上海仰邦科技股份有限公司

BX-5(M)K CRC16 校验算法 V1.1

供用户使用

2016-2-19

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一、C 语言查表法

1.算法

```
#include <stdio.h>
unsigned short tabel_CRC16[256] = {
    0X0000, 0XC0C1, 0XC181, 0X0140, 0XC301, 0X03C0, 0X0280, 0XC241,
    0XC601, 0X06C0, 0X0780, 0XC741, 0X0500, 0XC5C1, 0XC481, 0X0440,
    0XCC01, 0X0CC0, 0X0D80, 0XCD41, 0X0F00, 0XCFC1, 0XCE81, 0X0E40,
    0X0A00, 0XCAC1, 0XCB81, 0X0B40, 0XC901, 0X09C0, 0X0880, 0XC841,
    0XD801, 0X18C0, 0X1980, 0XD941, 0X1B00, 0XDBC1, 0XDA81, 0X1A40,
    0X1E00, 0XDEC1, 0XDF81, 0X1F40, 0XDD01, 0X1DC0, 0X1C80, 0XDC41,
    0X1400, 0XD4C1, 0XD581, 0X1540, 0XD701, 0X17C0, 0X1680, 0XD641,
    0XD201, 0X12C0, 0X1380, 0XD341, 0X1100, 0XD1C1, 0XD081, 0X1040,
    0XF001, 0X30C0, 0X3180, 0XF141, 0X3300, 0XF3C1, 0XF281, 0X3240,
    0X3600, 0XF6C1, 0XF781, 0X3740, 0XF501, 0X35C0, 0X3480, 0XF441,
    0X3C00, 0XFCC1, 0XFD81, 0X3D40, 0XFF01, 0X3FC0, 0X3E80, 0XFE41,
    0XFA01, 0X3AC0, 0X3B80, 0XFB41, 0X3900, 0XF9C1, 0XF881, 0X3840,
    0X2800, 0XE8C1, 0XE981, 0X2940, 0XEB01, 0X2BC0, 0X2A80, 0XEA41,
    0XEE01, 0X2EC0, 0X2F80, 0XEF41, 0X2D00, 0XEDC1, 0XEC81, 0X2C40,
    0XE401, 0X24C0, 0X2580, 0XE541, 0X2700, 0XE7C1, 0XE681, 0X2640,
    0X2200, 0XE2C1, 0XE381, 0X2340, 0XE101, 0X21C0, 0X2080, 0XE041,
    0XA001, 0X60C0, 0X6180, 0XA141, 0X6300, 0XA3C1, 0XA281, 0X6240,
    0X6600, 0XA6C1, 0XA781, 0X6740, 0XA501, 0X65C0, 0X6480, 0XA441,
    0X6C00, 0XACC1, 0XAD81, 0X6D40, 0XAF01, 0X6FC0, 0X6E80, 0XAE41,
    0XAA01, 0X6AC0, 0X6B80, 0XAB41, 0X6900, 0XA9C1, 0XA881, 0X6840,
    0X7800, 0XB8C1, 0XB981, 0X7940, 0XBB01, 0X7BC0, 0X7A80, 0XBA41,
    0XBE01, 0X7EC0, 0X7F80, 0XBF41, 0X7D00, 0XBDC1, 0XBC81, 0X7C40,
    0XB401, 0X74C0, 0X7580, 0XB541, 0X7700, 0XB7C1, 0XB681, 0X7640,
    0X7200, 0XB2C1, 0XB381, 0X7340, 0XB101, 0X71C0, 0X7080, 0XB041,
    0X5000, 0X90C1, 0X9181, 0X5140, 0X9301, 0X53C0, 0X5280, 0X9241,
    0X9601, 0X56C0, 0X5780, 0X9741, 0X5500, 0X95C1, 0X9481, 0X5440,
    0X9C01, 0X5CC0, 0X5D80, 0X9D41, 0X5F00, 0X9FC1, 0X9E81, 0X5E40,
    0X5A00, 0X9AC1, 0X9B81, 0X5B40, 0X9901, 0X59C0, 0X5880, 0X9841,
    0X8801, 0X48C0, 0X4980, 0X8941, 0X4B00, 0X8BC1, 0X8A81, 0X4A40,
    0X4E00, 0X8EC1, 0X8F81, 0X4F40, 0X8D01, 0X4DC0, 0X4C80, 0X8C41,
    0X4400, 0X84C1, 0X8581, 0X4540, 0X8701, 0X47C0, 0X4680, 0X8641,
    0X8201, 0X42C0, 0X4380, 0X8341, 0X4100, 0X81C1, 0X8081, 0X4040
};
unsigned short my_CRC(int *data, int size) {
    unsigned short tempcrc = 0;
    unsigned short temp = 0;
    int i =0;
    for (i=0; i<size; i++){
        temp = ((tempcrc & 0x00ff) ^ (data[i] & 0x00ff));
        tempcrc = ((tempcrc>>8) & 0xff) ^ tabel_CRC16[temp];
    }
    return tempcrc;
}
int main(int argc,char **argv) {
    int a[]={0x01,0x02,0x03,0x04,0x05,0x06,0xFE};
    printf("%x\n",my_CRC(a,sizeof(a)/sizeof(int)));
    return 0;
}
```

