

Data Structures

And Algorithms (DSA)

Day 01:

"INTRODUCTION TO PROGRAMMING"

Idea of Computer

Binary Numbers:- "Bi" means '2', But in binary '2' does not exist. In binary just 0, 1 form exists.

$$\{0\} \quad = \text{Base}_2$$

- i. $0+0 \rightarrow 0$
- ii. $0+1 \rightarrow 1$
- iii. $1+0 \rightarrow 1$
- iv. $1+1 \rightarrow 10$
- v. $10+1 \rightarrow 11$
- vi. and so, on.
(Means 2) (Means 3)

Binary of 2 :-	2	So, binary of 2 is 0.'10.
	2 1 — 0 0 — 1	

→ But agar mujhe '2' number ya kisi or bary of number ki binary nikalni ho toh 9 mile always use division Method.

Example:

Binary of 27 -

(use 2 divide klye)

Step 1:-	2 27	Base ₂
convert into binary	2 13 - 1 ↑	Main
	2 6 - 1 ↑	→ convert decimal (27)
	2 3 - 0 ↑	into binary (11011).
	2 1 - 1 ↑	(help of transistors)
	0 - 1	

Binary of 27 is = 11011.

Step 2:- Now → convert this number again
Again into in 27 (use 10 divide klye)
Original No. To verify - Base₁₀

10 27	Base ₁₀
10 2 — 7 ↑	
0 — 2	27

→ convert decimal
using base₁₀.

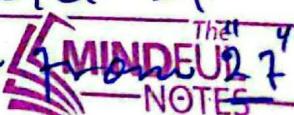
Step 3:-

convert "27" into decimal → 27 (Base₁₀)

$$= 2 \times 10^1 + 7 \times 10^0 \rightarrow \text{convert decimal using base} 10$$

$$= 20 + 7 \times 1$$

$$= 20 + 7 \rightarrow 27 \rightarrow \text{Get 27}$$

again  The MINDEU 27 NOTES

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Step 4:- Convert binary no. into decimal number.
binary number of 27 is:

11011 (Base₂)

convert into decimal.

Main

convert binary
(11011) into
decimal (27).

11011

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

$$= 2^4 + 2^3 + 0 + 2 + 1$$

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

$$= 27 \rightarrow \text{Get } 27 \text{ again from binary number.}$$

Get 27 again from binary number.

convert 27 by using octa.

Octa means $\rightarrow 8$ (0, 1, 2, 3, 4, 5, 6, 7)

Hexa means $\rightarrow 16$ (0, 1, 2, 3, 4, 5, 6,

Base₈

27

↓

8 | 2 — 7

↓

0 — 2

7, 8, 9, 10, 11

↓ ↓ ↓

A B C

27

↓ ↓

D E F

Base₈

27

$$= 2 \times 8^1 + 7 \times 8^0$$

$$= 16 + 7 \times 1$$

$$= 16 + 7 = 27$$

Step 4:- Convert binary no. into decimal number.
binary number of 27 is:

11 0 1 1 (Base₂)

convert into decimal.

11 0 . 1 1

$$\begin{aligned}
 &= 1 \times 2^4 + 1 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 1 \times 2^0 \\
 &= 2^4 + 2^3 + 0 + 2 + 1 \\
 &= 2 \times 2 \times 2 \times 2 + 2 \times 2 \times 2 + 2 + 1 \\
 &= 16 + 8 + 2 + 1
 \end{aligned}$$

= 27 → Get 27 again from
binary number.

convert 27 by using Octa.

Octa means → 8 (0, 1, 2, 3, 4, 5, 6, 7)

Hexa means → 16 (0, 1, 2, 3, 4, 5, 6,

7, 8, 9, 10, 11, 12, 13,
↓ ↓ ↓ ↓
A B C D

Base₈

8 | 2 7

8 | 2 - 7 ↑

0 - 2

27

14, 15 E F

Base₈

27

$$= 2 \times 8^1 + 7 \times 8^0$$

$$= 16 + 7 \times 1$$

$$= 16 + 7 = 27$$

→ convert '11' using Hexa-decimal "Base 16"
(16 numbers)

(0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F)
↑
10 " 12 13 14 15

so consider
one one &
that's why
we say B = 11

Decimal = 11 = Hex

$$\begin{aligned} \underline{11} &= 1 \times 16^1 + 1 \times 16^0 \\ &= 16 + 1 \\ &= 17 \end{aligned}$$

Why we does not
write it in '11'.

