**微算機系統**

實驗一

組別： 第16組

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1. 實驗內容：

本次實驗主旨目標

利用七段顯示器解碼過程，練習以VHDL邏輯函數方式實驗邏輯電路，並利用之前所學到的卡諾圖鏡進行換算配合實作硬體電路架構和配置。

1. 實驗過程及結果：

撰寫你如何完成本次作業的流程方法。

請附上結果圖片(放置於此部分即可)。

目標一:

Step1: 先寫VHDL的程式碼

由於七段顯示器是用a,b,c,d,e,f,g 七段來顯示0~9的數字，老師要求我們要顯示出0~F(數字0~15)。所以我們利用之前所學的布林代數式來簡化那七段顯示器的電路設計，並一個個打出。

一張含有 螢幕擷取畫面 的圖片

自動產生的描述

STEP2:設定相對要接的腳位

|  |  |
| --- | --- |
| 自己設要PORT的IN，OUT名稱 | PIN的位置 |
| W | PIN\_AD27 |
| X | PIN\_AC27 |
| Y | PIN\_AC28 |
| Z | PIN\_AB28 |
| A | PIN\_G18 |
| B | PIN\_ F22 |
| C | PIN\_E17 |
| D | PIN\_L26 |
| E | PIN\_L25 |
| F | PIN\_J22 |
| G | PIN\_H22 |

