系統程式期末報告 PRESONAL WORK　　1092970 陳子輝

1, 負責項目

使用 C# 編寫 SIC/XE Assembler

2, 系統大綱

```
static Dictionary<string, string> opcode = new Dictionary<string, string>();
static Dictionary<char, int> hexTable = new Dictionary<char, int>();
static Dictionary<string, string> register = new Dictionary<string, string>();
```

```
static void Main(string[] args)
{

    Content content = new Content();
    content.Initialize();
    content.CalculateLOC();
    content.CalculateOBJCode();
    StreamWriter sw = new StreamWriter("TestFile1.TXT");
    WriteSymtab(content, sw);
    WriteLocAndObj(content, sw);
    sw.Close();

}
```

Step1: 定義 SIC/XE 的所有 opcode

Step2: 定義 register 的代號

Step3: 宣告 Content 保存後序的內容

Step4: 初始化各項參數，並讀入文本程式碼資料到 operation 內

Step5: 遍歷所有指令，並判斷 Label

Step6: 遍歷所有指令，計算 Loc counter

Step7: 遍歷所有指令，計算該指令的 Obj Code

Step8: 將每一個指令的資訊輸出到 txt 檔案

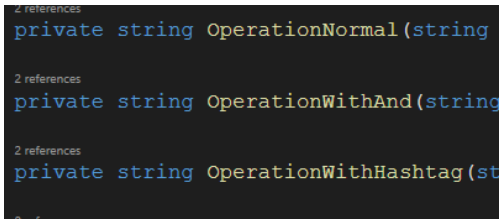
3, 系統組成

- class-Content

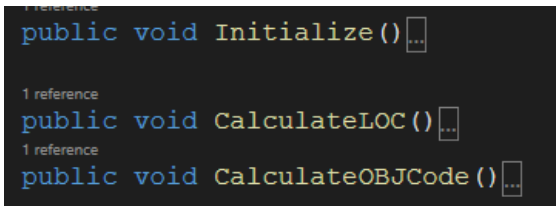
```
public class Content
{
    string txtPath;
    List<List<string>> operation;
    public List<string> LOC;
    public List<string> OBJCODE;
    public List<string> SYMTAB;
    public Dictionary<string, int> SymtabPair;
    public int baseLoc = 0;

    1 reference
    public void Initialize()

    1 reference
    public void CalculateLOC()
    1 reference
    public void CalculateOBJCode()

    2 references
    private string OperationNormal(string command, string info, string xbpe, bool isType4,int index)

    2 references
    private string OperationWithAnd(string command, string info, string xbpe, bool isType4,int index)

    2 references
    private string OperationWithHashtag(string command, string info, string xbpe, bool isType4,int index)

    8 references
    private string CaternateString(string opni, string xbpe, string lastpart,string format,string nixbpe)

    4 references
    private string CaternateStringF2(string opni, string lastpart)

    4 references
    public string IncludeOffset(string temp, int type)
}
```

用以紀錄所有資料，包括文本資料，計算 Loc，obj

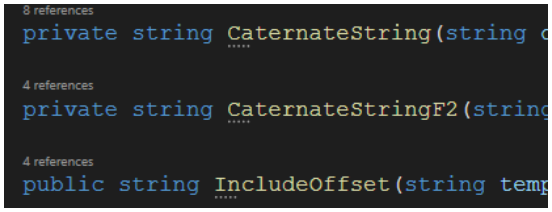
所使用的 Method：



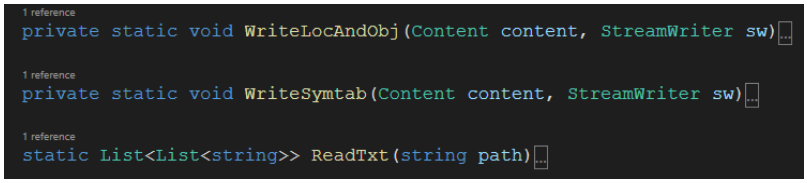
OperationNormal：處理一般的指令
OperationWithAnd：處理帶有@的指令（indirect）
OperationWithHashtag:處理帶有#的指令（immediate）



