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BCS - 1F

Course:

IICT

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Assignment No 01

Task 1 :-

• If a Byte is assumed to represent a number .....?

Sol :- The range of the number that can be represented by an 8-bit byte is determined by the number of possible combination of these 8 bits.

An 8-bit byte can represent 2^8 different combinations, which is equal 256. However in most of the cases is the representation ~~of~~ is signed, which mean one bit is used for the sign (+ve or -ve) and remaing ~~7 or 2~~^{7} 7-bits or 2^7 for the magnitude of the number.

So

- Minimum value (signed) : -128
- Maximum value (signed) : 127

But if we want to show only in magnitud then we represent a maximum number range from 0 - 255.

Task 2:

Represent each of the quantities in 2-bytes. using signed ...?

a) 65536:

Sol As the number is non-negative so sign bit is zero.

The binary conversion is.

2	65536	
2	32768	0
2	16384	0
2	8192	0
2	4096	0
2	2048	0
2	1024	0
2	512	0
2	256	0
2	128	0
2	64	0
2	32	0
2	16	0
2	8	0
2	4	0
2	2	0
	1	0

$(65536)_{10} = (10000000000000000)_2$

So, in sign-magnitude representation in 3 bytes
= Sign (0) + Magnitude

$(0\underline{1}0000000000000000)$

This question can not be represented in 2 bytes as the range of 2-bytes is 0 - 65535

2) 196

Sol:- As value is a non-negative number, the sign bit is 0

binary representation of 196 is

$(196)_{10} = (11000100)_2$

2	196
2	98 - 0
2	49 - 0
2	24 - 1
2	12 - 0
2	6 - 0
2	3 - 0
	1 - 1

As we have to represent it is sign-magnitud it 16 bits or 2-bytes

So,

sign-magnitude representation is

$(0000000011000100) = (196)$

3) -65535:

Sol As value is negative so sign bit is 1.

Binary represention of -65535 is, given by

So magnitude 65535 in binary is

$$(65535)_{10} = (1111111111111111)_2$$

2	65535
2	32767 — 1
2	16383 — 1
2	8191 — 1
2	4095 — 1
2	2047 — 1
2	1023 — 1
2	511 — 1
2	255 — 1
2	127 — 1
2	63 — 1
2	31 — 1
2	15 — 1
2	7 — 1
2	3 — 1
	1 — 1

As we are using 2-bytes or 16-bits and magnitud of 65535 uses all the 16-bits so no padding is required.

4) -32

Sol :- As it is negative value sign bit is 1

the binary conversion of 32

$$(32)_{10} = (100000)_2$$

2	32
2	16 — 0
2	8 — 0
2	4 — 0
2	2 — 0
	1 — 0

with sign-magnitude in 16-bits

$$(-32)_{10} = (1000000000100000)_2$$

5) 100015

Sol: As the value is positive so sign bit is 0

the binary conversion of 100015 is

$$(100015)_{10} = (110000110101011111)_2$$

2	100015
2	50007 – 1
2	25003 – 1
2	12501 – 1
2	6250 – 1
2	3125 – 0
2	1562 – 1
2	781 – 0
2	390 – 1
2	195 – 0
2	97 – 1
2	48 – 1
2	24 – 0
2	12 – 0
2	6 – 0
2	3 – 0
	1 – 1

As it already used 16-bits so no pading is required.

Task 3:

Represent the following quantities as sequences of bytes encodes using ASCII characters.

1) 20456

Sol:- By using ASCII,
'2' is represented "50"
'0' as "48", '4' as "52" ~~and~~
'5' as "53" and 6 as "54
it becomes.
5048525354

5048525353
↓

So we required 5- bytes to write 20456.

2) 196

Sol: In ASCII, "1" is represented by 49, '9' by '57' and 6 by '54'
So it becomes 495754
ind binary $(495754)_{10} = (0111100100000100001010)_2$
So we required 3-bytes to represent '196'

3) 1024

Sol:- In ASCII, '1' represented as '49' '0' as 48, '2' as 50 and '4' as 52.

So it becomes 49485052

$(49485052)_{10} = (010111110011000101001111100)_2$

We need 4-bytes to represent "1024".

4) 32

Sol:- In ASCII, '3' is represented as 51 and '2' as 50

So it becomes 5150

$(5150)_{10} = (0101000000 11110)$

we need 2-bytes to represent "32".

5) 100015

Sol:- In ASCII, '1' represented as 49, '0' as 48, '0' as 48, '0' as 48, '1' as 49 and '5' as 53, So it becomes.

494848484953 but in binar

$(494848484958)_{10} = (011100110011011101000100101001100011001)_2$

so we represent '100015' in 6-bytes.