一張含有 文字, 地圖 的圖片

自動產生的描述

STEP3:編譯後燒錄

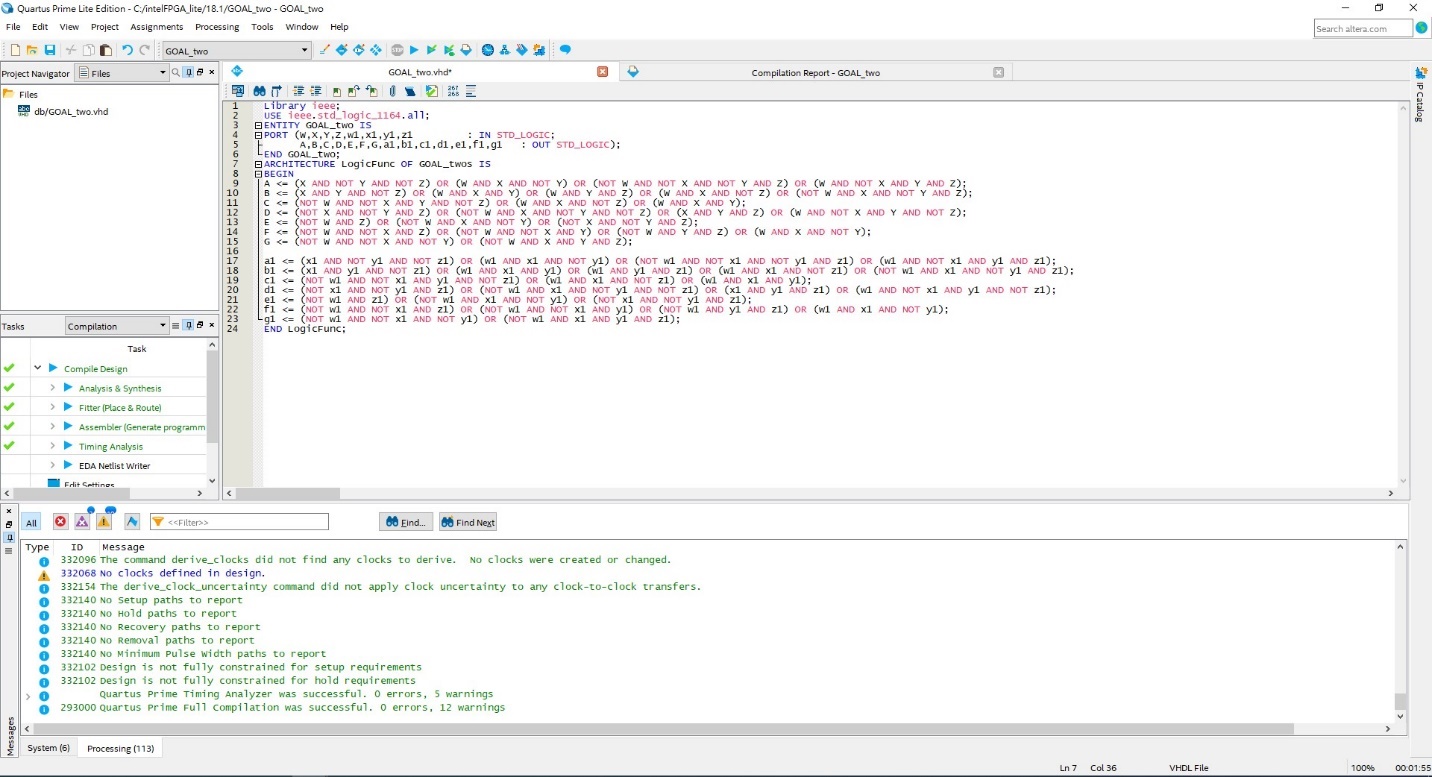
一張含有 電子用品, 電路 的圖片

自動產生的描述

目標二:

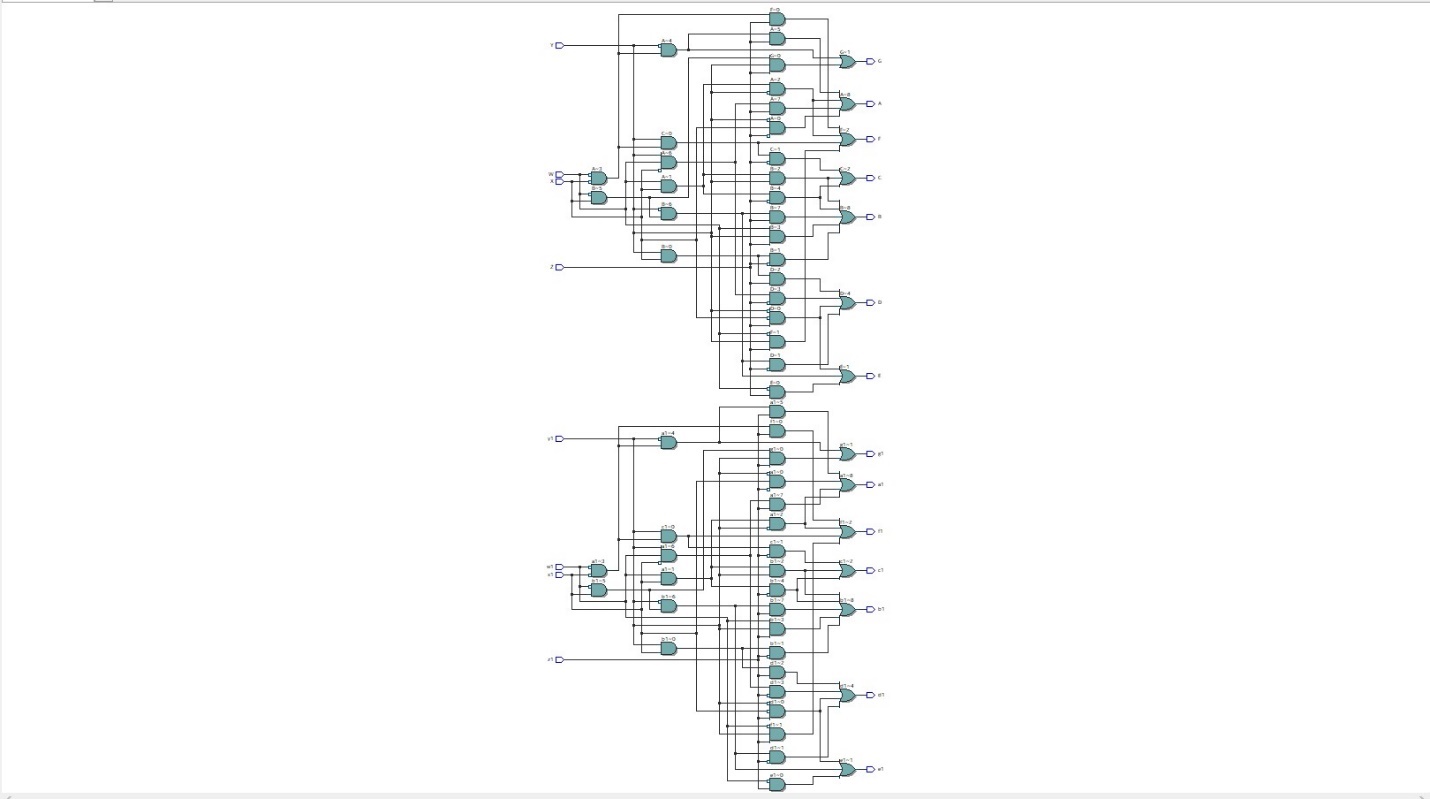
Step1: 先寫VHDL的程式碼

老師要求我們要顯示出數字0~FF。所以我們利用目標一的程式碼下去改。將目標一原本寫好的程式碼不動，增加四個PORT IN的SIGNAL和八個要PORT OUT 的SIGNAL名稱。然後一個個打出他們的布林代數式。