2.运行截图

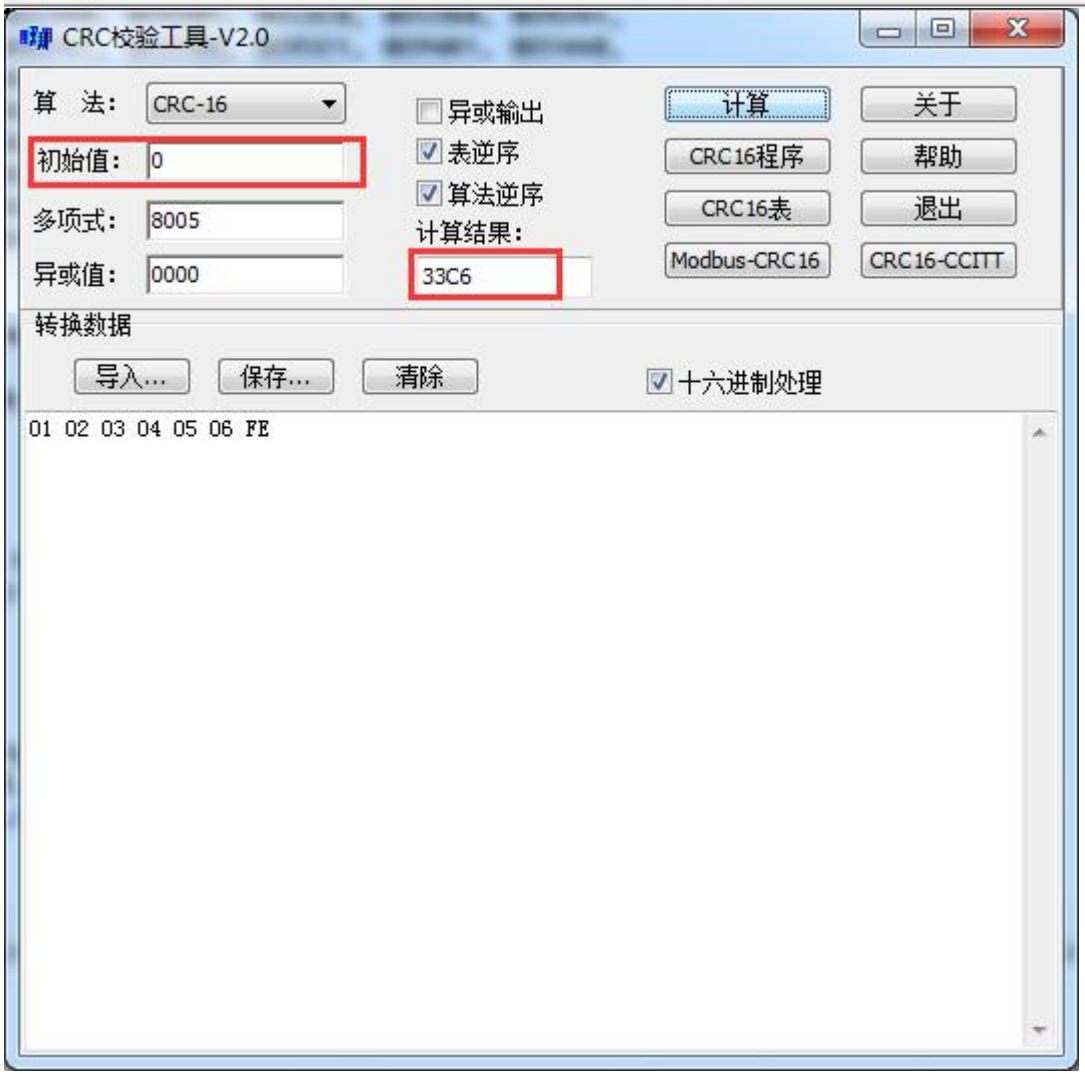
```
    0X7200, 0XB2C1, 0XB381, 0X7340, 0XB101, 0X71C0, 0X7080, 0XB041,
    0X5000, 0X90C1, 0X9181, 0X5140, 0X9301, 0X53C0, 0X5280, 0X9241,
    0X9601, 0X56C0, 0X5780, 0X9741, 0X5500, 0X95C1, 0X9481, 0X5440,
    0X9C01, 0X5CC0, 0X5D80, 0X9D41, 0X5F00, 0X9FC1, 0X9E81, 0X5E40,
    0X5A00, 0X9AC1, 0X9B81, 0X5B40, 0X9901, 0X59C0, 0X5880, 0X9841,
    0X8801, 0X48C0, 0X4980, 0X8941, 0X4B00, 0X8BC1, 0X8A81, 0X4A40,
    0X4E00, 0X8EC1, 0X8F81, 0X4F40, 0X8D01, 0X4DC0, 0X4C80, 0X8C41,
    0X4400, 0X84C1, 0X8581, 0X4540, 0X8701, 0X47C0, 0X4680, 0X8641,
    0X8201, 0X42C0, 0X4380, 0X8341, 0X4100, 0X81C1, 0X8081, 0X4040
};

unsigned short my_CRC(int *data, int size) {
    unsigned short tempcrc  = 0;
    unsigned short temp = 0;
    int i =0;

    for (i=0; i<size; i++)
    {
        temp = ((tempcrc & 0x00ff) ^ (data[i] & 0x00ff));
        tempcrc = ((tempcrc>>8) & 0xff) ^ tabel_CRC16[temp];
    }
    return tempcrc;
}

int main(int argc,char **argv)  {
    int a[]={0x01,0x02,0x03,0x04,0x05,0x06,0xFE};
    printf("%x\n",my_CRC(a,sizeof(a)/sizeof(int)));
    return 0;
}
```

```
"E:\TEMPBUILD\VC\TEST\crcCyuyan\Debug\
33c6
Press any key to continue
```