Task 4:

Q 1# Using ASCII convert binary coded into word.

i) $\overset{2^6}{1}\overset{2^5}{0}\overset{2^4}{0}\overset{2^3}{1}\overset{2^2}{1}\overset{2^1}{0}\overset{2^0}{0}$

Sol:- 1001100 in decimal

$= 1 \times 2^6 + 1 \times 2^3 + 1 \times 2^2$

$= 64 + 8 + 4$

$(1001100)_2 = (76)_{10}$

And in ASCII 76 is "L"

ii) 1100101

Sol $\overset{2^6}{1}\overset{2^5}{1}\overset{2^4}{0}\overset{2^3}{0}\overset{2^2}{1}\overset{2^1}{0}\overset{2^0}{1}$ in decimal is

$= 1 \times 2^6 + 1 \times 2^5 + 1 \times 2^2 + 1 \times 2^0$

$= 64 + 32 + 4 + 1$

$(1100101)_2 = (101)_{10}$

And in ASCII 101 is "e"

iii) 1101101

Sol:- $\overset{2^6}{1}\overset{2^5}{1}\overset{2^4}{0}\overset{2^3}{1}\overset{2^2}{1}\overset{2^1}{0}\overset{2^0}{1}$ in decimal is

$= 1 \times 2^6 + 1 \times 2^5 + 1 \times 2^3 + 1 \times 2^2 + 1 \times 2^0$

$= 64 + 32 + 8 + 4 + 1$

$= (109)_{10}$

And in ASCII "109" is "m"

4) 1101111

sol:- $\overset{2^6}{1}\overset{2^5}{1}\overset{2^4}{0}\overset{2^3}{1}\overset{2^2}{1}\overset{2^1}{1}\overset{2^0}{1}$ in decimal is

$= 1\times2^6 + 1\times2^5 + 1\times2^3 + 1\times2^2 + 1\times2^1 + 1\times2^0$

$= 64 + 32 + 8 + 4 + 2 + 1$

$(1101111)_2 = (111)_{10}$

And in ASCII '111' is 'o'

5) 1101110

sol:- $\overset{2^6}{1}\overset{2^5}{1}\overset{2^4}{0}\overset{2^3}{1}\overset{2^2}{1}\overset{2^1}{1}\overset{2^0}{0}$ in decimal is

$= 1\times2^6 + 1\times2^5 + 1\times2^3 + 1\times2^2 + 1\times2^1$

$= 64 + 32 + 8 + 4 + 2$

$(1101110)_2 = (110)_{10}$

And in ASCII 110 is 'n'

Q 2 # Convert BLUE to binary

sol:- For "B" ASCII is 66 and for its binary

$(66)_{10} = (1000010)_2$

For "L" ASCII is "76" and its binary is

$(76)_{10} = (1001100)_2$

2^6	2^5	2^4	2^3	2^2	2^1	2^0	
64	32	16	8	4	2	1	
1	0	0	0	0	1	0	= 66
1	0	0	1	1	0	0	= 76

For "U" ASCII is '85' and its binary is

$(85)_{10} = (1010101)_2$

	2^6	2^5	2^4	2^3	2^2	2^1	2^0
	64	32	16	8	4	2	1
85	1	0	1	0	1	0	1
	1	0	0	0	1	0	1

For 'E' ASCII is '69' and its binary is

$(69)_{10} = (1000101)_2$

So no 'BLUE' in Binary is represented as " 1000010 1001100 1010101 1000101."

Task 5:

- Perform Hexa addition (59F) base 16 and (E46) base 16

Sol Addition

$$
\begin{array}{cccc}
 & \overset{1}{5} & 9 & F \\
+ & E & 4 & 6 \\
\hline
 & D & E & 5
\end{array}
$$

F = 15
15+6=21
21 = 15
14 = E
14+5=19

$(59F)_{16} + (E46)_{16} = (DE5)_{16}$

$2^3\ 2^2\ 2^1\ 2^0$
8 4 2 1

	Dec	Binary	Hexad
	0	0000	0
	1	0001	1
	2	0010	2
	3	0011	3
	4	0100	4
	5	0101	5
	6	0110	6
	7	0111	7
	8	1000	8
	9	1001	9
16	10	1010	A
17	11	1011	B
18	12	1100	C
19	13	1101	D
	14	1110	E
	15	1111	F

- Perfor Octal Multiplication of $(762) \times (45)$ both bases are 8

Sol:

$$\begin{array}{r} {}^{3}\ {}^{3}\ \ {}^{1}\ \ \\ 7\ 6\ 2 \\ \times\ \ 4\ 5 \\ \hline 1\ 4\ 6\ 7\ 2 \\ 3\ 7\ 1\ 0\ \times \\ \hline 4\ 3\ 7\ 7\ 2 \\ \hline \end{array}$$

0 — 7

R.W

$5 \times 2 = 10$

$8 \overline{)10}$ 1 — 2

$1 \times 8 + 2$

$8 \overline{)31}$ 3 — 7

$8 \overline{)38}$

$1 \times 8 + 3$

$4 \times 8 + 6$

$3 \times 8 + 1$

$3 \times 8 + 7$

So

$$(762)_8 \times (45)_8 = (43772)_8$$

- Subtract $\overset{2^6\,2^5\,2^4\,2^3\,2^2\,2^1\,2^0}{1101110}$ from $\overset{2^4\,2^3\,2^2\,2^1\,2^0}{11000}$.

Sol To subtract 1101110 from (11000)

As we see we have to subtract a larger number from a smaller for this switch the number and put and negative sign to the right side of the answer.

$$\begin{array}{r} 1\ 1\ \overset{0\ \ 2}{0}\ 1\ 1\ 1\ 0 \\ -\ \ \ \ 1\ 1\ 0\ 0\ 0 \\ \hline -01\ 0\ 1\ 01\ 1\ 0 \end{array}$$

1101110 = 110

11000 = 24

24 − 110

= −86

−86 = 01010110