NAME

htobe16, htole16, be16toh, le16toh, htobe32, htole32, be32toh, le32toh, htobe64, htole64, be64toh, le64toh – convert values between host and big-/little-endian byte order

SYNOPSIS

```
#include <endian.h>

uint16_t htobe16(uint16_t host_16bits);
uint16_t htole16(uint16_t host_16bits);
uint16_t be16toh(uint16_t big_endian_16bits);
uint16_t le16toh(uint16_t little_endian_16bits);

uint32_t htobe32(uint32_t host_32bits);
uint32_t htole32(uint32_t host_32bits);
uint32_t be32toh(uint32_t big_endian_32bits);
uint32_t le32toh(uint32_t little_endian_32bits);

uint64_t htobe64(uint64_t host_64bits);
uint64_t htole64(uint64_t host_64bits);
uint64_t be64toh(uint64_t big_endian_64bits);
uint64_t le64toh(uint64_t little_endian_64bits);
```

Feature Test Macro Requirements for glibc (see **feature_test_macros**(7)):

htobe16(), **htole16**(), **be16toh**(), **le16toh**(), **htobe32**(), **htole32**(), **be32toh**(), **le32toh**(), **htobe64**(), **htole64**(), **be64toh**(), **le64toh**():

Since glibc 2.19:
_DEFAULT_SOURCE
In glibc up to and including 2.19:
_BSD_SOURCE

DESCRIPTION

These functions convert the byte encoding of integer values from the byte order that the current CPU (the "host") uses, to and from little-endian and big-endian byte order.

The number, *nn*, in the name of each function indicates the size of integer handled by the function, either 16, 32, or 64 bits.

The functions with names of the form "htobe*nn*" convert from host byte order to big-endian order.

The functions with names of the form "htole*nn*" convert from host byte order to little-endian order.

The functions with names of the form "be*nn*toh" convert from big-endian order to host byte order.

The functions with names of the form "le*nn*toh" convert from little-endian order to host byte order.

VERSIONS

These functions were added to glibc in version 2.9.

CONFORMING TO

These functions are nonstandard. Similar functions are present on the BSDs, where the required header file is *<sys/endian.h>* instead of *<endian.h>*. Unfortunately, NetBSD, FreeBSD, and glibc haven't followed the original OpenBSD naming convention for these functions, whereby the *nn* component always appears at the end of the function name (thus, for example, in NetBSD, FreeBSD, and glibc, the equivalent of OpenBSDs "betoh32" is "be32toh").

NOTES

These functions are similar to the older **byteorder**(3) family of functions. For example, **be32toh**() is identical to **ntohl**().

The advantage of the **byteorder**(3) functions is that they are standard functions available on all UNIX systems. On the other hand, the fact that they were designed for use in the context of TCP/IP means that they lack the 64-bit and little-endian variants described in this page.

EXAMPLE

The program below display the results of converting an integer from host byte order to both little-endian and big-endian byte order. Since host byte order is either little-endian or big-endian, only one of these conversions will have an effect. When we run this program on a little-endian system such as x86-32, we see the following:

```
$ ./a.out
x.u32 = 0x44332211
htole32(x.u32) = 0x44332211
htobe32(x.u32) = 0x11223344
```

Program source

```
#include <endian.h>
#include <stdint.h>
#include <stdio.h>
#include <stdlib.h>

int
main(int argc, char *argv[])
{
    union {
        uint32_t u32;
        uint8_t arr[4];
    } x;

    x.arr[0] = 0x11;    /* Lowest-address byte */
    x.arr[1] = 0x22;
    x.arr[2] = 0x33;
    x.arr[3] = 0x44;    /* Highest-address byte */

    printf("x.u32 = 0x%x\n", x.u32);
    printf("htole32(x.u32) = 0x%x\n", htole32(x.u32));
    printf("htobe32(x.u32) = 0x%x\n", htobe32(x.u32));

    exit(EXIT_SUCCESS);
}
```

SEE ALSO

bswap(3), **byteorder**(3)

COLOPHON

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