

Logic System Assignment 2

A simple CAD tool based on Quine-McCluskey method Due date: 2017/06/22

1. Description

In this homework, you will write a program to implement a 10-variable Quine-McCluskey method.

2. Requirement

i. Read the input file

Your program will read the input file for the minterm information:

$$\text{e.g. } F(A,B,C,D,E,F,G,H,I,J) = \sum m(0,1,2,3,9,45,123,247,301,397,432,592,666,733,878,952,1023) + \sum d(4,6,10,14,977,978,1000)$$

The format of the information are followed by **input/output specification**.

ii. Divide the minterms into groups and compare adjacent groups

You can use arrays to store the different groups of minterms and allocate new arrays to store the result of previous comparison.

iii. Write the output file

You should show the **process of comparison** and the **prime implicant chart** in the output file.

3. Input/Output Specification

i. Programming language

You can finish your program in C, C++ or Java.

Your program should be able to read the input file and generate the output file following the specific format.

ii. **Input/Output filename**

Input: input.txt

Output: output.txt

iii. **The following is the input/output format example:**

```
input.txt - 記事本
檔案(F) 編輯(E) 格式(O) 檢視(V) 說明(H)
0
1
16
17
128
341
512
640
1023
```

Minterms :
range from 0 to 1023

```
output.txt - 記事本
檔案(F) 編輯(E) 格式(O) 檢視(V) 說明(H)
=====Round 1=====
v 0000000000 : 0
-----
v 0000000001 : 1
v 0000010000 : 16
v 0010000000 : 128
v 1000000000 : 512
-----
v 0000010001 : 17
v 1010000000 : 640
-----
0101010101 : 341
-----
1111111111 : 1023

=====Round 2=====
v 000000000- : 0,1
v 00000-0000 : 0,16
v 00-0000000 : 0,128
v -000000000 : 0,512
-----
v 00000-0001 : 1,17
v 000001000- : 16,17
v -010000000 : 128,640
v 10-0000000 : 512,640

=====Round 3=====
00000-000- : 0,1,16,17
x 00000-000- : 0,1,16,17
-0-0000000 : 0,128,512,640
x -0-0000000 : 0,512,128,640

=====Result=====
| 0, 1, 16, 17, 128, 341, 512, 640,1023
-----+-----
a'b'c'd'e'g'h'i' | x x x x
b'd'e'f'g'h'i'j' | x x x
a'bc'de'fg'hi'j | x
abcdefghij | x
-----+-----
F(A,B,C,D,E,F,G,H,I,J)=a'b'c'd'e'g'h'i'+b'd'e'f'g'h'i'j'+a'bc'de'fg'hi'j+abcdefghij
```

Process of Grouping:
Maximum round number is 11

Result:
show **prime implicant chart**
and **final result** in minimum SOP

	0,	1,	16,	17,	128,	341,	512,	640,	1023
a'b'c'd'e'g'h'i'	x	x	x	x					
b'd'e'f'g'h'i'j'	x				x		x	x	
a'bc'de'fg'hi'j						x			
abcdefghij									x

F(A,B,C,D,E,F,G,H,I,J)=a'b'c'd'e'g'h'i'+b'd'e'f'g'h'i'j'+a'bc'de'fg'hi'j+abcdefghij

4. Hint

You can use this flow chart to design your program. It **isn't necessary** to follow this chart step by step.

