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/*
 * This code is from "Algorithms in C, Third Edition,"
 * by Robert Sedgewick, Addison Wesley Longman, 1998.
 * (Adapted by Y. Kohayakawa)
 */

#include "Item.h"

#define eq(A, B) (!less(A, B) && !less(B, A))

void sort(Item a[], int l, int r)
  { int i, j, k, p, q; Item v;
    if (r <= l) return;
    v = a[r]; i = l-1; j = r; p = l-1; q = r;
    for (;;)
      {
        while (less(a[++i], v)) ;
        while (less(v, a[--j])) if (j == l) break;
        if (i >= j) break;
        exch(a[i], a[j]);
        if (eq(a[i], v)) { p++; exch(a[p], a[i]); }
        if (eq(v, a[j])) { q--; exch(a[q], a[j]); }
      }
    exch(a[i], a[r]); j = i-1; i = i+1;
    for (k = l  ; k < p; k++, j--) exch(a[k], a[j]);
    for (k = r-1; k > q; k--, i++) exch(a[k], a[i]);
    sort(a, l, j);
    sort(a, i, r);
  }
```