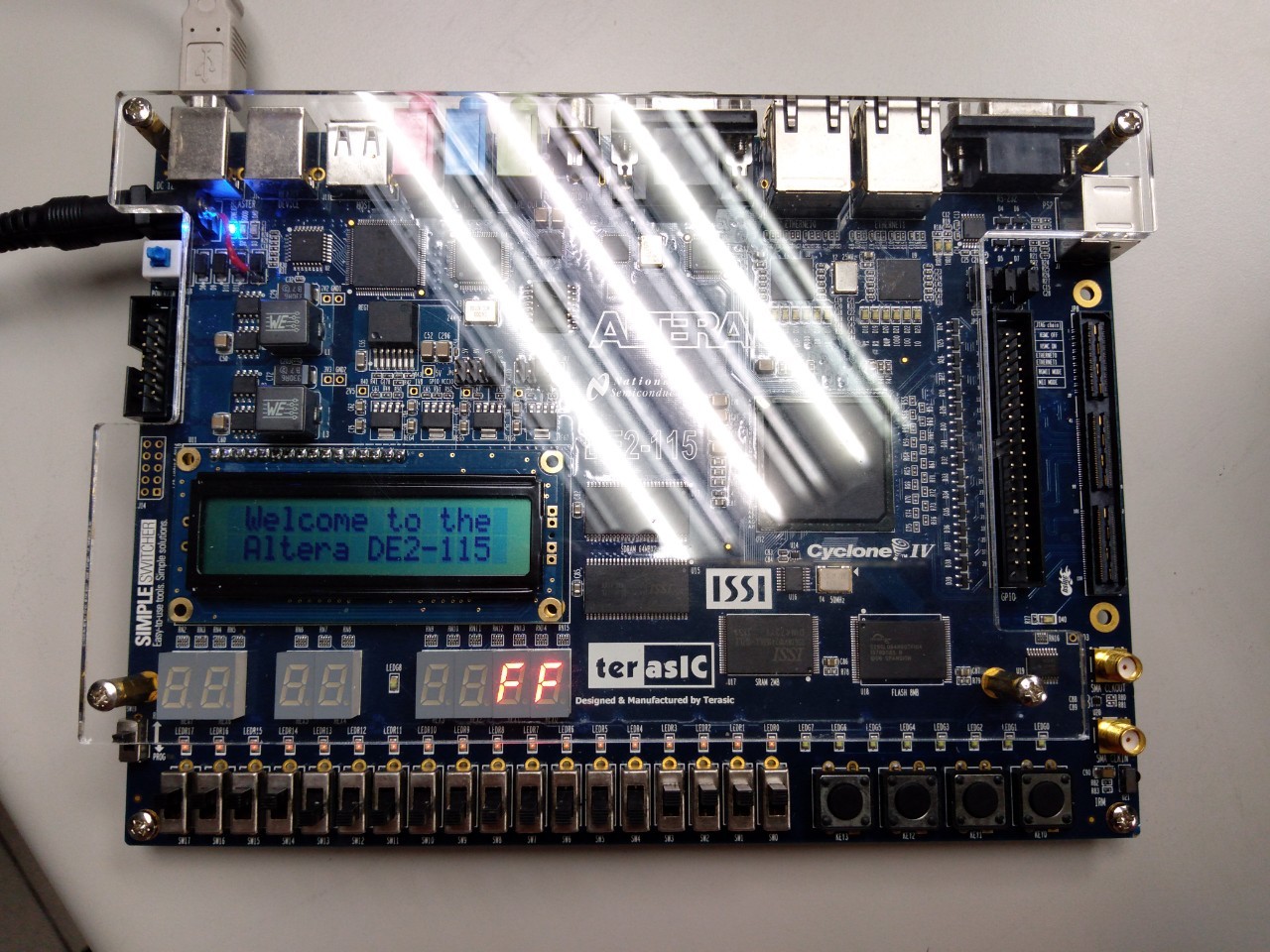


STEP2:設定相對要接的腳位

|  |  |
| --- | --- |
| 自己設要PORT的IN，OUT名稱 | PIN的位置 |
| W | PIN\_AD27 |
| X | PIN\_AC27 |
| Y | PIN\_AC28 |
| Z | PIN\_AB28 |
| A | PIN\_G18 |
| B | PIN\_ F22 |
| C | PIN\_E17 |
| D | PIN\_L26 |
| E | PIN\_L25 |
| F | PIN\_J22 |
| G | PIN\_H22 |
| w1 | PIN\_AA23 |
| x1 | PIN\_AA22 |
| y1 | PIN\_Y24 |
| z1 | PIN\_Y23 |
| a1 | PIN\_M24 |
| b1 | PIN\_Y22 |
| c1 | PIN\_W21 |
| d1 | PIN\_W22 |
| e1 | PIN\_W25 |
| f1 | PIN\_U23 |
| g1 | PIN\_U24 |
|  |  |