Initialize：初始化 Content 裡面的變數
CalculateLoc：計算 Loc 值與記錄 Label 到 Symtab
CalculateOBJCode：計算 OBJcode



CaternateString：把預計想要的字串連接起來 例如 LOC=XXXX opni+xbpe+pc ， format，nixbpe
CaternateStringF2：用於 FORMAT 2 的字串連接
IncludeOffset：計算 opcode 的 offset +3 /+2（immediate）/ +1（indirect）



上述方法都是用於資料讀寫

4,系統內函數

函數功能及內容與系統大綱相同

Code:
https://drive.google.com/file/d/1XnFHEDfO4NmNzto4OkwuNBeSt4AXd_uR/view?usp=sharing

下方為範例程式碼所生成的輸出:

```
===SYMTAB===
COPY        0000
FIRST       0000
CLOOP       0006
ENDFIL      001A
EOF         002D
RETADR      0030
LENGTH      0033
BUFFER      0036
BUFEND      1036
MAXLEN      1036
RDREC       1036
RLOOP       1040
EXIT        1056
INPUT       105C
WRREC       105D
WLOOP       1062
REF         1073
OUTPUT      1079
```

```
===LOC===
0   LOC=0000    None
1   LOC=0000    0x17202D    , pc-relative  , 110010
2   LOC=0003    0x69202D    , pc-relative  , 010010
3   None
4   LOC=0006    0x4B101036  , format4      , 110001
5   LOC=000A    0x032026    , pc-relative  , 110010
6   LOC=000D    0x290000    , pc-relative  , 010010
7   LOC=0010    0x332007    , pc-relative  , 110010
8   LOC=0013    0x4B10105D  , format4      , 110001
9   LOC=0017    0x3F2FEC    , pc-relative  , 110010
10  LOC=001A    0x032010    , pc-relative  , 110010
11  LOC=001D    0x0F2016    , pc-relative  , 110010
12  LOC=0020    0x010003    , pc-relative  , 010010
13  LOC=0023    0x0F200D    , pc-relative  , 110010
14  LOC=0026    0x4B10105D  , format4      , 110001
15  LOC=002A    0x3E2003    , pc-relative  , 100010
16  LOC=002D    454F46
17  LOC=0030    None
18  LOC=0033    None
19  LOC=0036    None
20  LOC=1036    None
21  LOC=1000    None
22  command
23  command
24  command
25  LOC=1036    B410        , format2
26  LOC=1038    B400        , format2
27  LOC=103A    B440        , format2
28  LOC=103C    0x75101000  , format4      , 010001
29  LOC=1040    0xE32019    , pc-relative  , 110010
30  LOC=1043    0x332FFA    , pc-relative  , 110010
31  LOC=1046    0xDB2013    , pc-relative  , 110010
32  LOC=1049    0xA004        , format2
33  LOC=104B    0x332008    , pc-relative  , 110010
34  LOC=104E    0x57CFD9    , base-relative , 111100
35  LOC=1051    B850        , format2
36  LOC=1053    0x3B2FEA    , pc-relative  , 110010
37  LOC=1056    0x134FD6    , base-relative , 110100
38  LOC=1059    0x4F0000    ,              ,
39  LOC=105C    F1
40  command
41  command
42  command
43  LOC=105D    B410        , format2
44  LOC=105F    0x774FD6    , base-relative , 110100
45  LOC=1062    0xE32014    , pc-relative  , 110010
46  LOC=1065    0x332FFA    , pc-relative  , 110010
47  LOC=1068    0x53CFD9    , base-relative , 111100
48  LOC=106B    0xDF200B    , pc-relative  , 110010
49  LOC=106E    B850        , format2
50  LOC=1070    0x3B2FEF    , pc-relative  , 110010
51  LOC=1073    0x032FF9    , pc-relative  , 110010
52  LOC=1076    0x4F0000    ,              ,
53  LOC=1079    05
54  LOC=107A    None
```