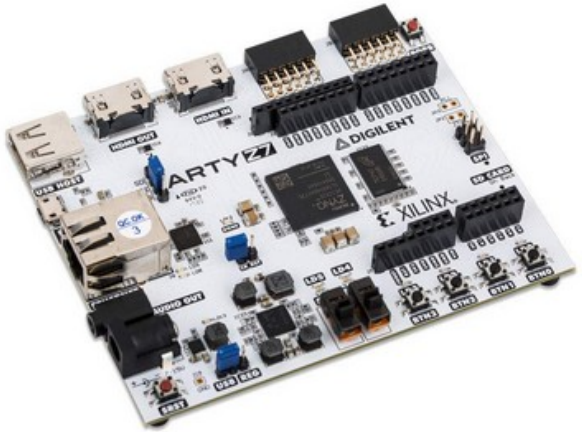
.UBAfiuba
FACULTAD DE INGENIERÍA

Microarquitecturas y Softcores

Carrera de Especialización en Sistemas Embebidos

Trabajo final

Raúl Romero



Contador BCD

Características principales

- Comandos por micro: “a”, “d”, “p” y “r”

- Frecuencia de actualización de la cuenta 1Hz

Diagrama en bloques

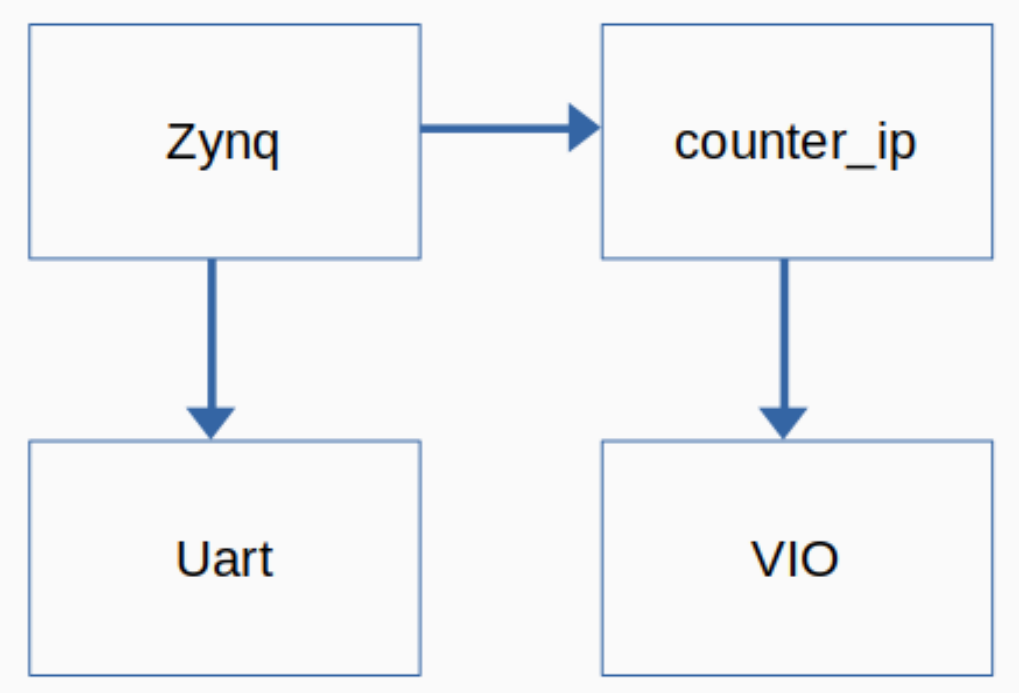


Diagrama en bloques CLP

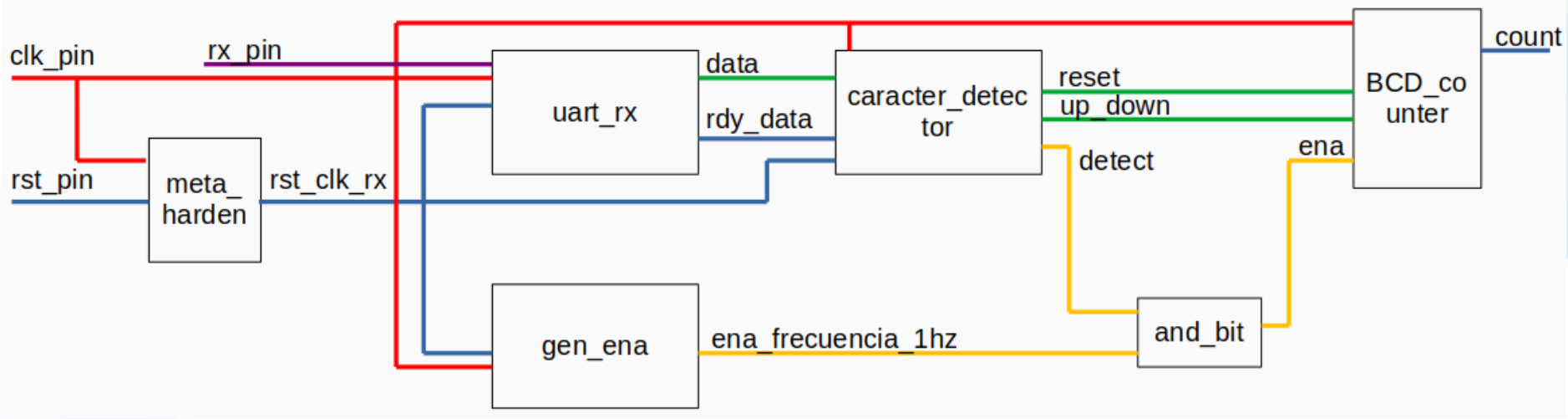


Diagrama en bloques MyS (counter_ip)

