

kiCrypt.dll (tm)

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I am open to ways to improve this application, please email me.

Visual Basic 6.0 with Service Pack 6 runtime files required.

To obtain required files (VBRun60sp6.exe):

<http://www.microsoft.com/downloads/details.aspx?FamilyId=7B9BA261-7A9C-43E7-9117-F673077FFB3C>

VBRun60sp6.exe installs Visual Basic 6.0 SP6 run-time files.

<http://support.microsoft.com/kb/290887>

This software has been tested on Windows XP through Windows 7.

Windows 9x, 2000 and NT4 are no longer supported.

All algorithms, with the exception of Base64, can process files in excess of 2gb.

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REFERENCE:

The Cryptography API, or How to Keep a Secret

<http://msdn.microsoft.com/en-us/library/ms867086.aspx>

CryptoAPI Cryptographic Service Providers

[http://msdn.microsoft.com/en-us/library/bb931357\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/bb931357(VS.85).aspx)

SHA-2 support on MS Windows

Paraphrasing: Regarding SHA-224 support, SHA-224 offers less security than SHA-256 but takes the same amount of resources. Also SHA-224 is not generally used by protocols and applications. The NSA's (National Security Agency) Suite B standards also does not include it. Microsoft has no plans to add it to future versions of their Cryptographic Service Providers (CSP).

<http://blogs.msdn.com/b/alejacma/archive/2009/01/23/sha-2-support-on-windows-xp.aspx>

NIST (National Institute of Standards and Technology)

FIPS (Federal Information Processing Standards Publication)

SP (Special Publications)

<http://csrc.nist.gov/publications/PubsFIPS.html>

FIPS 180-2 (Federal Information Processing Standards Publication)
dated 1-Aug-2002, with Change Notice 1, dated 25-Feb-2004
http://csrc.nist.gov/publications/fips/fips180-2/FIPS180-2_changenotice.pdf

FIPS 180-3 (Federal Information Processing Standards Publication)
dated Oct-2008 (supercedes FIPS 180-2)
http://csrc.nist.gov/publications/fips/fips180-3/fips180-3_final.pdf

FIPS 180-4 (Federal Information Processing Standards Publication)
dated Mar-2012 (Supercedes FIPS-180-3)
<http://csrc.nist.gov/publications/fips/fips180-4/fips-180-4.pdf>

Examples of the implementation of the secure hash algorithms
SHA-1, SHA-224, SHA-256, SHA-384, SHA-512, SHA-512/224 and
SHA-512/256, can be found at:
<http://csrc.nist.gov/groups/ST/toolkit/examples.html>
http://csrc.nist.gov/groups/ST/toolkit/documents/Examples/SHA2_Additional.pdf

Aaron Gifford's additional test vectors
<http://www.adg.us/computers/sha.html>

Guidelines for Media Sanitization (SP800-88)
http://csrc.nist.gov/publications/nistpubs/800-88/NISTSP800-88_rev1.pdf

WARNING:

MD4 Message-Digest Algorithm has been compromised at the rump
session of Crypto 2004 it was announced that Xiaoyun Wang,
Dengguo Feng, Xuejia Lai and Hongbo Yu found collisions for
MD4, MD5, RIPEMD, and the 128-bit version of HAVAL.
<http://eprint.iacr.org/2004/199.pdf>

Feb-2005: SHA-1 has been compromised. Recommended that
you do not use for password or document authentication.
http://www.schneier.com/blog/archives/2005/02/sha1_broken.html
<http://csrc.nist.gov/groups/ST/toolkit/documents/shs/NISTHashComments-final.pdf>

Mar-2005 Demonstrating a technique for finding MD5 collisions quickly.
Eight hours on 1.6 GHz computer.
http://cryptography.hyperlink.cz/md5/MD5_collisions.pdf