* Confusion na ho k ye one - one
hai ya 11, that's why we
write it in (B.)

Ellaborate & Age mai isko 11
(Eleven) baki two result kuch
is 8, than hona tha

$$= 11$$

$$= 11 \times 16^0 = 11 \times 1 \Rightarrow 11 \rightarrow \text{one sy result } 11$$

ya age '13' ki example delein.

$$= 13$$

$$= 13 \times 16^0 = 13 \times 1 = 13 \rightarrow \text{same number}$$

But

$$= \underbrace{1}_{1} \underbrace{3}_{3}$$

$$= 1 \times 16^1 + 3 \times 16^0$$

$$= 16 + 3 =$$

$$(19)$$

see difference
(So we say)

MINDFUL-
NOTES

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Summary Why we said 10, 11, 12, 13, 14, 15
to A, B, C, D, E, F?

Answers

Because ages mai 10 ko
A na kenti two iska hexadecimal
value essay calculate hota

10 (A)

$$= 10^1 \times 1^1 + 0 \times 16^0$$

$$= 10 + 0 = 10$$

, 11 (B)

$$= 16^1 \times 1 + 16^0 \times 1$$

$$= 16 + 1 = 17$$

can
↳ change

number changes

But its a ↳

single number (11) not one
one, so, say B'

↓ To remove
confusion

→ Why Study Binary Number?

on = 1

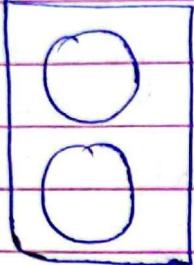
off = 0

* Moore Law:

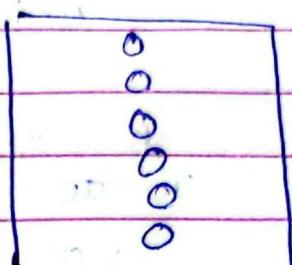
Every year transition double.

→ Pehly era mai → Ram size was
400GB, 500GB, 600GB was common
But now 4GB, 5GB is common
and size gata jahai.

Before size looks



Now size looks.