二、C 语言非查表法

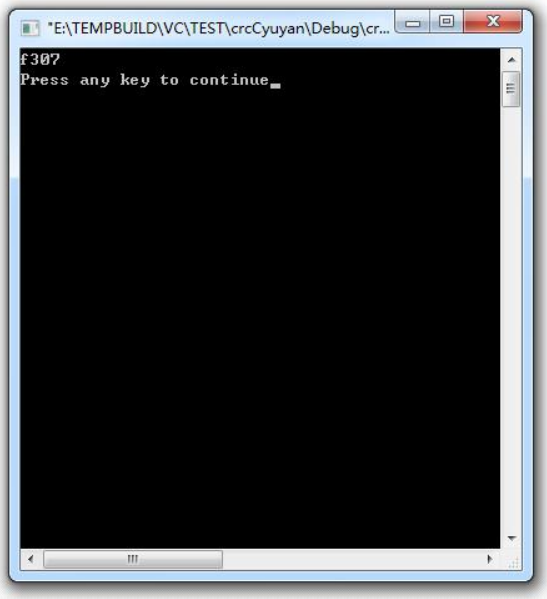
1. 算法

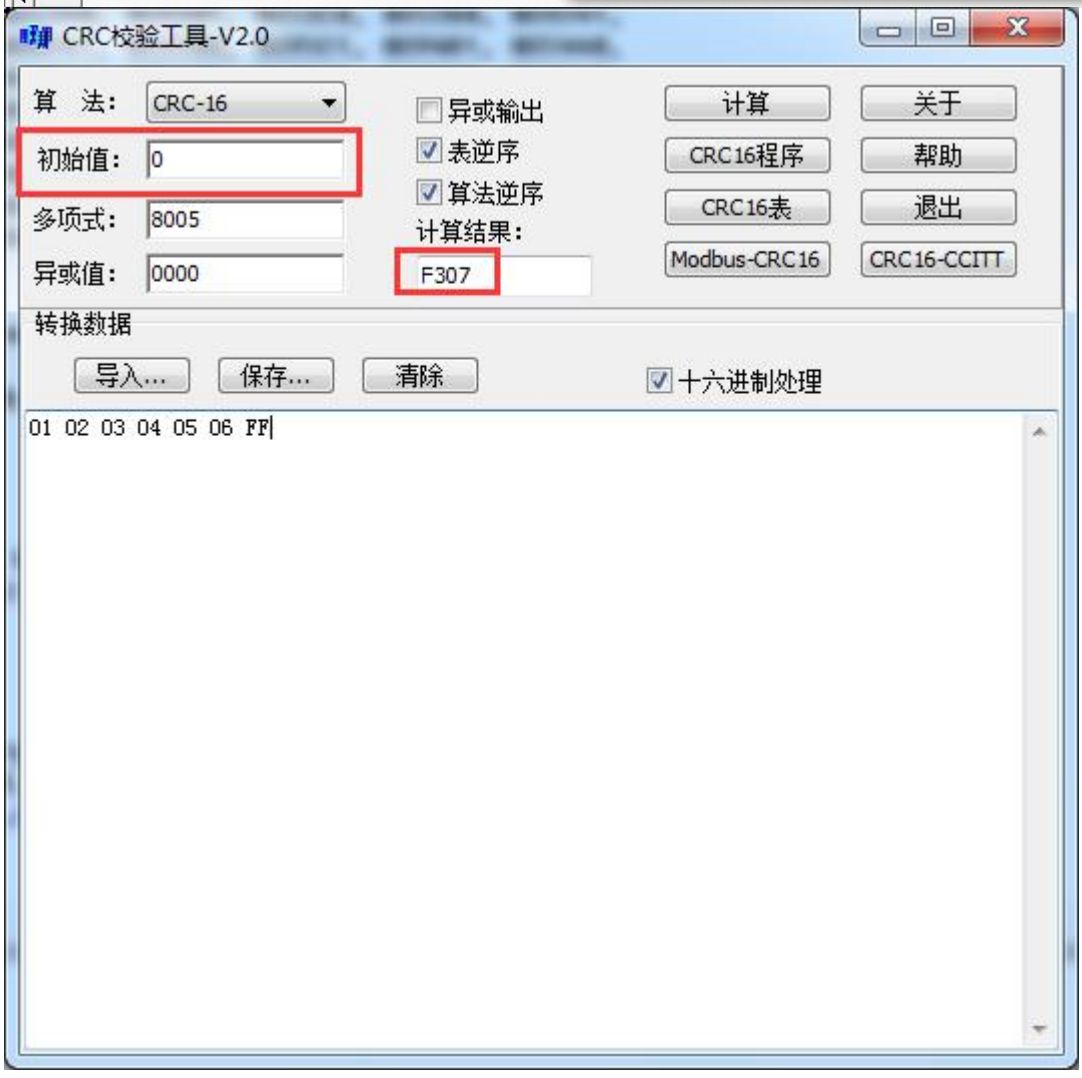
```
#include <stdio.h>
#define PLOY 0xa001 //0x8005 反转
unsigned short crc16(int *data,int size) {
    unsigned short crc = 0x0;
    int data_t ;
    int i = 0;
    int j = 0;
    if(data ==NULL){
        return 0;
    }
    for(j=0;j<size;j++){
        data_t = *data++;
        crc = (data_t ^ (crc));
        for(i=0;i<8;i++){
            if((crc&0x1)==1){
                crc = (crc>>1) ^ PLOY;
            }else{
                crc >>= 1;
            }
        }
    }
    return crc;
}
int main(int argc,char **argv) {
    int a[]={0x01,0x02,0x03,0x04,0x05,0x06,0xFF};
    printf("%x\n",crc16(a,sizeof(a)/sizeof(int)));
    return 0;
}
```

