

# LOGIKA INFORMATIKA

## (Logika Kombinasional: Sistem Bilangan)

Prodi S-1 Teknik Informatika

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Drs. Ino Suryana, M.Kom

# Sistem Bilangan

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

# Konversi Bilangan Integer

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

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

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

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.  $(45,24)_8 \rightarrow 4 * 8^1 + 5 * 8^0 + 2 * 8^{-1} + 4 * 8^{-2}$   
 $\rightarrow 32 + 5 + 2/8 + 4/64 = 37 + 0,25 + 0,0625 = \dots$

b.2  $(37,1426) = ?$ ,  $r = ??8$ ; 10? 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  $\rightarrow$  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

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

**Hasilnya**  $(12,125)_{10} = (1\ 100, 001)_2$  \_**oktal** (3bit=7=111): **1 100, 001** **14,1**  
**hexadec** (4 bit /nible= 15 = 1111)=**1100 , 0010** = **C,2** $\rightarrow$  **des:**

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

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

# 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:

- a. Decimal 225,225 to binary, octal, and hexadecimal.
- b. Binary 1101001,011 to decimal, octal, and hexadecimal.
- c. Octal 623,77 to decimal, binary, and hexadecimal.
- d. 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 :**

a.  $216_8 = \dots_2$

b.  $47_8 = \dots_2$

c.  $301_8 = \dots_2$

# 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 :  
 $C6_{16} = 1100\ 0110_2$   
 $385_{16} = \dots_2$

# Konversi dari dan ke radiks $\neq 10$

Konversikan biner ke oktal dan sebaliknya

a.1. 11101,1101 ke oktal !!

Bil biner dikelompokkan 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 dikelompokkan per 4 bit (satu nibble) dan konversika ke desimal, yaitu : 0001 = 1      1011 = 11=B      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):  $45_{10} = 0100\ 0101_{\text{BDC}}$ .



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- 1.13; 1.10;
  - 1.9; 1.8,
  - 1.7; 1.4;
  - dan 1.3.
- 
- Buku disearching dan download.

# 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...**