STEP3:編譯後燒錄



1. 程式碼（請調整成最小行高，行高0點）

|  |
| --- |
| 目標一 |
| (程式碼)  Library ieee;  USE ieee.std\_logic\_1164.all;  ENTITY seven\_segment\_display IS  PORT (W,X,Y,Z : IN STD\_LOGIC;  A,B,C,D,E,F,G : OUT STD\_LOGIC);  END seven\_segment\_display;  ARCHITECTURE LogicFunc OF seven\_segment\_display IS  BEGIN  A <= (X AND NOT Y AND NOT Z) OR (W AND X AND NOT Y) OR (NOT W AND NOT X AND NOT Y AND Z) OR (W AND NOT X AND Y AND Z);  B <= (X AND Y AND NOT Z) OR (W AND X AND Y) OR (W AND Y AND Z) OR (W AND X AND NOT Z) OR (NOT W AND X AND NOT Y AND Z);  C <= (NOT W AND NOT X AND Y AND NOT Z) OR (W AND X AND NOT Z) OR (W AND X AND Y);  D <= (NOT X AND NOT Y AND Z) OR (NOT W AND X AND NOT Y AND NOT Z) OR (X AND Y AND Z) OR (W AND NOT X AND Y AND NOT Z);  E <= (NOT W AND Z) OR (NOT W AND X AND NOT Y) OR (NOT X AND NOT Y AND Z);  F <= (NOT W AND NOT X AND Z) OR (NOT W AND NOT X AND Y) OR (NOT W AND Y AND Z) OR (W AND X AND NOT Y);  G <= (NOT W AND NOT X AND NOT Y) OR (NOT W AND X AND Y AND Z);  END LogicFunc; |
| 目標二 |
| (程式碼)  Library ieee;  USE ieee.std\_logic\_1164.all;  ENTITY GOAL\_two IS  PORT (W,X,Y,Z,w1,x1,y1,z1 : IN STD\_LOGIC;  A,B,C,D,E,F,G,a1,b1,c1,d1,e1,f1,g1 : OUT STD\_LOGIC);  END GOAL\_two;  ARCHITECTURE LogicFunc OF GOAL\_two IS  BEGIN  A <= (X AND NOT Y AND NOT Z) OR (W AND X AND NOT Y) OR (NOT W AND NOT X AND NOT Y AND Z) OR (W AND NOT X AND Y AND Z);  B <= (X AND Y AND NOT Z) OR (W AND X AND Y) OR (W AND Y AND Z) OR (W AND X AND NOT Z) OR (NOT W AND X AND NOT Y AND Z);  C <= (NOT W AND NOT X AND Y AND NOT Z) OR (W AND X AND NOT Z) OR (W AND X AND Y);  D <= (NOT X AND NOT Y AND Z) OR (NOT W AND X AND NOT Y AND NOT Z) OR (X AND Y AND Z) OR (W AND NOT X AND Y AND NOT Z);  E <= (NOT W AND Z) OR (NOT W AND X AND NOT Y) OR (NOT X AND NOT Y AND Z);  F <= (NOT W AND NOT X AND Z) OR (NOT W AND NOT X AND Y) OR (NOT W AND Y AND Z) OR (W AND X AND NOT Y);  G <= (NOT W AND NOT X AND NOT Y) OR (NOT W AND X AND Y AND Z);  a1 <= (x1 AND NOT y1 AND NOT z1) OR (w1 AND x1 AND NOT y1) OR (NOT w1 AND NOT x1 AND NOT y1 AND z1) OR (w1 AND NOT x1 AND y1 AND z1);  b1 <= (x1 AND y1 AND NOT z1) OR (w1 AND x1 AND y1) OR (w1 AND y1 AND z1) OR (w1 AND x1 AND NOT z1) OR (NOT w1 AND x1 AND NOT y1 AND z1);  c1 <= (NOT w1 AND NOT x1 AND y1 AND NOT z1) OR (w1 AND x1 AND NOT z1) OR (w1 AND x1 AND y1);  d1 <= (NOT x1 AND NOT y1 AND z1) OR (NOT w1 AND x1 AND NOT y1 AND NOT z1) OR (x1 AND y1 AND z1) OR (w1 AND NOT x1 AND y1 AND NOT z1);  e1 <= (NOT w1 AND z1) OR (NOT w1 AND x1 AND NOT y1) OR (NOT x1 AND NOT y1 AND z1);  f1 <= (NOT w1 AND NOT x1 AND z1) OR (NOT w1 AND NOT x1 AND y1) OR (NOT w1 AND y1 AND z1) OR (w1 AND x1 AND NOT y1);  g1 <= (NOT w1 AND NOT x1 AND NOT y1) OR (NOT w1 AND x1 AND y1 AND z1);  END LogicFunc; |

1. 實驗心得：

每個人的心得報告至少150字以上，有關於此實驗所遇到的難題，解決方法或是對於實驗過程的分析等。（每名組員都要寫）

由投影片中，老師已經給我們部分的布林代數式，我們將剩下的用卡諾圖來化簡。這次我和我的組員都有趕到越來越上手，