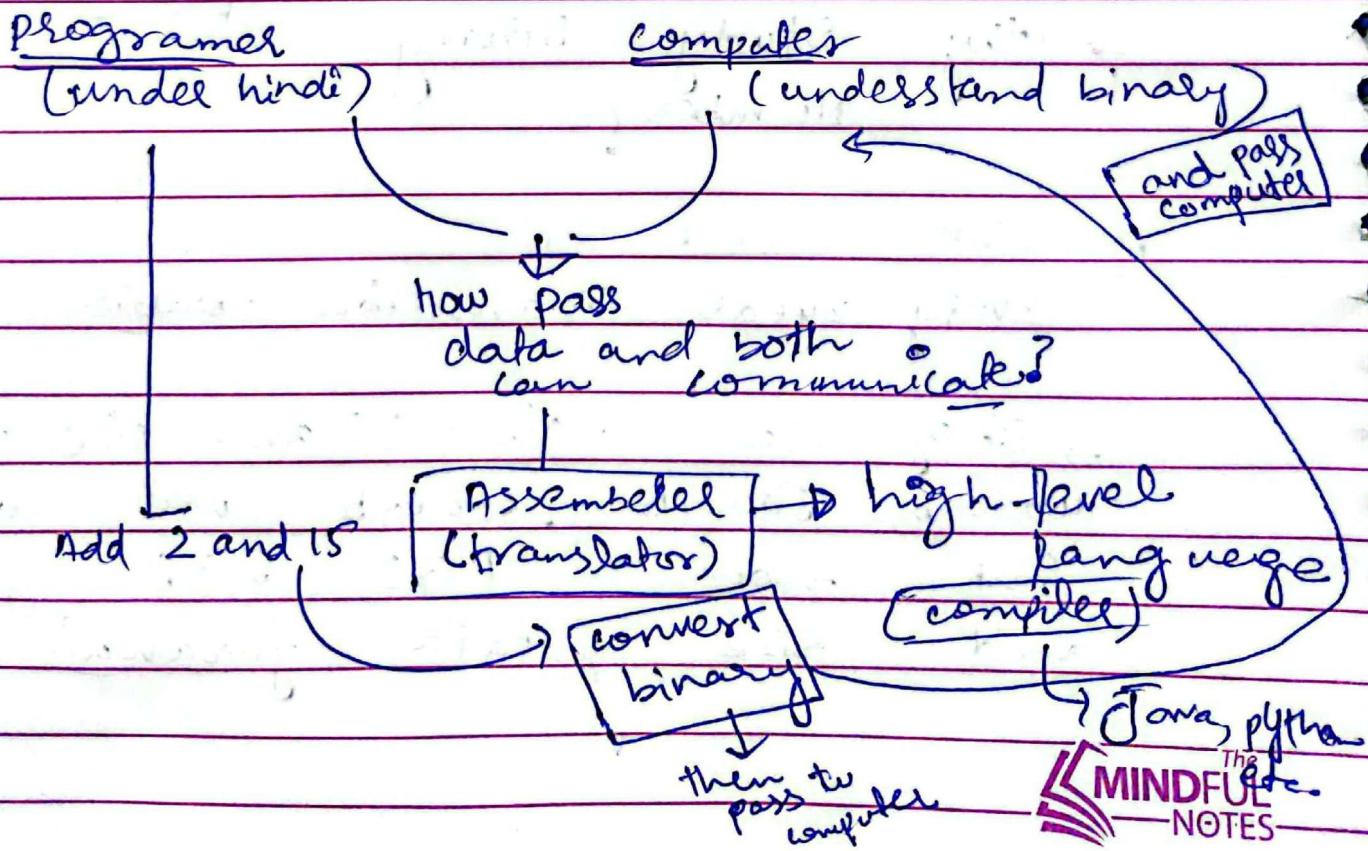


(more law)

- Computer understands language is binary which is in 0, 1 and ab two size form

Lekin let say

gives us benefits) utna km ogaya k naze b nahi ata Sahi sye.



Sequence:

Machine language

① Assembly language

② High-level language
(Python, Java)

- Machine language (best)

- Assembly (Assembly language code converts into binary then pass to machine.)
- High level language.

Data ki kahani:

that's why slow.

Data = store / fetch

space - ↓
time - ↓

Regs (mai hmesha)

yehi chahen
gi k data
kam time or
space lay).

Example Mai ye nahi chahti k mai
jb b kisi website per jaon tu
wo load hona mai baht zada time
lay. agr lay gi tu I will leave
that site.

Example Data.

→ 13, 17, 14, 18, 23 → unsorted (difficult to
find specif no.)

→ 13, 14, 17, 18, 23 → sorted (easily find specif
no.)

→ Ab hum kesy pata chalyga
K data sorted ya arranged hone
chahye. → Ye kesy ka jawab
logic or wo num sikhya off dsa sy.

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Save time?

Date: / / /

Guddu idea

bablu idea

$$\begin{aligned}
 &= 1 + 2 + 3 + 4 + \dots + 100 \\
 &= 5050 \\
 &= 11 \text{ min} \\
 &\hookrightarrow \text{assume} \\
 &\quad (\underline{\text{slow}})
 \end{aligned}$$

$$\begin{aligned}
 &= \frac{n \alpha(n+1)}{2} \\
 &= \frac{100(100+1)}{2} \\
 &= 5050 \\
 &= 10 \text{ sec.} \\
 &\quad (\underline{\text{fast}})
 \end{aligned}$$

computer \rightarrow Smjo hanay
 keye mazdoor ka
 kam keyga, hum oso jo kahygy
 wo whi keyga.