

# LOGIKA INFORMATIKA

## (Logika Kombinasiional: Sistem Bilangan)

Prodi S-1 Teknik Informatika

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# Sistem Bilangan

- Basis = base = **radiks** ( r ).
- Bilangan radiks r, anggotanya : 0, 1, 2, ..., (r-1)
- Bil r=10 (**desimal**) : 0,1,2, ..., 9 (10-1, r=10),
- Bil r=8 (**Oktal**) : 0,1,2, ..., 7,
- Bil r=16 (**Hexadecimal**) : 0,1,2, ..., 9, A (10),  
B(11), ..., F(15), dan
- Bil r=2 (**Biner**) : 0,1.

# Konversi Bilangan Integer

- Bilangan  $N_r = (b_{n-1}b_{n-2}\dots b_1b_0)_r$  memiliki nilai (decimal):

$$b_{n-1} * r^{n-1} + b_{n-2} * r^{n-2} + \dots + b_1 * r^1 + b_0 * r^0.$$

- Contoh:

- a. 294 bilangan desimal ( $r=10$ ), nilainya :

$$4 * 10^0 + 9 * 10^1 + 2 * 10^2 = 4 + 90 + 200$$

- b. 357 bil oktal, nilainya (desimal) : ...?

$$7 * 8^0 + 5 * 8^1 + 3 * 8^2 = 7 + 40 + 192 = 239_{10}$$

- c. 10011 bil biner, nilainya : ...?

- d. A9B1 bil hexadec, nilainya : ...?

# Konversi bilangan Fixed point

- Bilangan  $N_r = (b_{n-1}b_{n-2}\dots b_1 \textcolor{red}{b_0}, \textcolor{brown}{b_{-1}}b_{-2}\dots b_{-m})_r$  memiliki nilai (decimal)  
 $b_{n-1}*r^{n-1} + b_{n-2}*r^{n-2} + \dots + b_1*r^1 + \textcolor{red}{b_0}*r^0 + \textcolor{brown}{b_{-1}}*r^{-1} + b_{-2}*r^{-2} + \dots + b_{-m}*r^{-m}$ .

Contoh :

a.  $(12,75)_{10} \rightarrow 1*10^1 + 2*10^0 + 7*10^{-1} + 5*10^{-2}$   
 $\rightarrow 10 + 2 + 0,7 + 0,05 = 12,75$

b.  $(45,24)_8 \rightarrow 4*8^1 + 5*8^0 + 2*8^{-1} + 4*8^{-2}$   
 $\rightarrow 32 + 5 + 2/8 + 4/64 = 37 + 0,25 + 0,0625 = ....$   
b.2  $(37,1426) = ?, r = ??8; 10? \text{ Hexadec}=6$

c.  $(1011,01)_2 \rightarrow$

d.  $(2B,A8)_{16} \rightarrow$

e.  $(29,25) \rightarrow r = ??10$

Kesimpulan : konversi dari radiks ?? Ke radiks ???

# Konversi bilangan antar radiks

a. Dari **radiks 10** ke biner

$(12,125)_{10}$  – konversikan ke biner!!!

**Caranya :**

- a.1. Bil integer 12 → bagi dengan 2 (biner), ambil sisanya dan dibaca dari bawah ke atas
- a.2. Bil dec point 0,125 dikali dengan 2, ambil integernya. Bil dec point dikali 2, ambil integernya. Lakukan ini terus hingga diperoleh NOL. Dibaca dari atas ke bawah **oktal**

a.1. $12:2 = 6$ sisa 0	a.2. $0,125 \times 2 = 0,250$ ambil 0	$12:8=1$ sisa 4
$6 : 2 = 3$ sisa 0	$0,250 \times 2 = 0,500$ ambil 0	$1:8=0$ sisa 1
$3 : 2 = 1$ sisa 1	$0,5 \times 2 = 1,0$ ambil 1	Binary digit ; digit
$1 : 2 = 0$ sisa 1	BIT = Binary digit	

**Hasilnya  $(12,125)_{10} = (1\ 100,\ 001)_2$  – octal (3bit=7=111): 1 100, 001 14,1**

**hexadec (4 bit /nible= 15 = 1111)=1100 , 0010 = C,2 → des:**

>> Konversikan :  $(12,125)_{10}$  ke oktal dan hexadec !!!