2. 运行截图

```
#include <stdio.h>
#define PLOY  0xa001 //0x8005反转
unsigned short crc16(int *data,int size)  {
    unsigned short crc = 0x0;
    int data_t ;
    int i = 0;
    int j = 0;
    if(data ==NULL){
        return 0;
    }
    for(j=0;j<size;j++){
        data_t = *data++;
        crc = (data_t ^ (crc));
        for(i=0;i<8;i++){
            if((crc&0x1)==1){
                crc = (crc>>1) ^ PLOY;
            }else{
                crc >>= 1;
            }
        }
    }
    return crc;
}

int main(int argc,char **argv)  {
    int a[]={0x01,0x02,0x03,0x04,0x05,0x06,0xFF};
    printf("%x\n",crc16(a,sizeof(a)/sizeof(int)));
    return 0;
}
```





三、JAVA 语言

1. 算法

```
import java.io.*;
import java.util.*;
class MyClass{
    char crc16(int data[],int size){
        char crc = 0x0;
        int i,j;
        int data_t ;
        i = j = 0;
        if(data == null) return 0;
        for(j=0;j<size;j++){
            data_t = data[j];
            crc = (char)((data_t&0xFF) ^ (crc));
            for(i=0;i<8;i++){
                if((crc&0x1)==1){
                    crc = (char)((crc>>1) ^ (0xa001));
                }else{
                    crc >>= 1;
                }
            }
        }
        return (char)((crc>>8)|(crc<<8));
    }
}
public class CRC16{
    public static void main(String arg[]){
        int a[]={0x01,0x03,0x11,0xFF};
        char value,i,m;
        int j;
        MyClass crc=new MyClass();
        value = crc.crc16(a,a.length);
        System.out.print("( 二进制 )value=");
        for(i=0;i<16;i++){
            j=((value&(0x8000>>i))!=0)?1:0;
            System.out.print(j);
        }
        System.out.println();
        System.out.print("(十六进制)value=");
        for(i=3;i>=0;i--){
            m=(char)(((value>>(i*4))&(0x000F)));
            if((m>=0)&&(m<=9)){
                m +='0';
            }else if((m>=10)&&(m<=15)){
                m=(char)(m-10+'A');
            }
            System.out.print(m);
            if((i%2)==0){
                System.out.print(" ");
                if(i==0)break;
            }
        }
    }
}
```

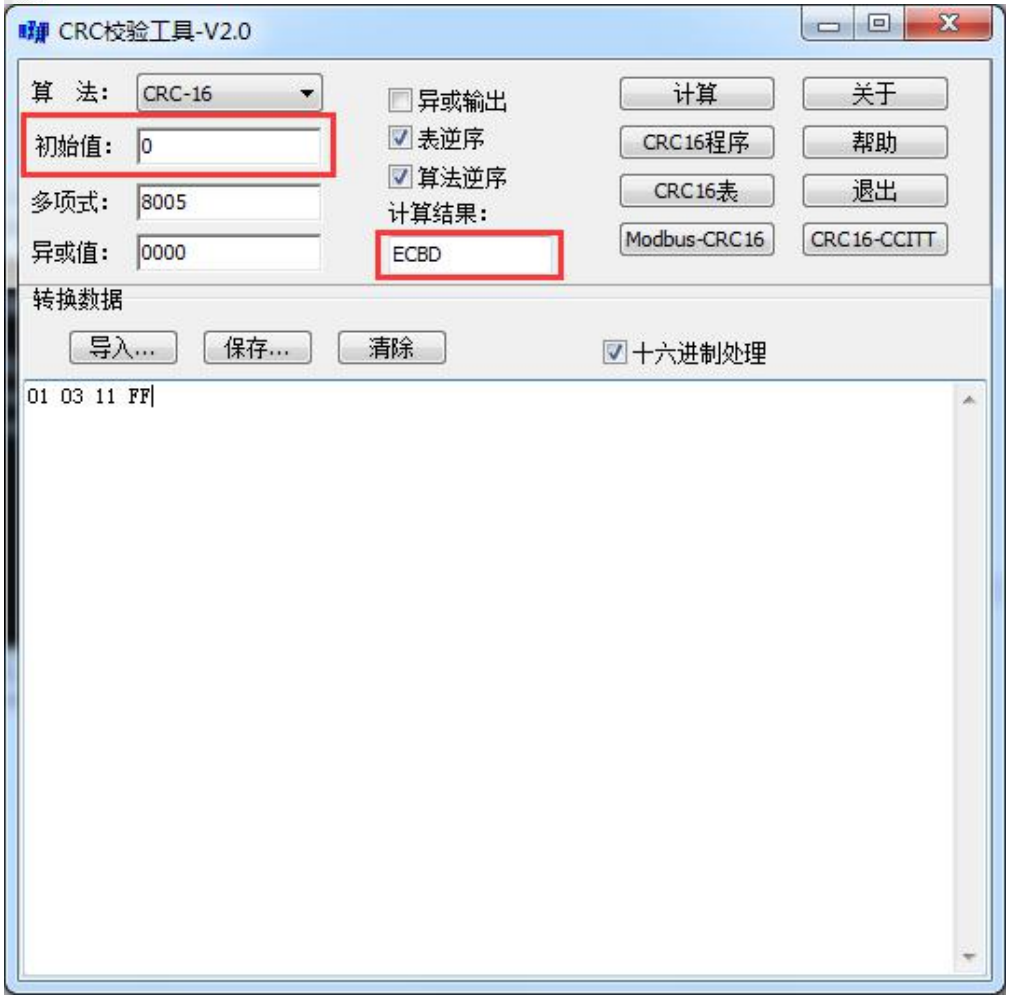
2. 运行截图

```
public class CRC16{
 public static void main(String arg[]){
  int a[]={0x01,0x03,0x11,0xFF};
  char value,i;
  char m;
  int j;
  MyClass crc=new MyClass();
  value = crc.crc16(a,a.length);
  System.out.print("( 二进制 )value=");
  for(i=0;i<16;i++){
   j=((value&(0x8000>>i))!=0)?1:0;
   System.out.print(j);
  }
  System.out.println();
  System.out.print("(十六进制)value=");
  for(i=3;i>=0;i--){
   m=(char)(((value>>(i*4))&(0x000F)));
   if((m>=0)&&(m<=9)){
    m +='0';
   }else if((m>=10)&&(m<=15)){
    m=(char)(m-10+'A');
   }
   System.out.print(m);
   if((i%2)==0){
    System.out.print(" ");
    if(i==0)break;
   }
  }
 }
}
```

```
管理员: C:\Windows\system32\cmd.e...

F:\>javac CRC16.java

F:\>java CRC16
( 二进制 )value=1011110111101100
(十六进制)value=BD EC
F:\>
```



