

**NAME**

**MD5Init**, **MD5Update**, **MD5Pad**, **MD5Final**, **MD5End**, **MD5File**, **MD5FileChunk**, **MD5Data** - calculate the RSA Data Security, Inc., "MD5" message digest

**LIBRARY**

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

**SYNOPSIS**

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

```
#include <md5.h>
```

*void*

```
MD5Init(MD5_CTX *context);
```

*void*

```
MD5Update(MD5_CTX *context, const void *data, unsigned int len);
```

*void*

```
MD5Pad(MD5_CTX *context);
```

*void*

```
MD5Final(unsigned char digest[16], MD5_CTX *context);
```

*char \**

```
MD5End(MD5_CTX *context, char *buf);
```

*char \**

```
MD5File(const char *filename, char *buf);
```

*char \**

```
MD5FileChunk(const char *filename, char *buf, off_t offset, off_t length);
```

*char \**

```
MD5Data(const void *data, unsigned int len, char *buf);
```

**DESCRIPTION**

The MD5 functions calculate a 128-bit cryptographic checksum (digest) for any number of input bytes. A cryptographic checksum is a one-way hash-function, that is, you cannot find (except by exhaustive search) the input corresponding to a particular output. This net result is a "fingerprint" of the input-data, which does not disclose the actual input.

MD4 is the fastest and MD5 is somewhat slower. MD4 has now been broken; it should only be used where necessary for backward compatibility. MD5 has not yet (1999-02-11) been broken, but sufficient attacks have been made that its security is in some doubt. The attacks on both MD4 and MD5 are both in the nature of finding "collisions" - that is, multiple inputs which hash to the same value; it is still unlikely for an attacker to be able to determine the exact original input given a hash value.

The **MD5Init()**, **MD5Update()**, and **MD5Final()** functions are the core functions. Allocate an *MD5\_CTX*, initialize it with **MD5Init()**, run over the data with **MD5Update()**, and finally extract the result using **MD5Final()**, which will also erase the *MD5\_CTX*.

The **MD5Pad()** function can be used to pad message data in same way as done by **MD5Final()** without terminating calculation.

The **MD5End()** function is a wrapper for **MD5Final()** which converts the return value to a 33-character (including the terminating '\0') ASCII string which represents the 128 bits in hexadecimal.

The **MD5File()** function calculates the digest of a file, and uses **MD5End()** to return the result. If the file cannot be opened, a null pointer is returned. The **MD5FileChunk()** function is similar to **MD5File()**, 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, **MD5FileChunk()** calculates the digest from *offset* to the end of file. The **MD5Data()** function calculates the digest of a chunk of data in memory, and uses **MD5End()** to return the result.

When using **MD5End()**, **MD5File()**, or **MD5Data()**, 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 33 characters of buffer space.

## ERRORS

The **MD5End()** function called with a null *buf* argument may fail and return NULL if:

[ENOMEM]            Insufficient storage space is available.

The **MD5File()** and **MD5FileChunk()** may return NULL when underlying `open(2)`, `fstat(2)`, `lseek(2)`, or `MD5End(3)` fail.

## SEE ALSO

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

R. Rivest, *The MD4 Message-Digest Algorithm*, RFC 1186.

R. Rivest, *The MD5 Message-Digest Algorithm*, RFC 1321.

H. Dobbertin, "Alf Swindles Ann", *CryptoBytes*, 1(3):5, 1995.

MJ. B. Robshaw, "On Recent Results for MD2, MD4 and MD5", *RSA Laboratories Bulletin*, 4, November 12, 1996.

## HISTORY

These functions appeared in FreeBSD 2.0.

## AUTHORS

The original MD5 routines were developed by RSA Data Security, Inc., and published in the above references. This code is derived directly from these implementations by Poul-Henning Kamp <phk@FreeBSD.org>.

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## BUGS

The MD5 algorithm has been proven to be vulnerable to practical collision attacks and should not be relied upon to produce unique outputs, *nor should they be used as part of a cryptographic signature scheme*. Copyright (C) 1991-2, RSA Data Security, Inc. Created 1991. All rights reserved.

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