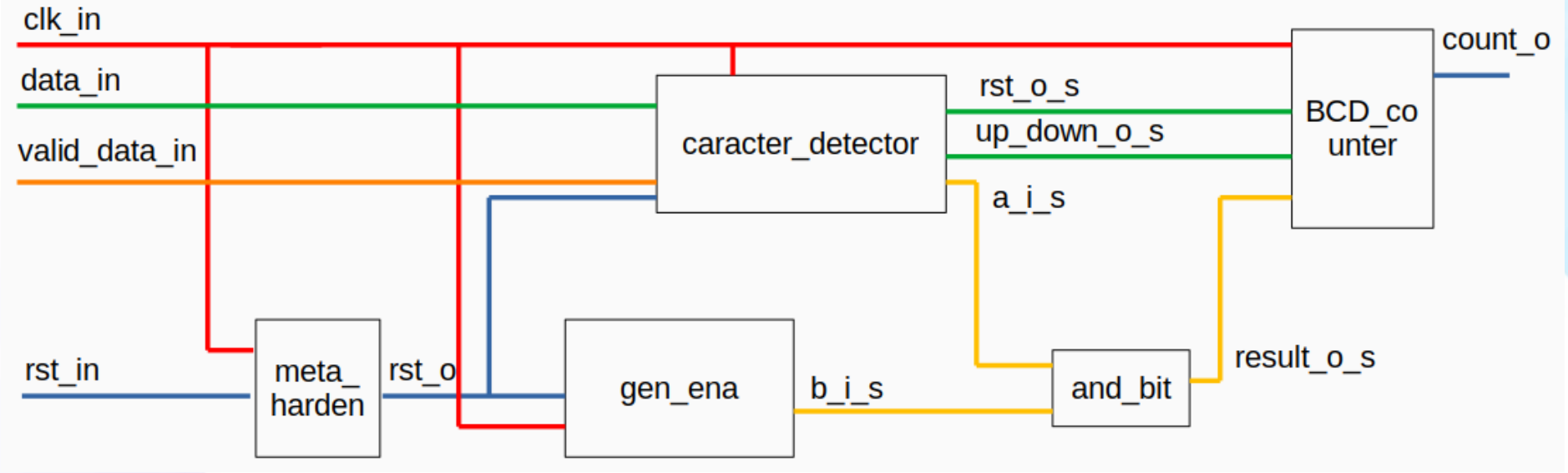


Diagrama en bloques vivado

