CS & IT ENGINEERING

Basics of Computer System

Number System

Lecture No.- 04

By- Vishvadeep Gothi sir

Recap of Previous Lecture

- Topic: Data
- Topic: Fixed Point & Floating Point
- Topic: Signed & Unsigned
- Topic: ASCII Encoding

Topics to be Covered

- Topic: Number System
- Topic: Radix or Base
- Topic: Binary
- Topic: Hexadecimal

Topic : Number System

Number System is a method of representing numbers

Topic : Number System

A number system of base-b has b digits: from 0 to $b-1$

radix

for example base $-10 \Rightarrow$ digits 0 to 9

Base-10

digits 0 to 9

000	010	20	30	40	50	⋯ 090	100	200	300	⋯	900
001	011	21	31			⋮	⋮	⋮	⋮		⋮
002	012	22	32			⋮	⋮	⋮	⋮		⋮
003	013	⋮	⋮			⋮	⋮	⋮	⋮		⋮
004	⋮	⋮	⋮			⋮	⋮	⋮	⋮		⋮
005	⋮	⋮	⋮			⋮	⋮	⋮	⋮		⋮
006	⋮	⋮	⋮			⋮	⋮	⋮	⋮		⋮
007	⋮	⋮	⋮			⋮	⋮	⋮	⋮		⋮
008	⋮	⋮	⋮								
009	019	29	39	49	59	099	199	299	399		999

Base-2 :-

(Binary number) ⇒ digits 0, 1

single

0 ⇒ 0

1 ⇒ 1

2-digit

00 ⇒ 0

01 ⇒ 1

10 ⇒ 2

11 ⇒ 3

3-digit

000 ⇒ 0

001 ⇒ 1

010 ⇒ 2

011 ⇒ 3

100 ⇒ 4

101 ⇒ 5

110 ⇒ 6

111 ⇒ 7

4-digit

0000 ⇒ 0

0001 ⇒ 1

0010 ⇒ 2

0011 ⇒ 3

0100 ⇒ 4

0101 ⇒ 5

0110 ⇒ 6

0111 ⇒ 7

1000 ⇒ 8

1001 ⇒ 9

1010 ⇒ 10

1011 ⇒ 11

1100 ⇒ 12

1101 ⇒ 13

1110 ⇒ 14

1111 ⇒ 15

Topic : Types of Number System

1. Binary
2. Octal
3. Decimal
4. Hexadecimal

Topic : Types of Number System

Popular :-

number representation

Base	Called	Digits Range
2	Binary	0, 1
8	octal	0, 1, 2, ⋯ ; 7
10	Decimal	0 to 9
16	Hexadecimal	0 to F

$\Rightarrow (\text{number})_2$

$\Rightarrow (\text{number})_8$

$(648)_{16}$

decimal

$0 \longrightarrow 0$

$1 \longrightarrow 1$

$\vdots$

$9 \longrightarrow 9$

$A \longrightarrow 10$

$B \longrightarrow 11$

$C \longrightarrow 12$

$D \longrightarrow 13$

$E \longrightarrow 14$

$F \longrightarrow 15$

	number	Valid / invalid
1.	$(1234)_6$	Valid
2.	$(2329)_9$	Invalid
3.	$(62AC)_{16}$	Valid
4.	$(1012)_3$	Valid
5.	$(3431)_4$	Invalid
6.	$(1265)_5$	Invalid
7.	$(6215)_6$	Invalid
8.	$(8294)_{10}$	Valid

ways to represent Hexadecimal number

Number system $\Rightarrow (1A06B)_{16}$

Microprocessor $\Rightarrow$ 1A06BH

Computer programming $\Rightarrow$ 0x1A06B

Topic : Number System Conversions

1. Decimal to any other base
2. Any other base to Decimal
3. One base(not decimal) to another base (not decimal)
4. One base(not decimal) = $(\text{another base})^{\text{integer}}$

2 mins Summary

Topic Number System

Topic Radix or Base

Topic Binary

Topic Hexadecimal

Happy Learning

THANK - YOU