Jun-2005 Two researchers from the Institute for Cryptology and
IT-Security have generated PostScript files with identical MD5-sums
but entirely different (but meaningful!) content.
http://www.schneier.com/blog/archives/2005/06/more_md5_collis.html

March 15, 2006: The SHA-2 family of hash functions
(i.e., SHA-224, SHA-256, SHA-384 and SHA-512) may be used
by Federal agencies for all applications using secure hash
algorithms. Federal agencies should stop using SHA-1 for
digital signatures, digital time stamping and other
applications that require collision resistance as soon as
practical, and must use the SHA-2 family of hash functions
for these applications after 2010. After 2010, Federal
agencies may use SHA-1 only for the following applications:

- hash-based message authentication codes (HMACs)
- key derivation functions (KDFs)
- random number generators (RNGs)

Regardless of use, NIST encourages application and protocol
designers to use the SHA-2 family of hash functions for all

new applications and protocols.
<http://csrc.nist.gov/groups/ST/hash/policy.html>

Export Control: Certain cryptographic devices and technical data regarding them are subject to Federal export controls. Exports of cryptographic modules implementing this standard and technical data regarding them must comply with these Federal regulations and be licensed by the Bureau of Export Administration of the U.S. Department of Commerce. Information about export regulations is available at:
<http://www.bis.doc.gov/index.htm>

How to use:

For a simple example, execute the SHA_Demo application. The demo converts the data to a byte array prior to passing it to the DLL to be hashed.

[STRING DATA]
Convert string data to byte array prior to passing to the HashString function.

Ex: `abytData() = StrConv("abc", vbFromUnicode)`

[FILE DATA]
Just the path and filename are passed in the byte array. Convert the path\filename data to byte array prior to passing to the HashFile function. The HashFile routine will open and read the file into an internal byte array.

Ex: `abytData() = StrConv("C:\Files\Test Folder\Testfile.txt", vbFromUnicode)`

Both will create a hashed output string based on file data input.

Test data provided to test either hash or cipher:

TestPhrase.txt	ASCII text phrase	(Copy & paste phrase for string test)
TestFile.txt	ASCII text file	

Binary test files:

KB_32.dat	32,768 binary zeros	
OneMil_0.dat	One million binary zeros	(FIPS 180-3)
OneMil_a.dat	One million letter "a"	(FIPS 180-2)
API32.txt	Text file over 1 MB	

Note from Mark Hutchinson's presentation about Microsoft's VB random number generator. <http://www.15seconds.com/issue/051110.htm>

References:

Randomize Statement Doesn't Re-initialize Rnd Function
<http://support.microsoft.com/default.aspx?scid=kb;en-us;120587>

"To re-initialize the random-number generator, use the Rnd function with a value of -1 to re-initialize the Rnd function, and then use the Randomize statement with the value you want to use as the seed value for the Rnd function."

VBA's Pseudo Random Number Generator
<http://www.noesis.net.au/prng.php>

INFO: How Visual Basic Generates Pseudo-Random Numbers for the RND Function
<http://support.microsoft.com/kb/231847/en-us>

RND and RANDOMIZE Alternatives for Generating Random Numbers
<http://support.microsoft.com/kb/28150/EN-US/>

** Enhanced ciphers

With all ciphers, except ArcFour, the data length will change. After encryption, data sizes will not match original sizes. This is due to internal padding and the storing of information required to decrypt the data later.

** PASSWORDS

Currently there is a minimum and maximum length of the password the user may enter. This can be changed in the kiCrypt DLL basCommon.bas module. In the declarations section, locate these two constants and make the desired change. Be sure to recompile the DLL and the demo application.

```
PWD_LENGTH_MIN = 8
PWD_LENGTH_MAX = 50
```

If no hash algorithm is selected then the default hash will be SHA-256.

