

NAME

SHA512_Init, **SHA512_Update**, **SHA512_Final**, **SHA512_End**, **SHA512_File**, **SHA512_FileChunk**, **SHA512_Data**, **SHA384_Init**, **SHA384_Update**, **SHA384_Final**, **SHA384_End**, **SHA384_File**, **SHA384_FileChunk**, **SHA384_Data**, **SHA512_224_Init**, **SHA512_224_Update**, **SHA512_224_Final**, **SHA512_224_End**, **SHA512_224_File**, **SHA512_224_FileChunk**, **SHA512_224_Data**, **SHA512_256_Init**, **SHA512_256_Update**, **SHA512_256_Final**, **SHA512_256_End**, **SHA512_256_File**, **SHA512_256_FileChunk**, **SHA512_256_Data** - calculate the FIPS 180-4 “SHA-512” family of message digests

LIBRARY

Message Digest (MD4, MD5, etc.) Support Library (libmd, -lmd)

SYNOPSIS

```
#include <sys/types.h>
```

```
#include <sha512.h>
```

```
void
```

```
SHA512_Init(SHA512_CTX *context);
```

```
void
```

```
SHA512_Update(SHA512_CTX *context, const unsigned char *data, size_t len);
```

```
void
```

```
SHA512_Final(unsigned char digest[64], SHA512_CTX *context);
```

```
char *
```

```
SHA512_End(SHA512_CTX *context, char *buf);
```

```
char *
```

```
SHA512_File(const char *filename, char *buf);
```

```
char *
```

```
SHA512_FileChunk(const char *filename, char *buf, off_t offset, off_t length);
```

```
char *
```

```
SHA512_Data(const unsigned char *data, unsigned int len, char *buf);
```

```
#include <sha384.h>
```

```
void
```

SHA384_Init(SHA384_CTX *context);

void

SHA384_Update(SHA384_CTX *context, const unsigned char *data, size_t len);

void

SHA384_Final(unsigned char digest[48], SHA384_CTX *context);

*char **

SHA384_End(SHA384_CTX *context, char *buf);

*char **

SHA384_File(const char *filename, char *buf);

*char **

SHA384_FileChunk(const char *filename, char *buf, off_t offset, off_t length);

*char **

SHA384_Data(const unsigned char *data, unsigned int len, char *buf);

#include <sha512t.h>

void

SHA512_224_Init(SHA512_CTX *context);

void

SHA512_224_Update(SHA512_CTX *context, const unsigned char *data, size_t len);

void

SHA512_224_Final(unsigned char digest[32], SHA512_CTX *context);

*char **

SHA512_224_End(SHA512_CTX *context, char *buf);

*char **

SHA512_224_File(const char *filename, char *buf);

*char **

SHA512_224_FileChunk(const char *filename, char *buf, off_t offset, off_t length);

*char **

SHA512_224_Data(*const unsigned char *data, unsigned int len, char *buf*);

void

SHA512_256_Init(*SHA512_CTX *context*);

void

SHA512_256_Update(*SHA512_CTX *context, const unsigned char *data, size_t len*);

void

SHA512_256_Final(*unsigned char digest[32], SHA512_CTX *context*);

*char **

SHA512_256_End(*SHA512_CTX *context, char *buf*);

*char **

SHA512_256_File(*const char *filename, char *buf*);

*char **

SHA512_256_FileChunk(*const char *filename, char *buf, off_t offset, off_t length*);

*char **

SHA512_256_Data(*const unsigned char *data, unsigned int len, char *buf*);

DESCRIPTION

The **SHA512_** functions calculate a 512-bit cryptographic checksum (digest) for any number of input bytes. A cryptographic checksum is a one-way hash function; that is, it is computationally impractical to find the input corresponding to a particular output. This net result is a "fingerprint" of the input-data, which does not disclose the actual input.

The **SHA512_Init()**, **SHA512_Update()**, and **SHA512_Final()** functions are the core functions. Allocate an *SHA512_CTX*, initialize it with **SHA512_Init()**, run over the data with **SHA512_Update()**, and finally extract the result using **SHA512_Final()**, which will also erase the *SHA512_CTX*.

SHA512_End() is a wrapper for **SHA512_Final()** which converts the return value to a 129-character (including the terminating `'\0'`) ASCII string which represents the 512 bits in hexadecimal.

SHA512_File() calculates the digest of a file, and uses **SHA512_End()** to return the result. If the file cannot be opened, a null pointer is returned. **SHA512_FileChunk()** is similar to **SHA512_File()**, but it only calculates the digest over a byte-range of the file specified, starting at *offset* and spanning *length*

bytes. If the *length* parameter is specified as 0, or more than the length of the remaining part of the file, **SHA512_FileChunk()** calculates the digest from *offset* to the end of file. **SHA512_Data()** calculates the digest of a chunk of data in memory, and uses **SHA512_End()** to return the result.

When using **SHA512_End()**, **SHA512_File()**, or **SHA512_Data()**, the *buf* argument can be a null pointer, in which case the returned string is allocated with `malloc(3)` and subsequently must be explicitly deallocated using `free(3)` after use. If the *buf* argument is non-null it must point to at least 129 characters of buffer space.

The `SHA384_`, `SHA512_224_`, and `SHA512_256_` functions are identical to the `SHA512_` functions except they use a different initial hash value and the output is truncated to 384, 224, and 256 bits respectively.

SHA384_End() is a wrapper for **SHA384_Final()** which converts the return value to a 97-character (including the terminating `'\0'`) ASCII string which represents the 384 bits in hexadecimal.

SHA512_224_End() is a wrapper for **SHA512_Final()** which converts the return value to a 57-character (including the terminating `'\0'`) ASCII string which represents the 224 bits in hexadecimal.

SHA512_224_End() is a wrapper for **SHA512_Final()** which converts the return value to a 57-character (including the terminating `'\0'`) ASCII string which represents the 224 bits in hexadecimal.

SHA512_256_End() is a wrapper for **SHA512_Final()** which converts the return value to a 65-character (including the terminating `'\0'`) ASCII string which represents the 256 bits in hexadecimal.

ERRORS

The **SHA512_End()** function called with a null *buf* argument may fail and return NULL if:

[ENOMEM] Insufficient storage space is available.

The **SHA512_File()** and **SHA512_FileChunk()** may return NULL when underlying `open(2)`, `fstat(2)`, `lseek(2)`, or `SHA512_End(3)` fail.

SEE ALSO

`md4(3)`, `md5(3)`, `ripemd(3)`, `sha(3)`, `sha256(3)`, `sha512(3)`, `skein(3)`

HISTORY

These functions appeared in FreeBSD 9.0.

AUTHORS

The core hash routines were implemented by Colin Percival based on the published FIPS 180-2 standard.

BUGS

No method is known to exist which finds two files having the same hash value, nor to find a file with a specific hash value. There is on the other hand no guarantee that such a method does not exist.