + 0 \times 10 = 0$$

$$Plau = 10 \times 10 = 100$$

3rd

$$n = 8 \rightarrow 4$$

$$cm = 0$$

$$cm = 100 + 0 \times 1000$$

$$\Leftarrow 100$$

$$Plau = 1000 \times 10 = 10000$$

$[798]_{10} \rightarrow []_8$

$n = 798 \rightarrow []_8$

1st

$$n = 798 \rightarrow 98$$

$$\text{rem} = 6$$

$$\text{ans} = 0 + 6 \times 1 = 6$$

$$\text{PL} = 1 \times 10 = 10$$

2nd

$$n = 98 \rightarrow 12$$

$$\text{ans} = 3$$

$$\text{ans} = 6 + 3 \times 10$$

$$\text{ans} = 6 + 30 = 36$$

$$\text{PL} = 10 \times 10 = 100$$

3rd

$$n = 12 \rightarrow 0$$

$$\text{rem} = 4$$

$$\text{ans} = 36 + 4 \times 100 = 436$$

$$\text{PL} = 100 \times 10 = 1000$$

4th

$$n = 0 \rightarrow 0$$

$$\text{rem} = 1$$

$$\text{ans} = 436 + 1 \times 1000 = 1436$$

```

public static void decimalToOctal(int n) {
    int ans = 0;
    int places = 1; //  $10^0$ 

    while (n > 0) {
        int rem = n % 8;
        n = n / 8;
        ans = ans + rem * places;
        places *= 10;
    }
    System.out.println(ans);
}

```

$$[7 \quad 9 \quad 8]_{10}$$

$$7 \times 10^2 + 9 \times 10^1 + 8 \times 10^0$$

$$7 \times 100 + 9 \times 10 + 8 \times 1$$

$$= 798$$

$$\begin{aligned}
 & [7 \quad 9 \quad 8]_8 = [1 \quad 4 \quad 3 \quad 6]_8 \\
 & 1 \times 8^3 + 4 \times 8^2 + 3 \times 8^1 + 6 \times 8^0 \\
 & 8^3 \rightarrow 512 \\
 & 8^2 \quad 8^2 \quad 8^2 \quad 8^2 \rightarrow 256 \\
 & 8^1 \quad 8^1 \quad 8^1 \rightarrow 24 \\
 & 8^0 \quad 8^0 \quad 8^0 \quad 8^0 \quad 8^0 \rightarrow 6 \\
 & = 798
 \end{aligned}$$

$$798$$

$$798 = 99 \times 8 + 6$$

$$99 = 12 \times 8 + 3$$

$$12 = 1 \times 8 + 4$$

$$1 = 0 \times 8 + 1$$

8 88---127is

$$\begin{array}{r} 96 \\ + 3 \\ \hline 11 \\ 99 \end{array}$$

8	798	
8	99	6
8	12	3
8	1	y
0		1

798

$$798 = \textcircled{99} \times 8 + 6 \rightarrow 8^4 \cdot 0 + 8^3 \cdot 1 + 8^2 \cdot 4 + 3 \cdot 8^1 + 6 \times 8^0$$

$$99 = \textcircled{12} \times 8 + 3 \rightarrow (8^2 \cdot 0 + 8 \cdot 1 + 4) \times 8 + 3 = 8^3 \cdot 0 + 8^2 \cdot 1 + 8 \cdot 4 + 3$$

$$12 = 1 \times 8 + 4 = (0 \times 8 + 1) \times 8 + 4 = 8^2 \cdot 0 + 8 \cdot 1 + 4$$

$$1 = 0 \times 8 + 1$$

$$8^0 \cancel{+} 8^3 \cdot 1 + 8^2 \cdot 4 + 3 \cdot 8^1 + 6 \cdot 8^0$$

$$8^0 \times 6 + 8^1 \times 3 + 4 \times 8^2 \\ + 8^3 \times 1$$

$$\Rightarrow 798$$

8	298	
8	99	6 \rightarrow 8^0
8	12	3 \rightarrow 8^1
8	1	1 \rightarrow 8^2
0		1 \rightarrow 8^3

$(798)_{10} \rightarrow (1481)_8$

