

CHAPTER 3

DATA REPRESENTATION

INTRODUCTION

Digital technology have found their way into innumerable areas of technology and the far most reaching is digital computers. In digital systems like computer ,the quantities are measured by symbol called digits. They occur in various forms like binary, octal, hexadecimal.

DIGITAL NUMBER SYSTEM

DECIMAL NUMBER SYSTEM

The number system is composed of 10 symbols (0,1,2,3,4,5,6,7,8,9).

Binary number system

To design an electronic system that can work with 10 different numbers is very difficult, and it is easy to use a number system with base 2 so binary digits are used. Ex 10001101

DIGITAL NUMBER SYSTEM

- ✓ Octal number system is also very important in digital system. It is number system with base 8.
- ✓ Hexadecimal number system uses base 16 from 0-9 and a, b, c, d, e, f as 16 symbols.

NUMBER CONVERSION

- ✓ The binary number system is very important as it is easy to feed it in a circuitry ,but we use decimal no. system
So there is a conversion need from one form to another.

DECIMAL TO BINARY

Divide the number to be converted and write its remainder, the remainder are its binary form.

FRACTION TO BINARY

Successively multiply the decimal by the radix.

BINARY TO DECIMAL FRACTION

Any binary number can be converted by summing up its positional value.

Ex.

$$(10110)_2$$

$$2^4 + 2^2 + 2^1 + 2^0 = 20$$

BINARY REPRESENTATION OF INTEGER

1. Sign and magnitude representation is the conventional form of number system. It is represented as signs (+ or -).
2. One's complement represents positive numbers by their binary equivalent called true value.
3. Two complement representation represents their binary equivalent numbers and negative numbers by their second compliment form.

BINARY REPRESENTATION OF REAL NUMBERS

- ✓ Real numbers are represented in storage medium by their exponents and mantissa. For example numbers 32.17 can be written as 0.3217×10^2 , 0.3217 is its mantissa and 2 is its exponent.

ASCII

- ✓ The **American Standard Code for Information Interchange (ASCII)** is a character-encoding scheme originally based on the English alphabet. ASCII codes represent text in computers, communications equipment, and other devices that use text. Most modern character-encoding schemes are based on ASCII, though they support many more characters than ASCII does.

ASCII CHARACTER SET

Dec	Hx	Oct	Char	Dec	Hx	Oct	Html	Chr	Dec	Hx	Oct	Html	Chr	Dec	Hx	Oct	Html	Chr
0	0	000	NUL (null)	32	20	040	 	Space	64	40	100	@	@	96	60	140	`	`
1	1	001	SOH (start of heading)	33	21	041	!	!	65	41	101	A	A	97	61	141	a	a
2	2	002	STX (start of text)	34	22	042	"	"	66	42	102	B	B	98	62	142	b	b
3	3	003	ETX (end of text)	35	23	043	#	#	67	43	103	C	C	99	63	143	c	c
4	4	004	EOT (end of transmission)	36	24	044	$	\$	68	44	104	D	D	100	64	144	d	d
5	5	005	ENQ (enquiry)	37	25	045	%	%	69	45	105	E	E	101	65	145	e	e
6	6	006	ACK (acknowledge)	38	26	046	&	&	70	46	106	F	F	102	66	146	f	f
7	7	007	BEL (bell)	39	27	047	'	'	71	47	107	G	G	103	67	147	g	g
8	8	010	BS (backspace)	40	28	050	((72	48	110	H	H	104	68	150	h	h
9	9	011	TAB (horizontal tab)	41	29	051))	73	49	111	I	I	105	69	151	i	i
10	A	012	LF (NL line feed, new line)	42	2A	052	*	*	74	4A	112	J	J	106	6A	152	j	j
11	B	013	VT (vertical tab)	43	2B	053	+	+	75	4B	113	K	K	107	6B	153	k	k
12	C	014	FF (NP form feed, new page)	44	2C	054	,	,	76	4C	114	L	L	108	6C	154	l	l
13	D	015	CR (carriage return)	45	2D	055	-	-	77	4D	115	M	M	109	6D	155	m	m
14	E	016	SO (shift out)	46	2E	056	.	.	78	4E	116	N	N	110	6E	156	n	n
15	F	017	SI (shift in)	47	2F	057	/	/	79	4F	117	O	O	111	6F	157	o	o
16	10	020	DLE (data link escape)	48	30	060	0	0	80	50	120	P	P	112	70	160	p	p
17	11	021	DC1 (device control 1)	49	31	061	1	1	81	51	121	Q	Q	113	71	161	q	q
18	12	022	DC2 (device control 2)	50	32	062	2	2	82	52	122	R	R	114	72	162	r	r
19	13	023	DC3 (device control 3)	51	33	063	3	3	83	53	123	S	S	115	73	163	s	s
20	14	024	DC4 (device control 4)	52	34	064	4	4	84	54	124	T	T	116	74	164	t	t
21	15	025	NAK (negative acknowledge)	53	35	065	5	5	85	55	125	U	U	117	75	165	u	u
22	16	026	SYN (synchronous idle)	54	36	066	6	6	86	56	126	V	V	118	76	166	v	v
23	17	027	ETB (end of trans. block)	55	37	067	7	7	87	57	127	W	W	119	77	167	w	w
24	18	030	CAN (cancel)	56	38	070	8	8	88	58	130	X	X	120	78	170	x	x
25	19	031	EM (end of medium)	57	39	071	9	9	89	59	131	Y	Y	121	79	171	y	y
26	1A	032	SUB (substitute)	58	3A	072	:	:	90	5A	132	Z	Z	122	7A	172	z	z
27	1B	033	ESC (escape)	59	3B	073	;	;	91	5B	133	[[123	7B	173	{	{
28	1C	034	FS (file separator)	60	3C	074	<	<	92	5C	134	\	\	124	7C	174	|	
29	1D	035	GS (group separator)	61	3D	075	=	=	93	5D	135]]	125	7D	175	}	}
30	1E	036	RS (record separator)	62	3E	076	>	>	94	5E	136	^	^	126	7E	176	~	~
31	1F	037	US (unit separator)	63	3F	077	?	?	95	5F	137	_	_	127	7F	177		DEL

ISCII

- ✓ In recent past the computer activities were limited to specific languages and with the increase in works there was to be develop a slandered code . In 1991, the bureau of Indian standard develop common code called **ISCII**. this is a 8-bit code capable of coding 256 characters.

UNICODE

- ✓ Unicode provides a unique number for every character,
- ✓ No matter what the platform
- ✓ No matter what the program.
- ✓ No matter what the language.

INDIAN LANGUAGES ON UNICODE

The standard has incorporated Indian scripts under group name Asian scripts , includes Devnagari ,Bengali ,Tamil ,Malayalam.

THANK

YOU