四、C++语言

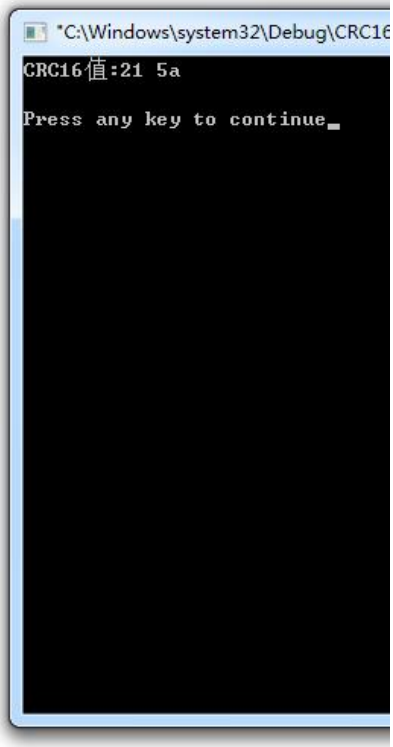
1. 算法

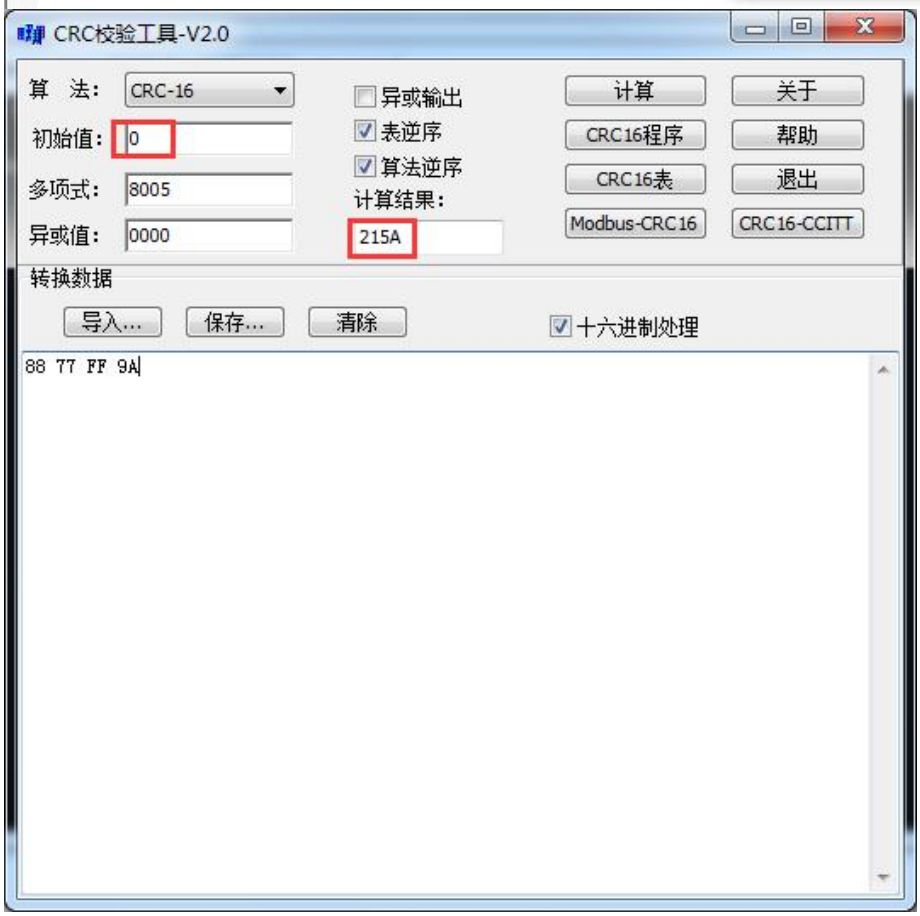
```
#include<iostream.h>
class CRC16
{
    public :
        int crc16(unsigned char * data,int size)
        {
            unsigned char data_t ;
            int crc,i,j;
            crc = i = j = 0;
            if(data == NULL)
            {
                return 0;
            }
            for(j=0;j<size;j++)
            {
                data_t = data[j];
                crc = (data_t ^ crc);
                for(i=0;i<8;i++)
                {
                    if((crc&0x1)==1)
                    {
                        crc = (crc >> 1) ^ 0xA001;
                    }
                    else
                    {
                        crc >>= 1;
                    }
                }
            }
            return crc;
        }
};

int main()
{
    unsigned char array[] = {0x88,0x77,0xFF,0x9A};
    int checkValue;
    CRC16 test;
    checkValue = test.crc16(array,sizeof(array));
    cout<<"CRC16 值:"<<hex<<((checkValue >> 8) & 0xff);
    cout<<" "<<hex<<(checkValue & 0xff)<<endl<<endl;
    return 0;
}
```

