

**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>.