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U20CS 120
* merge Soul Pseudo Code:
1) merge Soxt (A, l, u)
  SP( X ZW)
  mid= 2+(u-1)/2 = 100 + (NO) = = (NO)
    merge Sort (A, P, mid)
    merge Sort (A, mid+1, u)
    mesge Sol (A, P, mid, u)
  merge (A, l, mid, u)
  n, = mid- 1+1
   nz = u-mid
   L(n.l, R[n.)
  for i=0 to n, -1
   1 LCT = ACT +1) TO COT (SE
  for 1=0 to na-1
    1 RCiJ= Acmidtli) + (Gazana
   1=0, j=0, K=1
  while (icn, and icn2)
     : P(LC:) < = P(j])
       DCK]= LCi]
        1°=1+1
     else ACKJ=RCJ
        Siziero as stub or
     KEKHI
  while (icn.)
     ACY=LCi)
     K= KH
  While (i< n2)
     ACKJ= L[j]
 - Lets assume that Time taken by merge Sost function
  for n length array is TEnJand time taken by
 merge function for mangula win be a Confastrancesson
             Arosay 1 time,
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=7 T(m)=2T(m) + Q(m)
    let an = Co
  T(n)= 2T(n/2)+cn =7 recurrance relation
  -17(n/a) = 27(n/u) + cn/2 Here [cn = nk] k-Constal
  T(n)= 4T(n)+cn+cn
  => Solving equation using recursive tree method.
  2h T(1) T(1) T(1) T(1) T(1) T(1) T(1)
  T(n) = 22cn) + 2' eth(cn/2) + 22(cn/4) + - 1 + 2h(T(1)
          n= 26
          4=10g2
 T(n) = Cn[1+1+1+ ... + logn times] +
       = Onklogn
  I(y) = O(21092)
  merge Sort using divide an array in 8 Subarray
7 merge sort (A, R, W)
 38( ( < u)
   Size= u-l+1
   mid= &+($i3e/3)
    mid 2= 1 + (8i3e x 2/3)
    merge Soxt(A, l, mid.)
   merge Sort (A, mid1+1, mid2)
    mege soxt (n, mda+1, u)
    neige (A, R, mide, mids, u)
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merge (A, l, mid1, mid2, u)
  ni= midi - 2+1 (2002 bas 1002) didos
  n= mid= mids === [1] +131) +1
   n3 = u-mida [13/42/ = longa
   Teften J, midena, right Enal
   for i=0 to (n,-1) 1100=000
   for i=0 to na-1 Which = (misa
   1 midEi] = A Eitmids + 1] + [ = ]
  for 1=0 to 73-1
    I right [i] = A [i+ mid 2+] = [i] High
i=0, i=0, k=0, m=l while (i<n, and i<n2 and k<n3) +
    if ( left[i] <= mid[i]) (ms)
      if (left [i] == kight [k])
        PISE
         K= K+1(err= x boo errs [) slides
         m=mfildspix > (idbing) +;
        (P(midEi] < = xight(x)) mide

| A[m] = mid[i]
    2188
        m=mt1 [N] Mpix = [oriA
         I A En ] = right (K) Har = are
       else
          K= K+1 [1]+791 = Cond 6
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(1) chim (king, b, b) H
if (K7= mg)
  while (i and i and i and i + /- 1/2
      if ( rept [i] <= mid[i]) = burn
         AEmJ= left[i] story
         1214 Mars How Continer Lastys1
         AEm] = mid [i] is a list til
      else
         i= S+VI+ 16 ion + i 30 = Li Ibion 1
                     ofir ispate ng-
else if (iz=n2)
  while (izn, and Kens) - Usugar 1
     if ( left [i] < right [k])
         AEm)= left Ei] = i boso (00=1) storker
         1=1+1-14618 = = (1) +431)
        A [m] = Vight [x] = [m] A
     RISC
         K= K+1
else i'f (i 7=ni) (a) ligis = [mis]
  while (ikno and Keno)
     if (mid[i] < right[x])
       Abn) (= mid[i]
        j= j+1
        m=m+1 (iJbim=[m]A
        A[n] = right [k] Ith = [
     6186
        K= K+1
        m=m+1 LID HPIN = [A)A
while (icn)
  A [m] = left[i] 1+x=x
  言= ドキリ
   mamti
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```
while (j kna)
        [i] bim = [m]A
       1=1+1
              m=m+1
 While (KKn3)
              A[m] = Kighd [K]
                K= K+1
                 m=m+1
 -7 As merge function win take maximum.
 Heration over n size away
 -Time taken by that function win be o(n).
 -7 T(n) = 3T(n/3) + 8(n) Let 8(n) = cn = Kn
          T(n) = 3(T(n/3) + Kn
-> Loe will compute time by recursive tree method.
              T(n|3) T(n|3) T(n|4) T
             てい ていていていていていていていていてい
= Tr(n) = cn3° + cn/3×3'+cn/9×3'+...+cn/23'
= (cn+ cn+...+htimes) (:3h=n)
h=109n
       : T(n) = o(n logn)
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