2. 运行截图

```
#include<iostream.h>
class CRC16{
    public :
        int crc16(unsigned char * data,int size){
            unsigned char data_t ;
            int crc,i,j;
            i =crc=j= 0;
            if(data == NULL) return 0;
            for(j=0;j<size;j++){
                data_t = data[j];
                crc = (data_t ^ crc);
                for(i=0;i<8;i++){
                    if((crc&0x1)==1){
                        crc = (crc >> 1) ^ 0xA001;
                    }else{
                        crc >>= 1;
                    }
                }
            }
            return crc;
        }
};
int main(){
    unsigned char array[] = {0x88,0x77,0xFF,0x9A};
    int checkValue;
    CRC16 test;
    checkValue = test.crc16(array,sizeof(array));
    cout<<"CRC16值:"<<hex<<((checkValue >> 8) & 0xff);
    cout<<" "<<hex<<(checkValue & 0xff)<<endl<<endl;
    return 0;
}
```



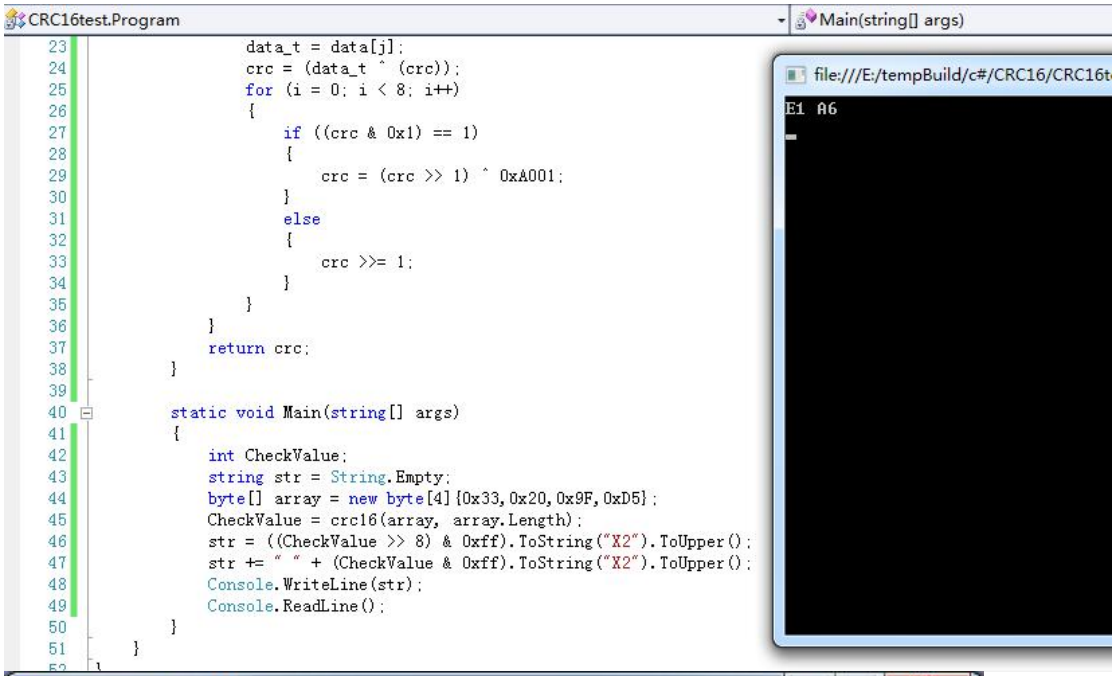


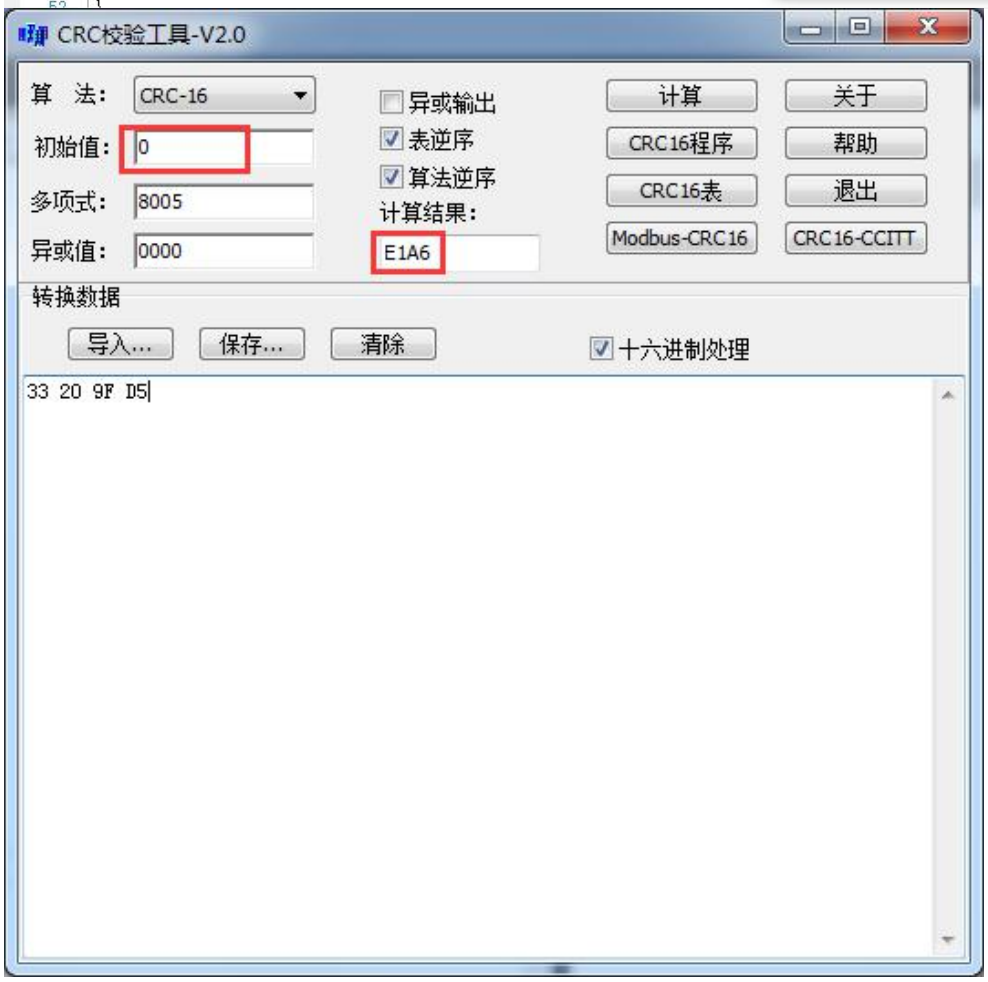
五、C#语言

1. 算法

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
namespace CRC16test
{
    class Program
    {
        static int crc16(byte[] data, int size)
        {
            int crc = 0x0;
            byte data_t;
            int i = 0;
            int j = 0;
            if (data == null)
            {
                return 0;
            }
            for (j = 0; j < size; j++)
            {
                data_t = data[j];
                crc = (data_t ^ (crc));
                for (i = 0; i < 8; i++)
                {
                    if ((crc & 0x1) == 1)
                    {
                        crc = (crc >> 1) ^ 0xA001;
                    }
                    else
                    {
                        crc >>= 1;
                    }
                }
            }
            return crc;
        }
        static void Main(string[] args)
        {
            int CheckValue;
            string str = String.Empty;
