

## sha256.cm

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/*  
  
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    (See accompanying LICENSE.txt or http://www.gnu.org/licenses/gpl.html  
    )  
  
*/  
  
// Copyright (c) 1994  
// Hewlett–Packard Company  
// Copyright (c) 1996  
// Silicon Graphics Computer Systems, Inc.  
// Copyright (c) 2009 Alexander Stepanov and Paul McJones  
  
using System.IO;  
  
namespace System.Security  
{  
    public nothrow inline uint RightRotate(uint x, uint n)  
    {  
        return (x >> n) | (x << (32u - n));  
    }  
  
    public class Sha256  
    {  
        static nothrow Sha256()  
        {  
            k[0] = 0x428a2f98u;  
            k[1] = 0x71374491u;  
            k[2] = 0xb5c0fbcfu;  
            k[3] = 0xe9b5dba5u;  
            k[4] = 0x3956c25bu;  
            k[5] = 0x59f111f1u;  
            k[6] = 0x923f82a4u;  
            k[7] = 0xab1c5ed5u;  
            k[8] = 0xd807aa98u;  
            k[9] = 0x12835b01u;  
            k[10] = 0x243185beu;  
            k[11] = 0x550c7dc3u;  
            k[12] = 0x72be5d74u;  
            k[13] = 0x80deb1feu;  
            k[14] = 0x9bdc06a7u;  
            k[15] = 0xc19bf174u;  
            k[16] = 0xe49b69c1u;  
            k[17] = 0xefbe4786u;  
            k[18] = 0x0fc19dc6u;
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k[19] = 0x240ca1ccu;
k[20] = 0x2de92c6fu;
k[21] = 0x4a7484aa;
k[22] = 0x5cb0a9dcu;
k[23] = 0x76f988dau;
k[24] = 0x983e5152u;
k[25] = 0xa831c66du;
k[26] = 0xb00327c8u;
k[27] = 0xbf597fc7u;
k[28] = 0xc6e00bf3u;
k[29] = 0xd5a79147u;
k[30] = 0x06ca6351u;
k[31] = 0x14292967u;
k[32] = 0x27b70a85u;
k[33] = 0x2e1b2138u;
k[34] = 0x4d2c6dfcu;
k[35] = 0x53380d13u;
k[36] = 0x650a7354u;
k[37] = 0x766a0abbu;
k[38] = 0x81c2c92eu;
k[39] = 0x92722c85u;
k[40] = 0xa2bfe8a1u;
k[41] = 0xa81a664bu;
k[42] = 0xc24b8b70u;
k[43] = 0xc76c51a3u;
k[44] = 0xd192e819u;
k[45] = 0xd6990624u;
k[46] = 0xf40e3585u;
k[47] = 0x106aa070u;
k[48] = 0x19a4c116u;
k[49] = 0x1e376c08u;
k[50] = 0x2748774cu;
k[51] = 0x34b0bcb5u;
k[52] = 0x391c0cb3u;
k[53] = 0x4ed8aa4au;
k[54] = 0x5b9cca4fu;
k[55] = 0x682e6ff3u;
k[56] = 0x748f82eeu;
k[57] = 0x78a5636fu;
k[58] = 0x84c87814u;
k[59] = 0x8cc70208u;
k[60] = 0x90befffau;
k[61] = 0xa4506cebu;
k[62] = 0xbef9a3f7u;
k[63] = 0xc67178f2u;
}
public nothrow Sha256()
{
    Reset();
}
public nothrow void Reset()
{
    digest[0] = 0x6a09e667u;

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        digest[1] = 0xbb67ae85u;
        digest[2] = 0x3c6ef372u;
        digest[3] = 0xa54ff53au;
        digest[4] = 0x510e527fu;
        digest[5] = 0x9b05688cu;
        digest[6] = 0x1f83d9abu;
        digest[7] = 0x5be0cd19u;
    }
    public nothrow void Process(byte x)
    {
        ProcessByte(x);
        bitCount = bitCount + 8u;
    }
    public nothrow void Process(const void* begin, const void* end)
    {
        byte* b = cast<byte*>(begin);
        byte* e = cast<byte*>(end);
        while (b != e)
        {
            Process(*b);
            ++b;
        }
    }
    public nothrow void Process(const void* buf, int count)
    {
        byte* b = cast<byte*>(buf);
        Process(b, b + count);
    }
    public nothrow string GetDigest()
    {
        ProcessByte(0x80u);
        if (byteIndex > 56u)
        {
            while (byteIndex != 0u)
            {
                ProcessByte(0u);
            }
            while (byteIndex < 56u)
            {
                ProcessByte(0u);
            }
        }
        else
        {
            while (byteIndex < 56u)
            {
                ProcessByte(0u);
            }
        }
        ProcessByte(cast<byte>((bitCount >> 56u) & 0xFFu));
        ProcessByte(cast<byte>((bitCount >> 48u) & 0xFFu));
        ProcessByte(cast<byte>((bitCount >> 40u) & 0xFFu));
        ProcessByte(cast<byte>((bitCount >> 32u) & 0xFFu));
    }

