

bitset.cm

```
/*  
  
    Copyright (c) 2012–2015 Seppo Laakko  
    http://sourceforge.net/projects/cmajors/  
  
    Distributed under the GNU General Public License, version 3 (GPLv3).  
    (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;  
  
namespace System.Collections  
{  
    public class BitSet  
    {  
        public nothrow BitSet(): numBits(0), bits()  
        {  
            try  
            {  
                bits.Add(0u);  
            }  
            catch (const Exception& ex)  
            {  
                exit(1);  
            }  
        }  
        public BitSet(int numBits_): numBits(0), bits()  
        {  
            Resize(numBits_);  
        }  
        public BitSet(const string& bits_): numBits(0), bits()  
        {  
            Resize(bits_.Length());  
            for (int i = 0; i < numBits; ++i)  
            {  
                if (bits_[i] == '1')  
                {  
                    Set(i);  
                }  
            }  
        }  
    }  
}
```

```

public default BitSet(const BitSet&);
public default void operator=(const BitSet&);
public default nothrow BitSet(BitSet&&);
public default nothrow void operator=(BitSet&&);
public default ~BitSet();
public nothrow void Clear()
{
    numBits = 0;
    bits.Clear();
}
public nothrow inline int Count() const
{
    return numBits;
}
public void Resize(int numBits_)
{
    numBits = numBits_;
    #assert(numBits >= 0);
    if (numBits > 0)
    {
        bits.Resize(1 + NumFullBlocks());
    }
    else
    {
        bits.Resize(1);
    }
}
public void Set()
{
    int n = bits.Count();
    for (int i = 0; i < n; ++i)
    {
        bits[i] = allOne;
    }
}
public void Reset()
{
    int n = bits.Count();
    for (int i = 0; i < n; ++i)
    {
        bits[i] = 0u;
    }
}
public void Set(int pos)
{
    #assert(pos >= 0 && pos < numBits);
    ulong& b = bits[pos / blockSize];
    b = b | (1u << (cast<ulong>(pos) & blockMask));
}
public void Reset(int pos)
{
    #assert(pos >= 0 && pos < numBits);
    ulong& b = bits[pos / blockSize];

```

```

        b = b & ~(1u << (cast<ulong>(pos) & blockMask));
    }
    public void Set(int pos, bool bit)
    {
        if (bit)
        {
            Set(pos);
        }
        else
        {
            Reset(pos);
        }
    }
    public void Flip()
    {
        int n = bits.Count();
        for (int i = 0; i < n; ++i)
        {
            bits[i] = ~(bits[i]);
        }
    }
    public void Flip(int pos)
    {
        #assert(pos >= 0 && pos < numBits);
        ulong& b = bits[pos / blockSize];
        b = b ^ (1u << (cast<ulong>(pos) & blockMask));
    }
    public bool operator [] (int index) const
    {
        return Test(index);
    }
    public bool Test(int pos) const
    {
        #assert(pos >= 0 && pos < numBits);
        ulong b = bits[pos / blockSize];
        return (b & (1u << (cast<ulong>(pos) & blockMask))) != 0u;
    }
    public bool All() const
    {
        int n = NumFullBlocks();
        for (int i = 0; i < n; ++i)
        {
            if (bits[i] != allOne)
            {
                return false;
            }
        }
        for (int i = LastBlockStartIndex(); i < numBits; ++i)
        {
            if (!Test(i))
            {
                return false;
            }
        }
    }

```

```

    }
    return true;
}
public bool Any() const
{
    int n = NumFullBlocks();
    for (int i = 0; i < n; ++i)
    {
        if (bits[i] != 0u)
        {
            return true;
        }
    }
    for (int i = LastBlockStartIndex(); i < numBits; ++i)
    {
        if (Test(i))
        {
            return true;
        }
    }
    return false;
}
public bool None() const
{
    int n = NumFullBlocks();
    for (int i = 0; i < n; ++i)
    {
        if (bits[i] != 0u)
        {
            return false;
        }
    }
    for (int i = LastBlockStartIndex(); i < numBits; ++i)
    {
        if (Test(i))
        {
            return false;
        }
    }
    return true;
}
public bool operator==(const BitSet& that) const
{
    if (numBits != that.numBits)
    {
        return false;
    }
    const List<ulong>& thatBits = that.bits;
    int n = NumFullBlocks();
    for (int i = 0; i < n; ++i)
    {
        if (bits[i] != thatBits[i])
        {

```

```

        return false;
    }
}
for (int i = LastBlockStartIndex(); i < numBits; ++i)
{
    bool test = Test(i);
    bool thatTest = that.Test(i);
    if (test != thatTest)
    {
        return false;
    }
}
return true;
}
public string ToString() const
{
    string s;
    s.Reserve(numBits);
    for (int i = 0; i < numBits; ++i)
    {
        if (Test(i))
        {
            s.Append('1');
        }
        else
        {
            s.Append('0');
        }
    }
    return s;
}
private inline nothrow int NumFullBlocks() const
{
    if (numBits == 0)
    {
        return 0;
    }
    return (numBits - 1) / blockSize;
}
private inline nothrow int LastBlockStartIndex() const
{
    return NumFullBlocks() * blockSize;
}
private const int blockSize = 64;
private const ulong blockMask = 63u;
private const ulong allOne = 0xFFFFFFFFFFFFFFFFu;
private int numBits;
private List<ulong> bits;
}
}

```