NAME

hash, **hash32**, **hash32_buf**, **hash32_str**, **hash32_strn**, **hash32_stre**, **hash32_strne**, **jenkins_hash**, **jenkins_hash32**, **murmur3_32_hash**, **murmur3_32_hash32** - general kernel hashing functions

SYNOPSIS

#include <sys/hash.h>

uint32_t
hash32_buf(*const void *buf, size_t len, uint32_t hash*);

uint32_t
hash32_str(*const void *buf, uint32_t hash*);

uint32_t
hash32_strn(*const void *buf, size_t len, uint32_t hash*);

uint32_t
hash32_stre(*const void *buf, int end, const char **ep, uint32_t hash*);

uint32_t
hash32_strne(*const void *buf, size_t len, int end, const char **ep, uint32_t hash*);

uint32_t
jenkins_hash(*const void *buf, size_t len, uint32_t hash*);

uint32_t
jenkins_hash32(*const uint32_t *buf, size_t count, uint32_t hash*);

uint32_t
murmur3_32_hash(*const void *buf, size_t len, uint32_t hash*);

uint32_t
murmur3_32_hash32(*const uint32_t *buf, size_t count, uint32_t hash*);

DESCRIPTION

The **hash32**() functions are used to give a consistent and general interface to a decent hashing algorithm within the kernel. These functions can be used to hash ASCII NUL terminated strings, as well as blocks of memory.

A *len* argument is the length of the buffer in bytes. A *count* argument is the length of the buffer in 32-bit

words.

The **hash32_buf**() function is used as a general buffer hashing function. The argument *buf* is used to pass in the location, and *len* is the length of the buffer in bytes. The argument *hash* is used to extend an existing hash, or is passed the initial value HASHINIT to start a new hash.

The **hash32_str**() function is used to hash a NUL terminated string passed in *buf* with initial hash value given in *hash*.

The **hash32_strn**() function is like the **hash32_str**() function, except it also takes a *len* argument, which is the maximal length of the expected string.

The **hash32_stre**() and **hash32_strne**() functions are helper functions used by the kernel to hash pathname components. These functions have the additional termination condition of terminating when they find a character given by *end* in the string to be hashed. If the argument *ep* is not NULL, it is set to the point in the buffer at which the hash function terminated hashing.

The **jenkins_hash**() function has same semantics as the **hash32_buf**(), but provides more advanced hashing algorithm with better distribution.

The **jenkins_hash32**() uses same hashing algorithm as the **jenkins_hash**() function, but works only on *uint32_t* sized arrays, thus is simpler and faster. It accepts an array of *uint32_t* values in its first argument and size of this array in the second argument.

The **murmur3_32_hash**() and **murmur3_32_hash32**() functions are similar to **jenkins_hash**() and **jenkins_hash32**(), but implement the 32-bit version of MurmurHash3.

RETURN VALUES

The **hash32**() functions return a 32 bit hash value of the buffer or string.

EXAMPLES

```
LIST_HEAD(head, cache) *hashtbl = NULL;
u_long mask = 0;

void
sample_init(void)
{

        hashtbl = hashinit(numwanted, type, flags, &mask);
}
```

```
void
sample_use(char *str, int len)
{
	uint32_t hash;

	hash = hash32_str(str, HASHINIT);
	hash = hash32_buf(&len, sizeof(len), hash);
	hashtbl[hash & mask] = len;
}
```

SEE ALSO

free(9), hashinit(9), malloc(9)

LIMITATIONS

The **hash32**() functions are only 32 bit functions. They will prove to give poor 64 bit performance, especially for the top 32 bits. At the current time, this is not seen as a great limitation, as these hash values are usually used to index into an array. Should these hash values be used for other means, this limitation should be revisited.

HISTORY

The **hash** functions first appeared in NetBSD 1.6. The current implementation of **hash32** functions was first committed to OpenBSD 3.2, and later imported to FreeBSD 6.1. The **jenkins_hash** functions were added in FreeBSD 10.0. The **murmur3_32_hash** functions were added in FreeBSD 10.1.

AUTHORS

The **hash32** functions were written by Tobias Weingartner. The **jenkins_hash** functions were written by Bob Jenkins. The **murmur3_32_hash** functions were written by Dag-Erling Smørgrav <*des@FreeBSD.org*>.