NAME

radixsort, **sradixsort** - radix sort

LIBRARY

Standard C Library (libc, -lc)

SYNOPSIS

#include <limits.h>
#include <stdlib.h>

int
radixsort(*const unsigned char **base*, *int nmemb*, *const unsigned char *table*, *unsigned endbyte*);

int
sradixsort(*const unsigned char **base, int nmemb, const unsigned char *table, unsigned endbyte*);

DESCRIPTION

The **radixsort**() and **sradixsort**() functions are implementations of radix sort.

These functions sort an array of pointers to byte strings, the initial member of which is referenced by *base*. The byte strings may contain any values; the end of each string is denoted by the user-specified value *endbyte*.

Applications may specify a sort order by providing the *table* argument. If non-NULL, *table* must reference an array of UCHAR_MAX + 1 bytes which contains the sort weight of each possible byte value. The end-of-string byte must have a sort weight of 0 or 255 (for sorting in reverse order). More than one byte may have the same sort weight. The *table* argument is useful for applications which wish to sort different characters equally, for example, providing a table with the same weights for A-Z as for a-z will result in a case-insensitive sort. If *table* is NULL, the contents of the array are sorted in ascending order according to the ASCII order of the byte strings they reference and *endbyte* has a sorting weight of 0.

The **sradixsort**() function is stable, that is, if two elements compare as equal, their order in the sorted array is unchanged. The **sradixsort**() function uses additional memory sufficient to hold *nmemb* pointers.

The **radixsort**() function is not stable, but uses no additional memory.

These functions are variants of most-significant-byte radix sorting; in particular, see D.E. Knuth's *Algorithm R* and section 5.2.5, exercise 10. They take linear time relative to the number of bytes in the strings.

RETURN VALUES

The **radixsort**() function returns the value 0 if successful; otherwise the value -1 is returned and the global variable *errno* is set to indicate the error.

ERRORS

[EINVAL] The value of the *endbyte* element of *table* is not 0 or 255.

Additionally, the **sradixsort**() function may fail and set *errno* for any of the errors specified for the library routine malloc(3).

SEE ALSO

sort(1), qsort(3)

Knuth, D.E., "Sorting and Searching", *The Art of Computer Programming*, Vol. 3, pp. 170-178, 1968.

Paige, R., "Three Partition Refinement Algorithms", *SIAM J. Comput.*, No. 6, Vol. 16, 1987.

McIlroy, P., "Computing Systems", *Engineering Radix Sort*, Vol. 6:1, pp. 5-27, 1993.

HISTORY

The **radixsort**() function first appeared in 4.4BSD.