`timescale 1ns / 1ps

module ALU(

input [3:0] a, //被乘数 a

input [3:0] b,//乘数 b

output [7:0] z //乘积输出 z

);

reg [7:0]z;

reg[7:0]m;

reg[7:0]n;

integer index;

reg c,d;

always@(\*)

begin

c=a[3];

d=b[3];

m={c,c,c,c,a};

n={d,d,d,d,b};

z=0;

for(index=0;index<8;index=index+1)

begin

if(n[index]==1)

begin

z=z+(m<<(index));

end

end

end

endmodule

`timescale 1ns / 1ps

module bin2dec (

input wire clk, //时钟，频率100MHz

input [3:0] a, //被乘数 a

input [3:0] b,

output reg [7:0] led\_id,

output reg [6:0] out\_led

);

wire[7:0] n;

ALU u1(a,b,n);

wire [7:0] abs; //存储 输入n的绝对值

wire [7:0] flag={8{n[7]}}; //r\_flag用于计算补码

assign abs = (n^flag)+flag[0]; //计算 输入n的绝对值

//8位2进制对应十进制至多3位

wire [7:0] num [0:3]; //从0到3 -> 符号位，百位，十位，个位

assign num[0] = 4'ha+flag[0]; //计算符号位，0xa：正数,0xb:负数

assign num[1] = abs / 100 % 10; //计算百位

assign num[2] = abs / 10 % 10; //计算十位

assign num[3] = abs % 10; //计算个位

reg [1:0] id=2'b00; //id从0至3->从左到右四个数码管

parameter CNT\_MAX = 99999;//设定时钟计数上限。

reg [31:0] cnt\_1ms;//计数

//用100MHz时钟从0到 99999计数即为1ms

always @ (posedge clk)//时钟上升沿

if (cnt\_1ms == CNT\_MAX)

cnt\_1ms <= 1'b0;

else

cnt\_1ms <= cnt\_1ms+1'b1;

//每1ms切换一次id

always@(posedge clk )

if(cnt\_1ms == CNT\_MAX - 1'b1)

id <= id+1'b1;

//选择灯

always @ (id)

case(id)

4'b0000: led\_id = 8'b1111\_0111; //0

4'b0001: led\_id = 8'b1111\_1011; //1

4'b0010: led\_id = 8'b1111\_1101; //2

4'b0011: led\_id = 8'b1111\_1110; //3

default: led\_id = 8'b0000\_0000; //default to 0, should not happen

endcase

//显示数字

always @ (id)

case(num[id])

4'b0000: out\_led = 7'b0000001; //0

4'b0001: out\_led = 7'b1001111; //1

4'b0010: out\_led = 7'b0010010; //2

4'b0011: out\_led = 7'b0000110; //3

4'b0100: out\_led = 7'b1001100; //4

4'b0101: out\_led = 7'b0100100; //5

4'b0110: out\_led = 7'b0100000; //6

4'b0111: out\_led = 7'b0001111; //7

4'b1000: out\_led = 7'b0000000; //8

4'b1001: out\_led = 7'b0000100; //9

4'b1010: out\_led = 7'b1111111; //a->不显示

4'b1011: out\_led = 7'b1111110; //b->显示

default: out\_led = 7'b1111111; //default to 7'b1111111, should not happen

endcase

endmodule

set\_property IOSTANDARD LVCMOS33 [get\_ports a[0]]

set\_property IOSTANDARD LVCMOS33 [get\_ports a[1]]

set\_property IOSTANDARD LVCMOS33 [get\_ports a[2]]

set\_property IOSTANDARD LVCMOS33 [get\_ports a[3]]

set\_property IOSTANDARD LVCMOS33 [get\_ports b[0]]

set\_property IOSTANDARD LVCMOS33 [get\_ports b[1]]

set\_property IOSTANDARD LVCMOS33 [get\_ports b[2]]

set\_property IOSTANDARD LVCMOS33 [get\_ports b[3]]

set\_property PACKAGE\_PIN J15 [get\_ports a[0]]

set\_property PACKAGE\_PIN L16 [get\_ports a[1]]

set\_property PACKAGE\_PIN M13 [get\_ports a[2]]

set\_property PACKAGE\_PIN R15 [get\_ports a[3]]

set\_property PACKAGE\_PIN R17 [get\_ports b[0]]

set\_property PACKAGE\_PIN T18 [get\_ports b[1]]

set\_property PACKAGE\_PIN U18 [get\_ports b[2]]

set\_property PACKAGE\_PIN R13 [get\_ports b[3]]

set\_property IOSTANDARD LVCMOS33 [get\_ports {led\_id[7]}]

set\_property IOSTANDARD LVCMOS33 [get\_ports {led\_id[6]}]

set\_property IOSTANDARD LVCMOS33 [get\_ports {led\_id[5]}]

set\_property IOSTANDARD LVCMOS33 [get\_ports {led\_id[4]}]

set\_property IOSTANDARD LVCMOS33 [get\_ports {led\_id[3]}]

set\_property IOSTANDARD LVCMOS33 [get\_ports {led\_id[2]}]

set\_property IOSTANDARD LVCMOS33 [get\_ports {led\_id[1]}]

set\_property IOSTANDARD LVCMOS33 [get\_ports {led\_id[0]}]

set\_property PACKAGE\_PIN J17 [get\_ports {led\_id[0]}]

set\_property PACKAGE\_PIN J18 [get\_ports {led\_id[1]}]

set\_property PACKAGE\_PIN T9 [get\_ports {led\_id[2]}]

set\_property PACKAGE\_PIN J14 [get\_ports {led\_id[3]}]

set\_property PACKAGE\_PIN P14 [get\_ports {led\_id[4]}]

set\_property PACKAGE\_PIN T14 [get\_ports {led\_id[5]}]

set\_property PACKAGE\_PIN K2 [get\_ports {led\_id[6]}]

set\_property PACKAGE\_PIN U13 [get\_ports {led\_id[7]}]

set\_property IOSTANDARD LVCMOS33 [get\_ports {out\_led[6]}]

set\_property IOSTANDARD LVCMOS33 [get\_ports {out\_led[5]}]

set\_property IOSTANDARD LVCMOS33 [get\_ports {out\_led[4]}]

set\_property IOSTANDARD LVCMOS33 [get\_ports {out\_led[3]}]

set\_property IOSTANDARD LVCMOS33 [get\_ports {out\_led[2]}]

set\_property IOSTANDARD LVCMOS33 [get\_ports {out\_led[1]}]

set\_property IOSTANDARD LVCMOS33 [get\_ports {out\_led[0]}]

set\_property PACKAGE\_PIN T10 [get\_ports {out\_led[6]}]

set\_property PACKAGE\_PIN R10 [get\_ports {out\_led[5]}]

set\_property PACKAGE\_PIN K16 [get\_ports {out\_led[4]}]

set\_property PACKAGE\_PIN K13 [get\_ports {out\_led[3]}]

set\_property PACKAGE\_PIN P15 [get\_ports {out\_led[2]}]

set\_property PACKAGE\_PIN T11 [get\_ports {out\_led[1]}]

set\_property PACKAGE\_PIN L18 [get\_ports {out\_led[0]}]

set\_property IOSTANDARD LVCMOS33 [get\_ports clk]

set\_property PACKAGE\_PIN E3 [get\_ports clk]