=====
Available in Cipher (clsCipher)
=====

```
' *****
' Enumerations
' *****
Public Enum enumCIPHER_ALGORITHM
    CIPHER_ARCFOUR      ' 0
    CIPHER_BASE64       ' 1
    CIPHER_BLOWFISH     ' 2   Default
    CIPHER_GOST         ' 3
    CIPHER_RIJNDAEL     ' 4
    CIPHER_BLOWFISH     ' 5
    CIPHER_SKIPJACK     ' 6
    CIPHER_TWOFISH      ' 7
End Enum
```

```
' *****
' ****                               ****
'                               Properties
' *****
```

CipherMethod - Input - Long integer - (0-7) designating which cipher
algorithm to use. See enumCIPHER_ALGORITHM

Version - Output - String - DLL version information

StopProcessing - Input/Output - Boolean - Designates if the user has opted
to stop processing.

Syntax: X.StopPressed = TRUE (Input)
Debug.Print X.StopPressed (Output)

Password - Input - String - Representing a user defined password.
Syntax: X.Password = "kenaso@tx.rr.com"

CreateNewFile - Input - Boolean - Used to designate if input file is to be
overwritten after encryption/decryption.
TRUE - Create new file to hold encrypted/decrypted data
FALSE - Overwrite input file after encryption/decryption

KeyLength - Input - Long Integer

BlockSize - Input - Long Integer - Only used by Rijndael cipher

CipherRounds - Input - Long Integer - Number of times to perform
encryption on some data

PrimaryKeyRounds - Input - Long Integer - Number of rounds to mix primary key
array. Only used by Blowfish and GOST ciphers.

HashMethod - Input - Long Integer - See enumHASH_ALGORITHM

CipherMethod - Input - Long Integer - See enumCIPHER_ALGORITHM

PasswordLength_Min - Output - Long Integer - Minimum password length

PasswordLength_Max - Output - Long Integer - Maximum password length

```
' *****
' ****                               ****
'                               Methods
' *****
```

```
' Encrypt a string of data.
Function EncryptString(ByVal strData As String) As String

' Decrypt a string of data.
Function DecryptString(ByVal strData As String) As String

NOTE:  strSource = Path\Filename location
       strTarget  = Path\Filename location

' Encrypt a file.  If no target name is given then the process
' will use the source name.
Function EncryptFile(ByVal strSource As String, _
                    Optional ByVal strTarget As String = "") As Boolean

' Decrypt a file.  If no target name is given then the process
' will use the source name.
Function DecryptFile(ByVal strSource As String, _
                    Optional ByVal strTarget As String = "") As Boolean

' Convert a hex string, stored in a byte array, into a normal
' string of data, also stored in a byte array.
Sub HexToString(ByRef abyData() As Byte)

' Convert a normal string, stored in a byte array, into a hex
' string of data, also stored in a byte array.
Sub StringToHex(ByRef abyData() As Byte)
```