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        ProcessByte(cast<byte>((bitCount >> 24u) & 0xFFu));
        ProcessByte(cast<byte>((bitCount >> 16u) & 0xFFu));
        ProcessByte(cast<byte>((bitCount >> 8u) & 0xFFu));
        ProcessByte(cast<byte>(bitCount & 0xFFu));
        string s = ToHexString(digest[0]);
        s.Append(ToHexString(digest[1]));
        s.Append(ToHexString(digest[2]));
        s.Append(ToHexString(digest[3]));
        s.Append(ToHexString(digest[4]));
        s.Append(ToHexString(digest[5]));
        s.Append(ToHexString(digest[6]));
        s.Append(ToHexString(digest[7]));
        return s;
    }
private nothrow void ProcessByte(byte x)
{
    block[byteIndex++] = x;
    if (byteIndex == 64u)
    {
        byteIndex = 0u;
        ProcessBlock();
    }
}
private nothrow void ProcessBlock()
{
    uint[64] w;
    for (int i = 0; i < 16; ++i)
    {
        w[i] = cast<uint>(block[4 * i]) << 24u;
        w[i] = w[i] | cast<uint>(block[4 * i + 1]) << 16u;
        w[i] = w[i] | cast<uint>(block[4 * i + 2]) << 8u;
        w[i] = w[i] | cast<uint>(block[4 * i + 3]);
    }
    for (int i = 16; i < 64; ++i)
    {
        w[i] = (RightRotate(w[i - 2], 17u) ^ RightRotate(w[i -
            2], 19u) ^ (w[i - 2] >> 10u)) + w[i - 7] + (
            RightRotate(w[i - 15], 7u) ^ RightRotate(w[i - 15], 18
            u) ^ (w[i - 15] >> 3u)) + w[i - 16];
    }
    uint a = digest[0];
    uint b = digest[1];
    uint c = digest[2];
    uint d = digest[3];
    uint e = digest[4];
    uint f = digest[5];
    uint g = digest[6];
    uint h = digest[7];
    for (int i = 0; i < 64; ++i)
    {
        uint t1 = h + (RightRotate(e, 6u) ^ RightRotate(e, 11u) ^
            RightRotate(e, 25u)) + ((e & f) ^ ((~e) & g)) + k[i]
            + w[i];
    }
}

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        uint t2 = (RightRotate(a, 2u) ^ RightRotate(a, 13u) ^
            RightRotate(a, 22u)) + ((a & b) ^ (a & c) ^ (b & c));
        h = g;
        g = f;
        f = e;
        e = d + t1;
        d = c;
        c = b;
        b = a;
        a = t1 + t2;
    }
    digest[0] = a + digest[0];
    digest[1] = b + digest[1];
    digest[2] = c + digest[2];
    digest[3] = d + digest[3];
    digest[4] = e + digest[4];
    digest[5] = f + digest[5];
    digest[6] = g + digest[6];
    digest[7] = h + digest[7];
}
private static uint[64] k;
private byte[64] block;
private byte byteIndex;
private ulong bitCount;
private uint[8] digest;
}

public nothrow string GetSha256MessageDigest(const string& message)
{
    Sha256 sha256;
    sha256.Process(message.Chars(), message.Length());
    return sha256.GetDigest();
}

public string GetSha256FileDigest(const string& filePath)
{
    Sha256 sha256;
    BinaryFileStream file(filePath, OpenMode.readOnly);
    IOBuffer buffer(4096u);
    int bytesRead = file.Read(buffer.Mem(), buffer.Size());
    while (bytesRead > 0)
    {
        sha256.Process(buffer.Mem(), bytesRead);
        bytesRead = file.Read(buffer.Mem(), buffer.Size());
    }
    return sha256.GetDigest();
}
}

```