            byte[] array = new byte[4]{0x33,0x20,0x9F,0xD5};
            CheckValue = crc16(array, array.Length);
            str = ((CheckValue >> 8) & 0xff).ToString("X2").ToUpper();
            str += " "+ (CheckValue & 0xff).ToString("X2").ToUpper();
            Console.WriteLine(str);
            Console.ReadLine();
        }
    }
}
```

2. 运行截图


CRC16test.Program
Main(string[] args)
data_t = data[j];
crc = (data_t ^ (crc));
for (i = 0; i < 8; i++)
{
if ((crc & 0x1) == 1)
{
crc = (crc >> 1) ^ 0xA001;
}
else
{
crc >>= 1;
}
}
}
return crc;
}
static void Main(string[] args)
{
int CheckValue;
string str = String.Empty;
byte[] array = new byte[4]{0x33,0x20,0x9F,0xD5};
CheckValue = crc16(array, array.Length);
str = ((CheckValue >> 8) & 0xff).ToString("X2").ToUpper();
str += " " + (CheckValue & 0xff).ToString("X2").ToUpper();
Console.WriteLine(str);
Console.ReadLine();
}
}
file:///E:/tempBuild/c#/CRC16/CRC16t
E1 A6


CRC校验工具-V2.0
算 法:
CRC-16
初始值:
0
多项式:
8005
异或值:
0000
异或输出
表逆序
算法逆序
计算结果:
E1A6
计算
关于
CRC16程序
帮助
CRC16表
退出
Modbus-CRC16
CRC16-CCITT
转换数据
导入...
保存...
清除
十六进制处理
33 20 9F D5

六、VB 语言

1.参考算法

```
Function CRC16(data() As Byte) As String
Dim CRC16Lo As Byte, CRC16Hi As Byte 'CRC 寄存器
Dim CL As Byte, CH As Byte '多项式码&HA001
Dim SaveHi As Byte, SaveLo As Byte
Dim i As Integer
Dim Flag As Integer
CRC16Lo = &HFF '此处变为 0
CRC16Hi = &HFF '此处变为 0
CL = &H1
CH = &HA0
For i = 0 To UBound(data)
CRC16Lo = CRC16Lo Xor data(i) '每一个数据与 CRC 寄存器进行异或
For Flag = 0 To 7
SaveHi = CRC16Hi
SaveLo = CRC16Lo
CRC16Hi = CRC16Hi \ 2 '高位右移一位
CRC16Lo = CRC16Lo \ 2 '低位右移一位
If ((SaveHi And &H1) = &H1) Then '如果高位字节最后一位为 1
CRC16Lo = CRC16Lo Or &H80 '则低位字节右移后前面补 1
End If '否则自动补 0
If ((SaveLo And &H1) = &H1) Then '如果 LSB 为 1，则与多项式码进行异或
CRC16Hi = CRC16Hi Xor CH
CRC16Lo = CRC16Lo Xor CL
End If
Next Flag
Next i
Dim ReturnData(1) As Byte
ReturnData(0) = CRC16Hi 'CRC 高位
ReturnData(1) = CRC16Lo 'CRC 低位
CRC16 = ReturnData
End Function
```

七、HTML+js 算法

1.算法

