AIM: write a program to implement error detection and correction using HAMMING code concept. Make a test run to input dute stream and verify error correction feature.

Code (binary)

```
# include coldio. h>
```

```
void calculate-parity-bits (int data [], int * p1, int * p2,
                                        int * ph, int * p 3) }
    *p1= (data [0]+ data [2]+ data [3]+ data [5]+ data [6]) >, 2,
   *p2=(duta [0]+ data[1]+ data[3]+ data[4]+ data[6]),2;
   *p4 = Cduta[03]+ duta[4]+ data[5])>. 2;
   * p8 = (data [61] + Lata (0) + data (2) >.2.
```

void parity-bits (int data [] int * p1, int *p2, int *p4, *p1 = (data[i0] + Jota[3] + data[6] + data[4] + data[2] * p2 = (data [9]+ data [8] + data [5) + data [0]) > 2. *p4= Cdate [7]+ data(6] + data [5] + date(0]) > 2. * p8 = (data [6] + data [3] + data [2] + data [1]) 2.2; 3

void generate transming-code (int data (), int transming-code () Calculate parity bits (data &pl, &p2, &p4, &p8).

havening code Co J = Lata Co J. hamping- code CIJ= data CIJ. naming - code [2] = duta [2].

harming - code [3] = ps.

harming- code (4) = data (3). hamming - crede [5] = data [4].

hamming -code [6]= duta [5] hamming - code (87) = take ple,

hamming -code [&] = duta [2].

harming code (9]= pr hamming code [16] 2 pl.

int detact- error (in transming cole CD) ? int p1,p2, p4,p8; previty - bits Chamming code, & pt, &p2, &p4, &ps). ant error - position = pl + 1 + p2 +2 + p4 + 4 + p8 + 21 return erra posibion. 3 int main () { vite data [7]. print of Curates ? kits of date one by one \union. Joe Cint 120; 162:14) { printy CuBit od: "it Dist Scary (upd "_ & date [i]) printy Capata after appending all kits: "). Joh Cino 1 = 0 , 1 < 7 , 1+1) { printy Cuy day data Cissis File printy Cylings (5) 1 to the (1) state + (2) state) - 10, 2 int tramming - code [11] oble -[1] alb generate - transming - code Chata, transming codes, printy Cuthe U-but haveming code is: "). for Cint 1=0,1<11:175 { printy Cosa ", having -cde Cill VO. 189, 24 2 4 19 m pring Culay. all o date parity his lister cité corruptiff code (11) printy (wenter the u-bit Haming code its a possible erre chie & bit). (neg) for Cinti =0, reu, res) ? parinty Cupit vid: " (1+1). Sconf (uy d' & corrupted = code (i)) 3

in code () the page 4 - 1, 0 0

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```
int error - pro = delect - error (correpted - coles)
   prints (" thate Calculated word position: Y.dlu",
                                11-one-pos H);
    if (corrupted_code (u = error -pro ]==0) {
        corrupted rede [4- orra-pos]=1;
     3 else &
         Corrupted - code [11 - ornor - pos ]=0;
      3
     printy ("Data ofter orna - asserting all hotes: ").
     Jos (int 1=0; 121111) {
          printy Cuy I", Corrupted - code (1));
     printy (" In "),
     return o;
Output
Bute 7 bits of data one by one:
But 1:1
Bit 221
But 3:0
Bit 4,0
Bit 5,1
Bit 6:1
Bit 7:1
Data after apparding all bits: 110014
The 11-bit Hamming code is: 11000 110101
outer the 11-bit harming and with a possible
 era ( bit by bit);
 Bit 1:1
 Bi 6 2 :1
 Bit 3: 1.
                          the o topet a waterland. In
  Bit 4:0
  Bit 5:0
  BUX611
```

3

But 7: 1 Bil 8:0

Bit 9:1

Bit 10:0

Bit 11:1

Calculated orra position 13 Dutu after error - correcting all bits: 11000110101

RESULT

a the sail I terminary with a 1100 Thus, a program to be implement everor detection and correction civing harming wide concept has been successfully written and the output is verified for bighary input.

in go we want for and we

