Hexadecimal to BCD Code conversion

By,
Subathra S

HEXADECIMAL TO BCD CODE CONVERSION

AIM

To write an assembly language program to convert the given hexadecimal number in to BCD number

ASSEMBLY LANGUAGE PROGRAM

```
C100 LXI H C200  21 ; Initialize the HL register pair
C101             00 ;
C102             C2 ;
C103 MOV A M     7E ; Move the memory content to accumulator
C104 MOV C A     4F ; Move the accumulator content to C register
C105 ANI 0F      E6 ; And the data byte OFH with the accumulator
C106             0F ; content
C107 MOV E A     5F ; Move the accumulator content in to E
                      register
C108 MOV A C     79 ; Move the C register content to accumulator
C109 ANI F0      E6 ; And the data byte FO_H with the accumulator
C10A             F0 ; content
C10B RRC         0F ; Rotate accumulator right through carry
C10C RRC         0F ; Rotate accumulator right through carry
C10D RRC         0F ; Rotate accumulator right through carry
C10E RRC         0F ; Rotate accumulator right through carry
C10F MOV D A     57 ; Move the accumulator content to D register
C110 JZ  C11C    CA ; Jump if zero to C11C_H
C111             1C ;
C112             C1 ;
C113 MVI A 00    3E ; Move immediately 00_H to accumulator
C114             00 ;
C115 ADI 16      C6 ; Add immediate data 16_H to the accumulator
C116             16 ;
C117 DAA         27 ; Decimal adjust accumulator
C118 DCR D       15 ; Decrement D register content
C119 JNZ C115    C2 ; Jump if no zero to C115_H
C11A             15 ;
C11B             C1 ;
C11C ADD E       83 ; Add the E register content with accumulator
C11D DAA         27 ; Decimal adjust accumulator
C11E INX H       23 ; Increment the HL register pair
C11F MOV M A     77 ; Move the accumulator content in to memory
C120 HLT         76 ; Halt the execution
```

EXECUTION - 1

```
C200 1B ; Hexadecimal number(Input data)
C201 27 ; BCD number(Output data)
```

PROGRAM TRACE

Addr	MC	Mnemonic	A	B	C	D	E	H	L	SP	Flag Word
C100	21	LXI H C200	00	00	00	00	00	C2	00	0000	0000 0000
C103	7E	MOV A M	1B	00	00	00	00	C2	00	0000	0000 0000
C104	4F	MOV C A	1B	00	1B	00	00	C2	00	0000	0000 0000
C105	E6	ANI 0F	0B	00	1B	00	00	C2	00	0000	0001 0000
C107	5F	MOV E A	0B	00	1B	00	0B	C2	00	0000	0001 0000
C108	79	MOV A C	1B	00	1B	00	0B	C2	00	0000	0001 0000
C109	E6	ANI F0	10	00	1B	00	0B	C2	00	0000	0001 0000
C10B	0F	RRC	08	00	1B	00	0B	C2	00	0000	0001 0000
C10C	0F	RRC	04	00	1B	00	0B	C2	00	0000	0001 0000
C10D	0F	RRC	02	00	1B	00	0B	C2	00	0000	0001 0000
C10E	0F	RRC	01	00	1B	00	0B	C2	00	0000	0001 0000
C10F	57	MOV D A	01	00	1B	01	0B	C2	00	0000	0001 0000
C110	CA	JZ C11C	01	00	1B	01	0B	C2	00	0000	0001 0000
C113	3E	MVI A 00	00	00	1B	01	0B	C2	00	0000	0001 0000
C115	C6	ADI 16	16	00	1B	01	0B	C2	00	0000	0000 0000
C117	27	DAA	16	00	1B	01	0B	C2	00	0000	0000 0000
C118	15	DCR D	16	00	1B	00	0B	C2	00	0000	0101 0100
C119	C2	JNZ C115	16	00	1B	00	0B	C2	00	0000	0101 0100
C11C	83	ADD E	21	00	1B	00	0B	C2	00	0000	0001 0100
C11D	27	DAA	27	00	1B	00	0B	C2	00	0000	0000 0100
C11E	23	INX H	27	00	1B	00	0B	C2	01	0000	0000 0100
C11F	77	MOV M A	27	00	1B	00	0B	C2	01	0000	0000 0100
C120	76	HLT	27	00	1B	00	0B	C2	01	0000	0000 0100

FLAG WORD

S	Z	x	Ac	x	P	x	Cy
0	0	0	0	0	1	0	0

EXECUTION - 2

```
C200 41 ; Hexadecimal number(Input data)
C201 65 ; BCD number(Output data)
```

