```
`timescale 1ns / 1ps
//////////////////////////////////////////////////////////////////////////////////
// Company:
// Engineer:
//
// Create Date:    10:40:16 08/03/2014
// Design Name:
// Module Name:    SOC-RV32I PipeLine CPU By Compiler DEMO9 CSTE
// Project Name:
// Target Devices:
// Tool versions:
// Description:
//
// Dependencies:
//
// Revision:
// Revision 0.01 - File Created
// Additional Comments:
//
//////////////////////////////////////////////////////////////////////////////////
module  CSTE_RV32IP_Compile(
                input clk_100mhz,
                input RSTN,
                input [15:0]SW,
                input [3:0]KCOL,
                output[4:0]KROW,
                output CR,
                output RDY,
                output readn,

                output LEDCK,                          //Sword LED
                output LEDCR,
                output LEDEN,
                output LEDDT,

                output SEGCK,                          //Sword Seven-segment LED
                output SEGCR,
                output SEGEN,
                output SEGDT,

                output [3:0]AN,                    //arduino Seven-segment LED
                output [7:0]SEGMENT,
                output [7:0]LED,                   //arduino LED
                output Buzzer,                     //arduino Buzzer

//           inout PS2C,                        //PS2
//            inout PS2D,

//          input RXD,                       //串行接收信号
//          output TXD,                      //串行发送信号

                output [3:0]Red,                   //VGA
                output [3:0]Green,
                output [3:0]Blue,
                output HSYNC,
                output VSYNC
                );

wire mapup;
wire [31:0] Ai, Bi;
wire CPUClk, nCPUClk, nclk,  clka;
wire MIO;
wire C0, C1, C2;
wire [31:0] Counter;
wire [31:0] Addr, Datai, Datao, inst;
wire CONT_W0208, GPIO_W0200, GPIO_W0204;
wire [31:0] Peripheral;
wire [3:0] BTNO;
wire [4:0] KCODE;
wire [6:0] Debug_addr;
wire [7:0] blink;
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72   wire [9:0]PCol,PRow;
73   wire[11:0] dout;
74   wire [15:0] GPIOf0;
75
76   wire [31:0] Debug_data;
77   wire [31:0] DIVO;
78   wire [31:0] Disp_num;
79   wire [0:0] data_ram_we;
80   wire GPIOE00;
81   wire GPIOF0;
82   wire IO_clk;
83   wire [7:0] LE;
84   wire [31:0] PC;
85   wire [7:0] point;
86   wire [3:0] Pulse;
87   wire [9:0] ram_addr;
88   wire [31:0] ram_data_in;
89   wire [31:0] ram_data_out;
90   wire Ready;
91   wire rst;
92   wire [4:0] State;
93   wire [15:0] SWO;
94   wire MWR;
95
96       assign Buzzer  = DIVO[25] & SWO[8];
97       assign IO_clk = nCPUClk;
98
99       RV32PCPU         U1(.clk(CPUClk),                          //Multi-cycle CPU
100                           .reset(rst),
101                           .TNI(),
102                           .Ready(Ready),
103                           .Addr(Addr),
104                           .Datai(Datai),
105                           .Datao(Datao),
106                           .INST(inst),
107                           .MIO(MIO),
108                           .PC(PC[31:0]),
109                           .MWR(MWR),
110                           .ALE(clka) ,
111                           .Debug_addr(Debug_addr),
112                           .Debug_data(Debug_data)
113                           );
114
115       ROM_D      U2(.a(PC[11:2]),
116                     .spo(inst));
117
118       RAM_B  U3 (.addra(ram_addr[9:0]),                  //Data Memory
119                .clka(clka),
120                .dina(ram_data_in[31:0]),
121                .wea(data_ram_we[0]),
122                .douta(ram_data_out)
123               );
124
125       wire [31:0] MEM_Addr = SWO[13] ? MIO ? {20'h0000, ram_addr, 2'b00} : 32'hFFFFFFFF
126                                      : PC;
127       wire [31:0] MEM_Data = SWO[13] ? MIO ?  ram_data_out               : 32'hAA55AA55
128                                      : inst;
129
130
131       MIOBUS    U4(.clk(clk_100mhz),                          //IOBUS
132                    .rst(rst),
133                    .BTN(BTNO),
134                    .SW(SWO),
135                    .CPU_wait(Ready),
136                    .mem_w(MWR),
137                    .Addr_bus(Addr),
138                    .Data4CPU(Datao),
139                    .Data2CPU(Datai[31:0]),
140
141                    .GPIO_W0200(GPIO_W0200),
142                    .GPIO_W0204(GPIO_W0204),
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143                 .CONT_W0208(CONT_W0208),
144                 .Peripheral(Peripheral),
145                 .C0(C0),
146                 .C1(C1),
147                 .C2(C2),
148                 .Counter(Counter),
149                 .ram_addr(ram_addr),
150                 .data_ram_we(data_ram_we),
151                  .ram_data_out(ram_data_out),
152                 .ram_data_in(ram_data_in)
153                 );
154
155     DSEGIO  U5(.clk(IO_clk),                //Seven segment display channel
156               .rst(rst),
