

Calculating check sum based on Hexadecimal representation

Given data

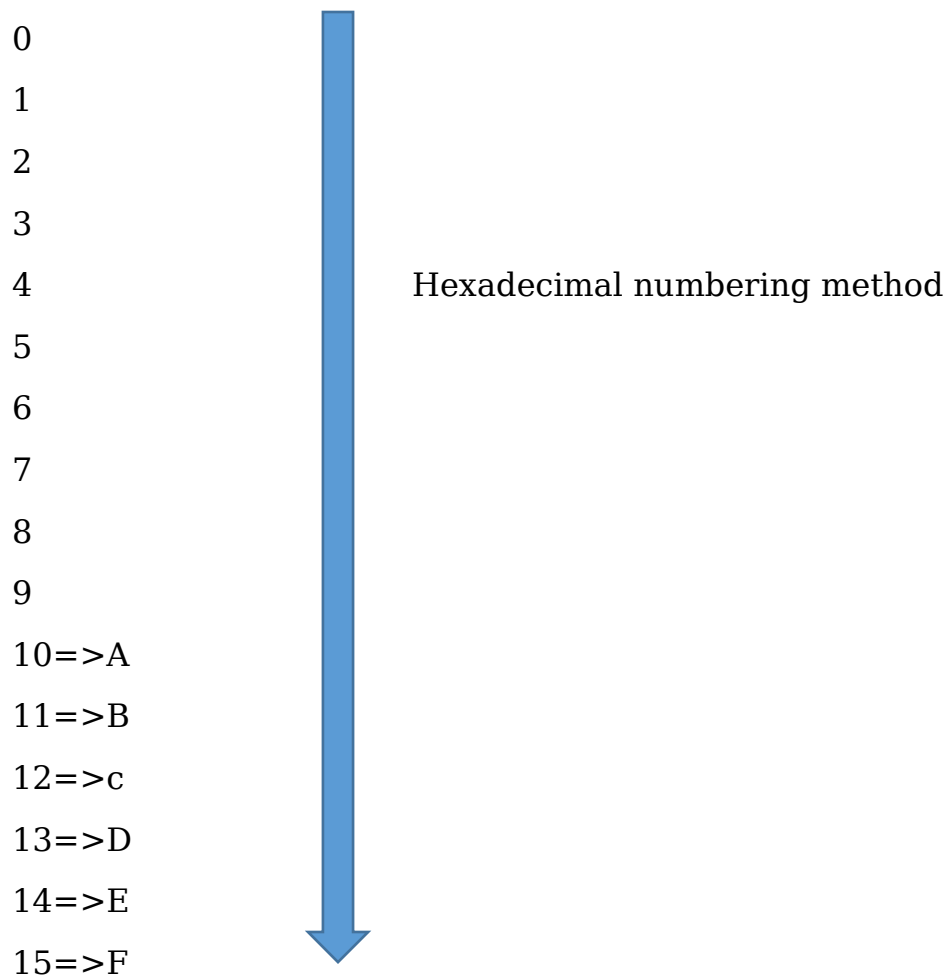
A.446F

B.938C

C.896E

D.965D

- The concept of hex decimal data representation in networking to calculate check sum missioned as the following. The representation start from 0_15



- Also you should have to concern carry value. Carry means the value that gain when number is completely divided by a given divisor so this value added to the next column.

- Addition, subtraction, division are the three mathematical operation that used to calculate check sum in hex decimal representation.

Sender Side Step

1. Add all the given data in a given column to get total value of check sum.
2. Divide the total value of each column by 16
3. Add carry value to the next column and writ the remainder under the given column
4. Find once complete addition by subtracting total data in each column from 15. This become check sum
5. Send the final value that gain to receiver

Receiver side step

6. Add all data with check sum value that send from the receiver
7. Repeat the above step 2 and divide by 16
8. Find once complement as it missioned in step 4 above
9. Check if receiver receive error free data. If value are equal to hex decimal (all values are FFFF). The receiver receive error free data unless data contain error.

❖ **Notice** for all case if we add total data with once complement and complement it again without varying the value of the data at sender and receiver side seams error free (00000) this confused all student ,but data lose manly happened at receiver side not at the sender side ,that is why we require to calculate sender side ,and receiver side separately.so check the difference by varying the value of one data at the receiver side to get error full data at receiver side.

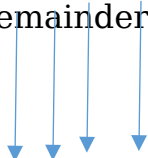
Example Sender Side

4 4 6 F $F+C+E+D = 15+12+14+13=54$ then $54/16$
 $=3(\text{carry})$ and remainder $=6$

9 3 8 C $6+8+6+5+\text{carry}(3)=28$ then $28/16 = 1(\text{carry})$ and
 reminder is $=12 \Rightarrow C$

8 9 6 E $4+3+9+6+\text{carry}(1)=23$ then $23/16 = 1(\text{carry})$ and
 remainder $=7$

9 6 5 D $4+9+8+9+1(\text{carry})=31$ then $31/16 = 1(\text{carry})$
 and remainder is $=15 \Rightarrow F$



F 7 C 6

+1 (the last carry)

F 7 C 7 total sum

Find once complement addition by subtracting total value in each column from 15.

$$15-7=8$$

$$15-C=3$$

$$15-7=8$$

$$15-F=0$$

0838 check sum

Receiver side calculation

Perform addition of each data with check sum value you get above.

4 4 6 F $F+C+E+D+8=15+12+14+13+8=62$ then
 $62/16=3(\text{carry})$ and remainder $=14=>E$

9 3 8 C $6+8+6+5+3+3(\text{carry})=31$ then $31/16=1(\text{carry})$ and
remainder is $=15=>F$

8 9 6 E $4+3+9+6+8+1(\text{carry})=31$ then $31/16=1$ carry and
remainder is $15=>F$

9 6 5 D $4+9+8+9+0+1(\text{carry})=31$ then $31/16=1$ carry and
remainder is $15=>F$

0 8 3 8
↓ ↓ ↓ ↓
F F F E

+1(the last carry)

F F F F since all data are equal to hex decimal the receiver receive error free data

Notice if a set of binary number and character (0100101A) are given and required to calculate check sum u should have to convert A character into binary based up on ASCII value of A then perform required step, but the ASCII value should be given.

Exercise 1 Assume sender A send the following four data to Receiver B

A.466F

B.726F

C.757A

D.616E

But while the data reach at the destination the receiver B receive data as the following

A.466F

B.724F

C.757A

D.616C

Calculate check sum based on hex decimal data representation and check if Receiver B receive error free data.