Okt:  $14 = 1*8^1 + 4*8^0 = 12$  Des;  $0,1 = 1*8^{-1} = 0,125$

# Soal-soal (Digital Design; M. Morris Mano)

- 1.3 Convert the decimal number 250,5 to base 4, base 8, and base 16.
- 1.4 Convert the following decimal numbers to binary: 12,0625,  $10^3$ , 673,23, and 1798.
- 1.6 Convert the following from the given base to the base indicated:
- Decimal 225,225 to binary, octal, and hexadecimal.
  - Binary 1101001,011 to decimal, octal, and hexadecimal.
  - Octal 623,77 to decimal, binary, and hexadecimal.
  - Hexadecimal 2AC5,D to decimal, octal, and binary.
- 1.7 Convert the following numbers to decimal:
- |                    |               |
|--------------------|---------------|
| a. $1001001.001_2$ | e. $0,342_6$  |
| b. $12121_3$       | f. $50_7$     |
| c. $1032,2_4$      | g. $8,3_9$    |
| d. $4310_5$        | h. $198_{12}$ |

# Konversi Oktal dan Heksadesimal ke Biner

Desimal	Oktal	Biner
0	0	000
1	1	001
2	2	010
3	3	011
4	4	100
5	5	101
6	6	110
7	7	111

- Setiap digit Oktal dikodekan biner dengan 3 bit.

- **Contoh:** Konversikan Oktal ke biner!

$$53_8 = \dots_2$$

Jawab:

- $5 = 101$ , dan  $3 = 011$

$$\text{Jadi } 53_8 = 101011_2$$

**Soal :**

- $216_8 = \dots_2$
- $47_8 = \dots_2$
- $301_8 = \dots_2$

# Konversi Heksadesimal ke Biner

Desimal	HeksaDes	Biner
0	0	0000
1	1	0001
2	2	0010
3	3	0011
4	4	0100
5	5	0101
6	6	0110
7	7 Oktal	0111
8	8 10	1000
9	9 11	1001
10	A 12	1010

Desimal	HeksaDes	Biner
11	B 13	1011
12	C 14	1100
13	D 15	1101
14	E 16	1110
15	F 17	1111
16	10 20	1 0000
		atau 0001 0000

- Setiap **digit Heksadesimal** dikodekan dengan **4 bit biner**.
  - Contoh :
- $C6_{16} = 1100\ 0110_2$
- $385_{16} = \dots\dots\ 2$

# Konversi dari dan ke radiks $\neq 10$

Konversikan biner ke oktal dan sebaliknya

a.1. 11101,1101 ke oktal !!

Bil biner dikelompokan per 3 bit (satu nibble) dan konversika ke desimal, yaitu

$$011 = 3 \quad 110 = 6$$

$$101 = 5 \quad 100 = 4$$

(integer) (bil di belakang koma)

Hasilnya :  $11101,1101 = (35,64)_8$

a.2. 11101,1011 ke hexadec !!

Bil biner dikelompokan per 4 bit (satu nibble) dan konversika ke desimal, yaitu :  $0001 = 1 \quad 1011 = 11=B \quad 1101 = 13=D$

(integer) (bil di belakang koma)

Hasilnya :  $11101,1101 = (1D,B)_{16}$

# Sistem BCD (Binary Coded Decimal)

Desimal	Biner	BCD	Desimal	Biner	BCD
0	0000	0000	10	1010	0001 0000
1	0001	0001	11	1011	0001 0001
2	0010	0010	12	1100	0001 0010
3	0011	0011	13	1101	0001 0011
4	0100	0100	14	1110	0001 0100
5	0101	0101	15	1111	0001 0101
6	0110	0110	16	10000	0001 0110
7	0111	0111		dst.	
8	1000	1000			
9	1001	1001			

Konversikan BCD : 1001001101010001 ke **desimal** !

Kelompokan per 4 bit dan konv ke desimal : 1001 0011 0101 0001

9      3      5      1

Jadi BCD : 1001001101010001 = 9351 (desimal)

Berlaku sebaliknya (decimal ke BCD):  $45_{10} = 0100\ 0101_{BCD}$ .



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# BCD ubah ke biner dan sebaliknya

1. Konversikan ke basis bilangan yang ditentukan
  - a.  $10011,101_2$  ke decimal, octal, dan hexadec
  - b.  $DA3,CA_{16}$  ke decimal, octal, dan biner
  - c.  $36,54_{10}$  ke hexadec, octal, dan biner
  - d.  $52,16_8$  ke hexadec, desimal, dan biner
2. Bil BCD  $100101000001$  ubah ke biner !
3. Bil biner  $10101101$  ubah be BCD !

**JAWABNYA ???**

**Selanjutnya materi  
Log\_Komb\_01...**