**電路實驗報告**

**資工二甲**

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1. Verilog Code

FA.v

`timescale 1ns/1ns

module FA(a, b, c, cout, sum);

input a, b, c;

output cout, sum;

wire e1, e2, e3;

xor(e1, a, b);

and(e2, a, b);

and(e3, e1, c);

or(cout, e2, e3);

xor(sum, e1, c);

endmodule

HA.v

`timescale 1ns/1ns

module HA(a, b, sum, cout);

input a, b;

output sum, cout;

xor(sum, a, b);

and(cout, a, b);

endmodule

RCA4.v

`timescale 1ns/1ns

module RCA4(a, b, cout, s);

input [3:0] a, b;

output [3:0] s;

output cout;

wire [3:0] c;

HA tha0(.a(a[0]), .b(b[0]), .sum(s[0]), .cout(c[0]));

FA tfa1(.a(a[1]), .b(b[1]), .c(c[0]), .sum(s[1]), .cout(c[1]));

FA tfa2(.a(a[2]), .b(b[2]), .c(c[1]), .sum(s[2]), .cout(c[2]));

FA tfa3(.a(a[3]), .b(b[3]), .c(c[2]), .sum(s[3]), .cout(c[3]));

assign cout = c[3];

endmodule

TM\_RCA4.v

`timescale 1ns/1ns

module TM\_RCA4;

reg [3:0] a, b;

wire [3:0] s;

wire cout;

RCA4 U\_RCA (.a(a), .b(b), .s(s), .cout(cout));

initial begin

a = 4'd0;

b = 4'd0;

// #200

// a = 4'd10; // 1010

// b = 4'd5; // 0101

#200

a = 4'd1; // 0001

b = 4'd3; // 0011

#200

a = 4'd2; // 0010

b = 4'd5; // 0101

#200

a = 4'd5; // 0101

b = 4'd3; // 0111

#200

a = 4'd6; // 0110

b = 4'd7; // 0111

#200

a = 4'd7;

b = 4'd1;

#200

a = 4'd9;

b = 4'd11;

#200

a = 4'd8;

b = 4'd13;

#200

a = 4'd10;

b = 4'd9;

#200

a = 4'd11;

b = 4'd13;

#200

a = 4'd15;

b = 4'd15;

#200

$stop;

end

endmodule

1. 一張含有 螢幕擷取畫面, 多媒體軟體, 軟體, 繪圖軟體 的圖片

   自動產生的描述結果

根據模擬結果，表格如下：

|  |  |  |  |
| --- | --- | --- | --- |
| 被加（減）數 A | 加（減）數 B | 末端進位 | 和 |
|  |  |  |  |
| 0 0 0 1 | 0 0 1 1 | 0 | 0 1 0 0 |
| 0 0 1 0 | 0 1 0 1 | 0 | 0 1 1 1 |
| 0 1 0 1 | 0 0 1 1 | 0 | 1 0 0 0 |
| 0 1 1 0 | 0 1 1 1 | 0 | 1 1 0 1 |
| 0 1 1 1 | 0 0 0 1 | 0 | 1 0 0 0 |
| 1 0 0 1 | 1 0 1 1 | 1 | 0 1 0 0 |
| 1 0 0 0 | 1 1 0 1 | 1 | 0 1 0 1 |
| 1 0 1 0 | 1 0 0 1 | 1 | 0 0 1 1 |
| 1 0 1 1 | 1 1 0 1 | 1 | 1 0 0 0 |
| 1 1 1 1 | 1 1 1 1 | 1 | 1 1 1 0 |

經數學計算後進行比對，結果正確。

1. 心得

黃乙家：做完這次實驗後我對 Verilog 這個硬體描述語言有了初步的了解，也學會如何使用 ModelSim 模擬四位元加法器。希望之後如果有需要自己開發電路時能夠順利解決問題與需求。

梁凱哲：這個實驗相比上周的二位元加法器複雜了不少，還是被之前寫C的思路影響導致修改嘞很多次還是有問題，完成這個實驗後更加了解modelsim的寫法，之後的實作會更加順利。