```
<!DOCTYPE HTML PUBLIC "http://www.onbonbx.com">
<HTML xmlns="http://www.onbonbx.com"><HEAD><TITLE>CRC16 计算
——HTML+js</TITLE>
<META http-equiv=Content-Type content="text/html; charset=gb2312">
<META content="MSHTML 6.00.2900.2180" name=FCH></HEAD>
<SCRIPT language=JavaScript>
function inttohex(num, size)
{
    var str, len;
    str = num.toString(16);
    len = str.length;
    if(len >= size)
        str = str.substr(len - size, size);
    else
    {
        while(size > len++)
            str = '0' + str;
    }
    return str.toUpperCase();
}
function rehextoint(string) //!<反转
{
    var i, str, len;
    str = '';
    for (i = 0; i < 16; i += 2)
        str += string.substr(14 - i, 2);
    return parseInt(str, 16);
}
function GetCRCString(crcdatastr, crcinitstr)
{
    var i, crc, len;
    len = crcdatastr.length * 4;
    for(i = 0; i < (4 - len / 4); i++)
        crcdatastr += "0"; //!<补 0
    crc = rehextoint(crcdatastr) ^ parseInt(crcinitstr, 16);
    crc &= (1 << 16) - 1;
    for(i = 0; i < len; i++)
    {
        if (crc & 1)
        {
            crc >>>= 1;
            crc ^= parseInt(("A001"), 16);
            crc |= (1 << 15);
        }else
            crc >>>= 1;
    }
    crc &= (1 << 16) - 1;
    return inttohex(crc, 4);
}
function HexStringFormat(str)
{
```

```
    var patrn = /[0-9a-fA-F]/; //!<正则表达式
    var i, ptr, ch;
    ptr = "";
    for(i = 0;i < str.length;i ++)
    {
        ch = str.substr(i, 1);
        if(patrn.test(ch))
            ptr += ch;
    }
    return ptr.toUpperCase();
}
function crc()
{
    var i , str , strcrc;
    if (text12.value.length > 0)
    {
        strcrc = "0000"; //!<初值
        str = HexStringFormat(text12.value);
        text140.value = "";
        for(i = 0; i < str.length; i += 4)
            strcrc = GetCRCString(str.substr(i, 4), strcrc);
        text140.value = inttohex((parseInt(strcrc, 16) ^
parseInt(("0000"), 16)), 4);
    }
}
</SCRIPT>
<BODY>
<table align="center"><tr> <td>马上计算：<br>
<textarea cols="100" rows="5" id=text12
title="将需要校验的数据拷贝至文本框内，格式如"AA BB CC"或"AABBCC"，点击计算按钮。
">
01 00 00 80 00 00 00 00 00 00 FE 02 28 00 A3 06 01 23 00 00 01 1F 00 00
00 00 00 00 04 00 10 00 00 00 00 02 00 00 00 00 02 02 01 00 00 0A 04 00
00 00 D1 F6 B0 EE
</textarea><br>
<INPUT type=button value="计算" onClick = crc() >CRC16 结果：
<input name="text" type=text id=text140 style="color:#F00" value=" "
size=19 maxlength=16></td></tr></table>
</BODY>
</HTML>
```

2.运行截图

CRC16.html

```
{
  var patrn = /[0-9a-fA-F]/;  //!<正则表达式
  var i, ptr, ch;
  ptr = "";
  for(i = 0;i < str.length;i ++)
  {
    ch = str.substr(i, 1);
    if(patrn.test(ch))
      ptr += ch;
  }
  return ptr.toUpperCase();
}

function crc()
{
  var i , str;
  var strcrc;
  if (text12.value.length > 0)
  {
    strcrc = "0000";  //!<初值
    str = HexStringFormat(text12.value);
    text140.value = "";
    for(i = 0; i < str.length; i += 4)
      strcrc = GetCRCString(str.substr(i, 4), strcrc);
    text140.value = inttohex((parseInt(strcrc, 16) ^ parseInt(("0000"), 16)), 4);
  }
}
</SCRIPT>
<BODY>
  <table align="center"><tr> <td>马上计算：<br>
  <textarea cols="100" rows="5"  id=text12 title="将需要校验的数据拷贝至文本框内，格式如“AA BB CC”或“AABBCC”，点击计算按钮。">
01 00 00 80 00 00 00 00 00 00 FE 02 28 00 A3 06 01 23 00 00 01 1F 00 00 00 00 00 00 04 00 10 00 00 00 00 02 00 00 00 00 02 02 01 00 00 0A 04 00 00 00 D1 F6 B0 EE
  </textarea><br>
  <INPUT type=button  value="计算" onClick = crc() >CRC16结果：
  <input name="text" type=text id=text140 style="color:#F00" value=" " size=19 maxlength=16></td></tr></table>
</BODY>
</HTML>
```