=====
Located in Hash (clsHash.cls)
=====

```
' *****
' Enumerations
' *****
Public Enum enumHASH_ALGORITHM
    eHASH_MD2           ' 0
    eHASH_MD4           ' 1
    eHASH_MD5           ' 2
    eHASH_SHA1          ' 3
    eHASH_SHA256        ' 4   Default
    eHASH_SHA384        ' 5
    eHASH_SHA512        ' 6
    eHASH_TIGER128      ' 7
    eHASH_TIGER160      ' 8
    eHASH_TIGER192      ' 9
    eHASH_TIGER224      ' 10
    eHASH_TIGER256      ' 11
    eHASH_TIGER384      ' 12
    eHASH_TIGER512      ' 13
    eHASH_WHIRLPOOL224  ' 14
    eHASH_WHIRLPOOL256  ' 15
    eHASH_WHIRLPOOL384  ' 16
    eHASH_WHIRLPOOL512  ' 17
End Enum

' *****
' ***** Properties *****
' *****
Version - Output - String - Name of DLL and version information

StopProcessing - Input/Output - Boolean - True if user wants to stop
                processing.

HashMethod - Input only - [OPTIONAL] Long integer (0-17) designating what
             hash algorithm to use. See enumHASH_ALGORITHM

HashRounds - Input only - [OPTIONAL] Long integer (1-10) designating number
             of hash iterations to use.

ReturnLowercase - Input only - [OPTIONAL] Boolean - Return hashed data in
                  upper or lower case format. Default = TRUE

' *****
' ***** Methods *****
' *****
' Creates a hash output string based on string data input
' in byte array format.
Function HashString(ByRef abyInput() As Byte) As Variant

' Creates a hash output string based on file data input.
' Input is the Path/File location only in byte array format.
Function HashFile(ByRef abyInput() As Byte) As Variant
```

```
=====
Available in CRC32 (clsCRC32.cls)
=====
```

```
' *****
' ****                               ****
'                               Properties
' *****
Version - Output - String - Name of DLL and version information

StopProcessing - Input/Output - Boolean data to designate if the user has
                  opted to stop the processing.
                  Syntax:  X.StopPressed = TRUE      (Input)
                           Debug.Print X.StopPressed (Output)
```

```
' *****
' ****                               ****
'                               Methods
' *****
' Returns a numeric value representing a string input.
Function CRC32_String(ByVal strData As String) As String

' Returns a numeric value representing a Path/File location only.
Function CRC32_File(ByVal strSource As String) As String
```


=====

Available in cPRNG (clsRandom)
A cryptographically random number generator using Microsoft's CryptoAPI.