```
Code (Tent)
# include coldio. hs
Hunclade & string. 40
void calculate - parity - bits (int data (), int + p1,
    int # pz, int *p4, int # 18) {
    * VI = (data (0) + data (2) + data (3) + data (5) +
    + p2 = Conta COJ+ data (1]+ data (2)+ data (4)+
    *p4 = Cdata [3]+ data Cle ] + data (5) 2.2.
                                     dula C6 ] > 23
    *p8 = (data [1]+ data [0] + data (2)) 1,2)
void parity-bits (int data (), int *pl, int +p2,
    * p1= (data (10)+ data (8)+ data (6) + data (11) +
                               int * p4, int * p3) &
                      duta (2] + data CO] > x.2;
     *p2 = Cdata (9] + data [8] + data [5] + duta [4] +
                          data (i) + data (o) 12. V. 2.
     * PU = Chate [7]+ data [6]+ data [5] + data (54)>2.
     * p8 = (data [3] + data [3] + data (2] + data (1)) v. 2;
```

void generate bramming code Cont duta [] int hamming - code (3) { int p1, p2, p4, p8; Calculate-parity-bits (data, & p1, & p2, & pre, & p3). hamming -code [0] = data [0]. homming - code (1] = data (1]. hamming - code [2] = data[2]. hamming - code (3) = p8. hamming Code (4) = Jata [3]. haming-code [5] e data [4]: homing- code [6] = data Co]. hamming -code [7] = p4; having - code C& J = Sata Co J. tranning - code CaJ = p 2.

haming - code [10] = p1.

3

int detect provo Cint hamming -code (3) } int p1, p2, p4, p8; parity- bits Chameming-code, 2p1, 2p2, 2p4, 2ps) int error-position = p 1 + 1+ p2 + 2+ pl+4+ p3 +2 return erra- position. void char - bo - bin ary (char ch, int data()) & for Cint 120; 127; 1+1) & data Cid= Con >> (6-1) &1: Char timary-to- char line tata (3) 8 draw ch =0; a sure l'action de l'action de l'action for Citi =0; 1 <7: 1+1) { On 1 = Chata Ci Jee (6-i) return chi dra input beat (100). printy (" Enter a st ring Cup to 29 charactors) show Scary Cux, 795", input tent) int data [7] hamming code (ci), correpted code Clue erroded - tent (1007=203. Char decoded - best (1007 = 203. int ks =0, for (int i = 0; i c storler (input beat); i++){ Class - to - binary Cinput - text (i), data) generate - hamming- code (buta, hamming-code); for (int 1=0; 0 < U; 1+1) & anoded tout Ck++) = hamming -code CiJ+ 0;

printy (" Encoded hamming code: " 5 \", anded tent); printy CuEnter the received Hamming code Cup to 1100 bits, cance leigh as under ! ("). Examp ("x, s", ended bunk): K=0: for (int i = 0; ic stream (amoded tent) /451+153 for (inti = 0, i all i ++) & Corrupted - code (i)] = emoded - tend (lart) int orror pros = detect - sorra (corrupted -code). if (erra- pro ! = 0) corrupted - code (11 - erra - pro) = (corrupted-code (11- erre-pos)==6)? 3 1:0 data (O] = corrupted - code (O). data (1)= appropried -code (1), duta [2] = corrupted -code [2]: duta [3] = coroupted - code [3]. duta CleJ = Goranysted -code CleJ. Lata [5] = Corrysted -code [5] dutu (6) = corrupted -code (6). Levoded bent (i) = bin wy -to-cure Ctuta). 3 printy (" Decoded and corrected out: Y.s | 4 4 decoded - touts. return o There, a program to influence & when detertion and consection is ramor my role werept in iles worther and we can july writing by beat types

OUTPUT

Enter a storing Cup to an draracters):

abc

Emodel Haroming Code: 110000001101000010001, 0000 11111

Bute the received Haromery Code Cup to 11500 his Same length or encoded):

11000000 1101000011 00011 00000 11110

Devoded and convected bent; abc

and the state of the state of the sales

support and College to the product

Cosmplet cole Cu- on - po James

ma ist with place - indo tool sected (1) is assurptive - sole (1). with (5) = complete - ade (5) 90 23 = Carenty of a society buta Tags commissed - code (167) tates (53= Corregion - code (37. duty (6) a core iplat - well (6)

decoded trad (i) = bis 12 - to - when I have ,

judy ("landed or to whated land: 2 las decorded - bat).

RESULT

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Thus, a program de implement for contre error detection and correction using hamming code concept tray been wentlen and success july verified for best cipputs.