157               .EN(GPIO_W0204),              //GPIOE00
158               .A0(DIVO[6]),
159               .map2up(DIVO[20]),
160               .Test(SWO[7:5]),
161               .LES(64'h0000_0000_0000_0000),
162               .points({DIVO[31:0], DIVO[31:13], 5'b00000, 8'h00}),
163               .Data0(Peripheral),
164               .data1({2'b00, PC[31:2]}),
165               .data2(inst),
166               .data3(Counter),
167               .data4(Addr),
168               .data5(Datao),
169               .data6(ram_data_out[31:0]),
170               .data7(Ai),
171
172               .Disp(Disp_num[31:0]),
173               .LE(LE),
174               .point(point),
175               .mapup(mapup)
176               );
177
178   //-----------------------------------Peripheral
179     Display  U6(.clk(clk_100mhz),                   //Device 1: Seven-segment display
180                .rst(rst),
181                .Start(DIVO[20]),
182                .Text(SWO[0]),
183                .flash(DIVO[25]),
184                .Hexs(Disp_num),
185                .LES(LE),
186                .points(point),
187                .mapup(DIVO[20]),
188
189                .segclk(SEGCK),
190                .segclrn(SEGCR),
191                .SEGEN(SEGEN),
192                .segsout(SEGDT)
193                 );
194
195
196     GPIO  U7 (.clk(IO_clk),                             //Device 2: GPIO
197             .rst(rst),
198             .EN(GPIO_W0200),                                //GPIOF00,General
               Purpose Input Output For LED
199             .Datai(Peripheral),
200             .Start(DIVO[20]),
201             .GPIOf0(GPIOf0),
202             .LEDo(),
203             .ledclk(LEDCK),
204             .ledclrn(LEDCR),
205             .LEDEN(LEDEN),
206             .ledsout(LEDDT)
207             );
208
209     Counter  U10(.clk(clk_100mhz),                      //Device 3: counter module
210                .clk0(DIVO[8]),
211                .clk1(DIVO[9]),
212                .clk2(DIVO[11]),
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                .counter_ch(GPIOf0[1:0]),
                .counter_val(Peripheral),
                .counter_we(CONT_W0208),
                .rst(rst),
                .Counter(Counter),
                .counter0_OUT(C0),
                .counter1_OUT(C1),
                .counter2_OUT(C2)
                     );

//-----------------------------------Auxiliary module
    Clkdiv  U8(.clk(clk_100mhz),                    //General clock module
               .rst(rst),
               .STEP(SWO[2]),
               .clkdiv(DIVO),
               .nclk(nclk),
               .CPUClk(CPUClk),
               .nCPUClk(nCPUClk)
                );

    Arraykeys  U9(.clk(clk_100mhz),                     //Array keyboard
                  .rst(rst),
                  .RSTN(RSTN),
                  .KCOL(KCOL),
                  .KROW(KROW),
                  .SW(SW),
                  .BTNO(BTNO),
                  .pulse(Pulse),
                  .CR(CR),
                  .readn(readn),
                  .KCODE(KCODE),
                  .KRDY(RDY),
                  .SWO(SWO)
                   );

    EnterT32  M4(.clk(clk_100mhz),                  //Dual Data input module by
    Button
                 .BTN(BTNO[3:0]),
                 .ArrayKey(SWO[15]),
                 .TEST(SWO[7:5]),
                 .Text(SWO[0]),
                 .UP16(SWO[1]),
                 .Din(KCODE),
                 .DRDY(RDY),
                 .Ai(Ai),
                 .Bi(Bi),
                 .blink(blink),
                 .readn(readn)
                  );

    Disp2Hex    U61(.Scan2(SWO[1]),                     //Arduino seven-segment
    display
                    .Scan10(DIVO[19:18]),
                    .flash(DIVO[25]),
                    .Text(SWO[0]),
                    .LES(LE),
                    .points(point),
                    .Hexs(Disp_num),

                    .AN(AN),
                    .SEGMENT(SEGMENT)
                    );

    PIO     U71(.clk(IO_clk),                           //Arduino GPIO
                .rst(rst),
                .EN(GPIO_W0200),
                .Datai(Peripheral),
                .LED(LED[7:0]),
                .GPIOf0()
                );

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```
282       VGA_TESTP   U11(.clk(clk_100mhz),
283                       .clk25(DIVO[1]),
284   //                    .PCol(PCol),
285   //                    .PRow(PRow),
286                       .Debug_addr(Debug_addr),
287                       .Debug_data(Debug_data),
288                       .MEM_Addr(MEM_Addr),
289                       .MEM_Data(MEM_Data),
290                       .SWO15(SWO[15]),
291                       .SWO14(SWO[14]),
292                       .SWO13(SWO[13]),
293   //                    .dout(dout),
294                       .Red(Red),
295                       .Green(Green),
296                       .Blue(Blue),
297                       .VSYNC(VSYNC),
298                       .HSYNC(HSYNC));
299
300   endmodule
301
302
```