=====

```
' *****
' Enumerations
' *****
Public Enum enumPRNG_ReturnFormat
    ePRNG_ASCII          ' 0
    ePRNG_HEX            ' 1
    ePRNG_HEX_ARRAY      ' 2
    ePRNG_BYTE_ARRAY     ' 3
    ePRNG_LONG_ARRAY     ' 4
    ePRNG_DBL_ARRAY      ' 5
End Enum

Public Enum enumPRNG_HashAlgorithm
    ePRNG_MD2            ' 0
    ePRNG_MD4            ' 1
    ePRNG_MD5            ' 2
    ePRNG_SHA1           ' 3
    ePRNG_SHA256         ' 4
    ePRNG_SHA384         ' 5
    ePRNG_SHA512         ' 6
End Enum

Public Enum enumPRNG_Compare
    ePRNG_CaseSensitive  ' 0 - Exact byte match
    ePRNG_IgnoreCase     ' 1 - Uppercase/Lowercase considered same
End Enum

' *****
' ****                               ****
' *****

StopProcessing - Input/Output - Boolean - True if user wants to stop processing

AES_Ready - Output - Boolean - True if operating system can use SHA2 functionality

CompareMethod - Input - Long Integer - Designates type of data comparison to be used

' *****
' ****                               ****
' *****

' Build random data using ASCII values 0-255.
Function BuildRndData(ByVal lngDataLength As Long, _
    Optional ByVal lngReturnFormat As enumPRNG_ReturnFormat =
ePRNG_BYTE_ARRAY, _
    Optional ByVal blnCreateExtraSeed As Boolean = True) As Variant

' Build random data that falls between two ASCII values, inclusive.
Function BuildWithinRange(ByVal lngDataLength As Long, _
    Optional ByVal lngLowValue As Long = 0, _
    Optional ByVal lngHighValue As Long = 255, _
    Optional ByVal lngRetDataType As enumPRNG_ReturnFormat =
enuByteArray, _
    Optional ByVal blnCreateExtraSeed As Boolean = True) As Variant

' The data will be SORTED. This routine removes all duplicates based on
' user selection of case sensitivity. The number of duplicates removed
' are returned.
Function RemoveDupes(ByRef avntData As Variant, _
```

```
Optional ByRef lngDupeCnt As Long = 0, _
Optional ByVal blnReturnMixed As Boolean = False) As Boolean

' An array of data passed to this routine will be rearranged.
Sub ReshuffleData(ByRef avntData As Variant, _
Optional ByVal lngMixCount As Long = 25)

' With this routine you can generate a series of non-repeating numbers.
' An array will be loaded starting with the base number (lngMinValue)
' requested up to the maximum value requested (lngMaxValue). You can
' also enter the incremental step between the minimum and maximum value.
' This array is then passed to another routine ReshuffleData() to be
' thoroughly rearranged. When it is returned, the requested number of
' elements (lngReturnQty) from the mixed array are transferred
' sequentially to the return array (alngMixed()).
'
' Syntax:  x = NonRepeatingNbrs(100, 0, 9999, 5)
'          Return 100 numbers, lowest = 0, highest = 9999,
'          incremental step = 5, Sort return data in
'          Ascending order (default)
Function NonRepeatingNbrs(ByVal lngReturnQty As Long, _
                        ByVal lngMinValue As Long, _
                        ByVal lngMaxValue As Long, _
                        Optional ByVal lngStep As Long = 1, _
                        Optional ByVal blnSortData As Boolean = True) As Long()

' CombSort is faster than all but QuickSort and close to it. On the
' other hand, the code is much simpler than QuickSort and can be easily
' customized for any array type. The CombSort was first published by
' Richard Box and Stephen Lacey in the April 1991 issue of Byte magazine.
Function CombSort(ByRef avntData As Variant, _
Optional ByVal blnAscending As Boolean = True) As Boolean

' Generate a one-way hash string from a string of data. These are the
' algorithms to use:  MD2 MD4 MD5 SHA-1 SHA-256 SHA-384 SHA-512
'
' Special note:  SHA-224, SHA-512/224 and SHA-512/256 have not yet been
' implemented into the Microsoft crypto suite of hashes.
Function CreateHash(ByVal strInput As String, _
Optional ByVal lngHashAlgo As enumPRNG_HashAlgorithm = ePRNG_SHA512, _
Optional ByVal blnReturnAsHex As Boolean = True) As String

' Generate a random long integer between two input values.
Function GetRndValue(ByVal sngLow As Single, _
                    ByVal sngHigh As Single) As Long

' Convert a long integer to a double precision number. Returns a decimal
' position of 14 places.
Function LongToDouble(ByVal lngValue As Long) As Double

' This is an ArrPtr function that determines if the passed array is
' initialized, and if so will return the pointer to the safearray header.
' If the array is not initialized, it will return zero.
' Syntax:  If CBool(IsArrayInitialized(array_being_tested)) Then ...
Function IsArrayInitialized(ByVal avntData As Variant) As Long

' Properly empty and deactivate a collection
Sub EmptyCollection(ByRef colData As Collection)

' This little code snippet returns a truly random value.
Function RndSeed() As Double

' Swap data with each other. Wrote this function since BASIC stopped
```

```
' having its own SWAP function. Use this for swapping strings, type
' structures, numbers with decimal values, etc.
Sub SwapData(ByRef vntData1 As Variant, _
             ByRef vntData2 As Variant)

' Swap numeric data (byte, integer, or long) with each other
' without using a temporary holding variable.
Sub SwapLong(ByRef AA As Long, _
             ByRef BB As Long)

Sub SwapInt(ByRef AA As Integer, _
            ByRef BB As Integer)

Sub SwapByte(ByRef AA As Byte, _
             ByRef BB As Byte)

' Converts a byte array to string data.
Function ByteArrayToString(ByRef abyData() As Byte) As String

' Converts string data to a byte array.
Function StringToByteArray(ByVal strData As String) As Byte()

' Creates a unique string of hex data using CryptoAPI hash functions. Also,
' randomly select a starting position in hashed data string to capture two
' eight byte strings of data. These will be converted into long integers
' for new carryover values.
Function CreateExtraSeed(Optional ByVal lngRetLength As Long = 0) As String
```

```
=====
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=====
```

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