PROGRAM TRACE

Addr	MC	Mnemonic	A	B	C	D	E	H	L	SP	Flag Word
			00	00	00	00	00	00	00	0000	0000 0000
C100	21	LXI H C200	00	00	00	00	00	C2	00	0000	0000 0000
C103	7E	MOV A M	41	00	00	00	00	C2	00	0000	0000 0000
C104	4F	MOV C A	41	00	41	00	00	C2	00	0000	0000 0000
C105	E6	ANI 0F	01	00	41	00	00	C2	00	0000	0001 0000
C107	5F	MOV E A	01	00	41	00	01	C2	00	0000	0001 0000
C108	79	MOV A C	41	00	41	00	01	C2	00	0000	0001 0000
C109	E6	ANI F0	40	00	41	00	01	C2	00	0000	0001 0000
C10B	0F	RRC	20	00	41	00	01	C2	00	0000	0001 0000
C10C	0F	RRC	10	00	41	00	01	C2	00	0000	0001 0000
C10D	0F	RRC	08	00	41	00	01	C2	00	0000	0001 0000
C10E	0F	RRC	04	00	41	00	01	C2	00	0000	0001 0000
C10F	57	MOV D A	04	00	41	04	01	C2	00	0000	0001 0000
C110	CA	JZ C11C	04	00	41	04	01	C2	00	0000	0001 0000
C113	3E	MVI A 00	00	00	41	04	01	C2	00	0000	0001 0000
C115	C6	ADI 16	16	00	41	04	01	C2	00	0000	0000 0000
C117	27	DAA	16	00	41	04	01	C2	00	0000	0000 0000
C118	15	DCR D	16	00	41	03	01	C2	00	0000	0001 0100
C119	C2	JNZ C115	16	00	41	03	01	C2	00	0000	0001 0100
C115	C6	ADI 16	2C	00	41	03	01	C2	00	0000	0000 0000
C117	27	DAA	32	00	41	03	01	C2	00	0000	0001 0000
C118	15	DCR D	32	00	41	02	01	C2	00	0000	0001 0000
C119	C2	JNZ C115	32	00	41	02	01	C2	00	0000	0001 0000
C115	C6	ADI 16	48	00	41	02	01	C2	00	0000	0000 0100
C118	15	DCR D	48	00	41	01	01	C2	00	0000	0001 0000
C119	C2	JNZ C115	48	00	41	01	01	C2	00	0000	0001 0000
C115	C6	ADI 16	5E	00	41	01	01	C2	00	0000	0000 0000
C117	27	DAA	64	00	41	01	01	C2	00	0000	0001 0000
C118	15	DCR D	64	00	41	00	01	C2	00	0000	0101 0100
C119	C2	JNZ C115	64	00	41	00	01	C2	00	0000	0101 0100
C11C	83	ADD E	65	00	41	00	01	C2	00	0000	0000 0100
C11D	27	DAA	65	00	41	00	01	C2	00	0000	0000 0100
C11E	23	INX H	65	00	41	00	01	C2	01	0000	0000 0100
C11F	77	MOV M A	65	00	41	00	01	C2	01	0000	0000 0100
C120	76	HLT	65	00	41	00	01	C2	01	0000	0000 0100

FLAG WORD

S	Z	x	Ac	x	P	x	Cy
0	0	0	0	0	1	0	0

EXECUTION - 3

```
C200 A6 ; Hexadecimal number(Input data)
C201 66 ; BCD number(Output data)
```

PROGRAM TRACE

C119	C2	JNZ C115	96	00	A6	04	06	C2	00	0000	0001 0000
C115	C6	ADI 16	AC	00	A6	04	06	C2	00	0000	1000 0100
C117	27	DAA	12	00	A6	04	06	C2	00	0000	0000 0101
C118	15	DCR D	12	00	A6	03	06	C2	00	0000	0001 0101
C119	C2	JNZ C115	12	00	A6	03	06	C2	00	0000	0001 0101
C115	C6	ADI 16	28	00	A6	03	06	C2	00	0000	0000 0100
C117	27	DAA	28	00	A6	03	06	C2	00	0000	0000 0100
C118	15	DCR D	28	00	A6	02	06	C2	00	0000	0001 0000
C119	C2	JNZ C115	28	00	A6	02	06	C2	00	0000	0001 0000
C115	C6	ADI 16	3E	00	A6	02	06	C2	00	0000	0000 0000
C117	27	DAA	44	00	A6	02	06	C2	00	0000	0001 0100
C118	15	DCR D	44	00	A6	01	06	C2	00	0000	0001 0000
C119	C2	JNZ C115	44	00	A6	01	06	C2	00	0000	0001 0000
C115	C6	ADI 16	5A	00	A6	01	06	C2	00	0000	0000 0100
C117	27	DAA	60	00	A6	01	06	C2	00	0000	0001 0100
C118	15	DCR D	60	00	A6	00	06	C2	00	0000	0101 0100
C119	C2	JNZ C115	60	00	A6	00	06	C2	00	0000	0101 0100
C11C	83	ADD E	66	00	A6	00	06	C2	00	0000	0000 0100
C11D	27	DAA	66	00	A6	00	06	C2	00	0000	0000 0100
C11E	23	INX H	66	00	A6	00	06	C2	01	0000	0000 0100
C11F	77	MOV M A	66	00	A6	00	06	C2	01	0000	0000 0100
C120	76	HLT	66	00	A6	00	06	C2	01	0000	0000 0100

FLAG WORD

S	Z	x	Ac	x	P	x	Cy
0	0	0	0	0	1	0	0

REFERENCE

1. Ramesh S.Gaonkar, "Microprocessor Architecture, Programming, and Applications", Fourth Edition, Penram International Publishing (India), 2000.

2. S.Subathra, "Microprocessor Laboratory", Record work, Adhiparashakthi Engineering College, Melmaruvathur, March 2001

3. S.Subathra, "Programming in 8085 Microprocessor and its applications – An Innovative Analysis", Technical Report,

Adhiparashakthi Engineering College, Melmaruvathur, March 2003

4. Micro-85 EB, User Manual, Version – 3.0, CAT #M85 EB-002, VI Microsystems Pvt. Ltd., Chennai.

5. icro85 simulation software, Infotech Solutions, Calcutta.