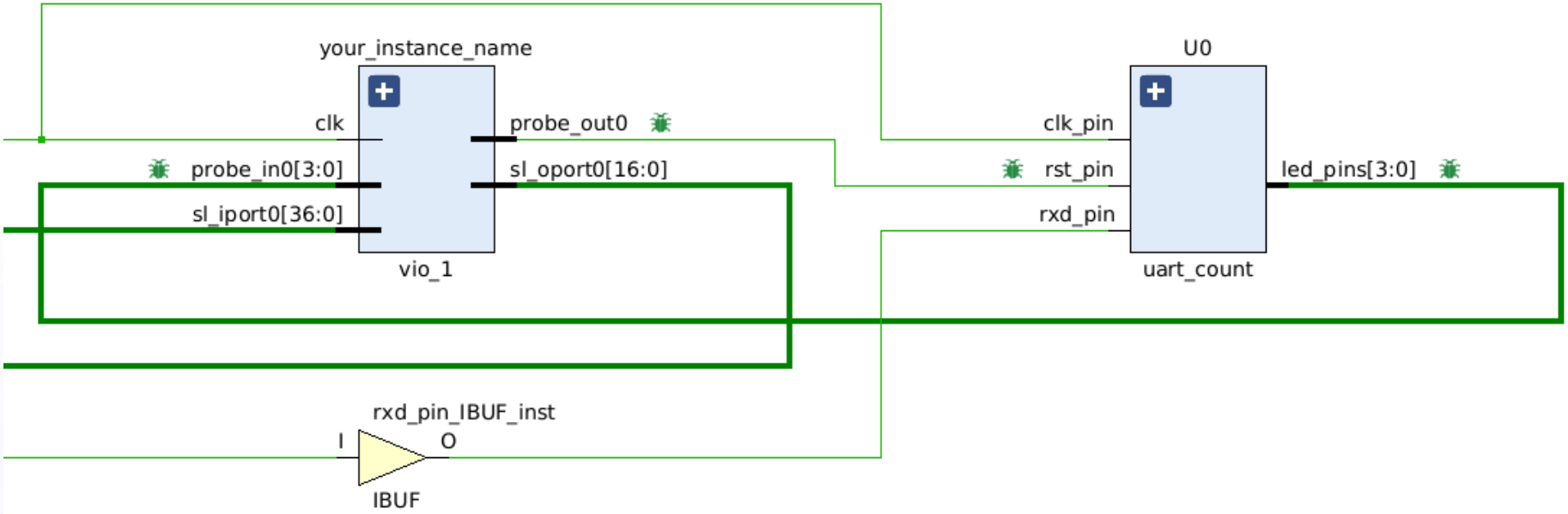
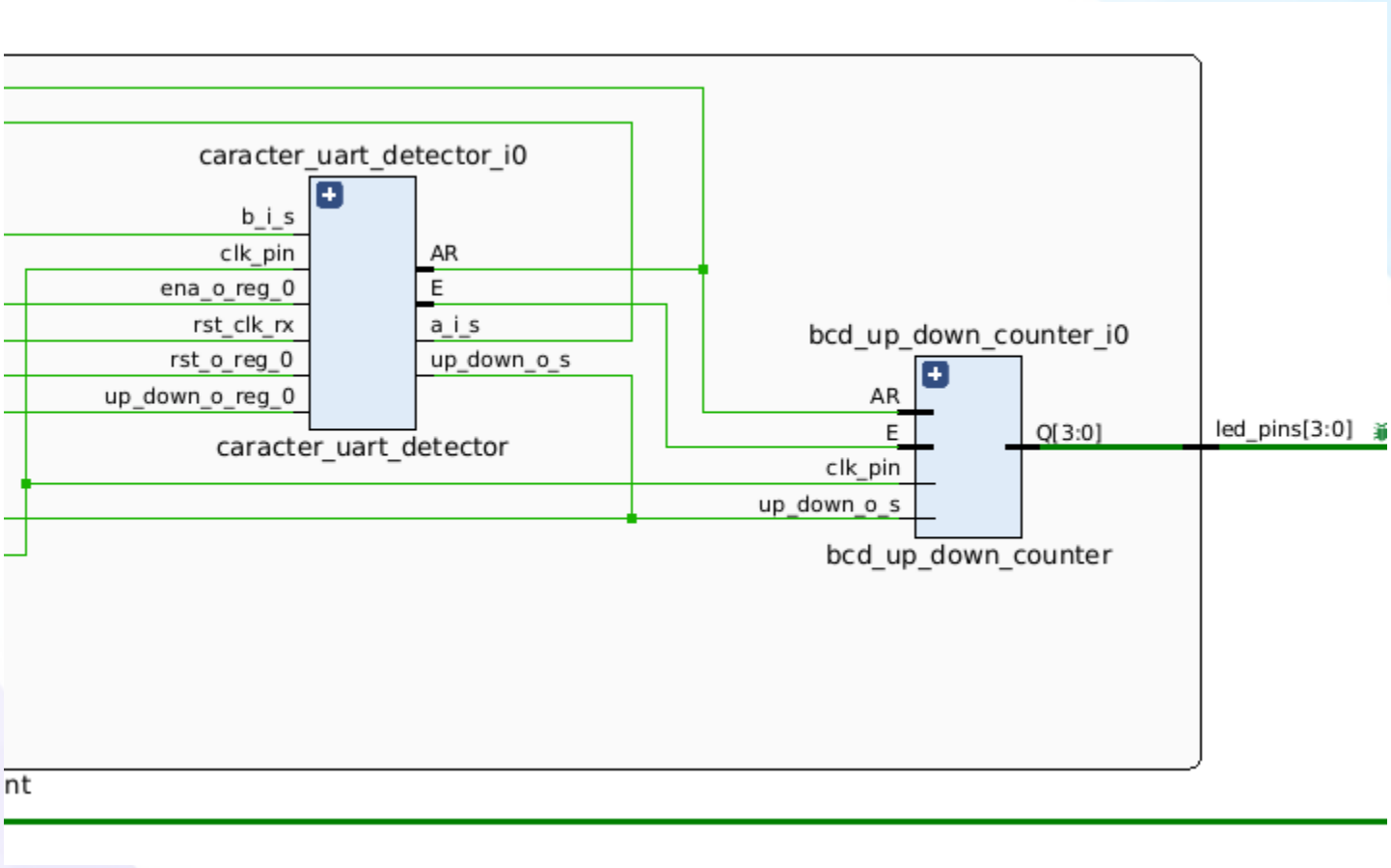
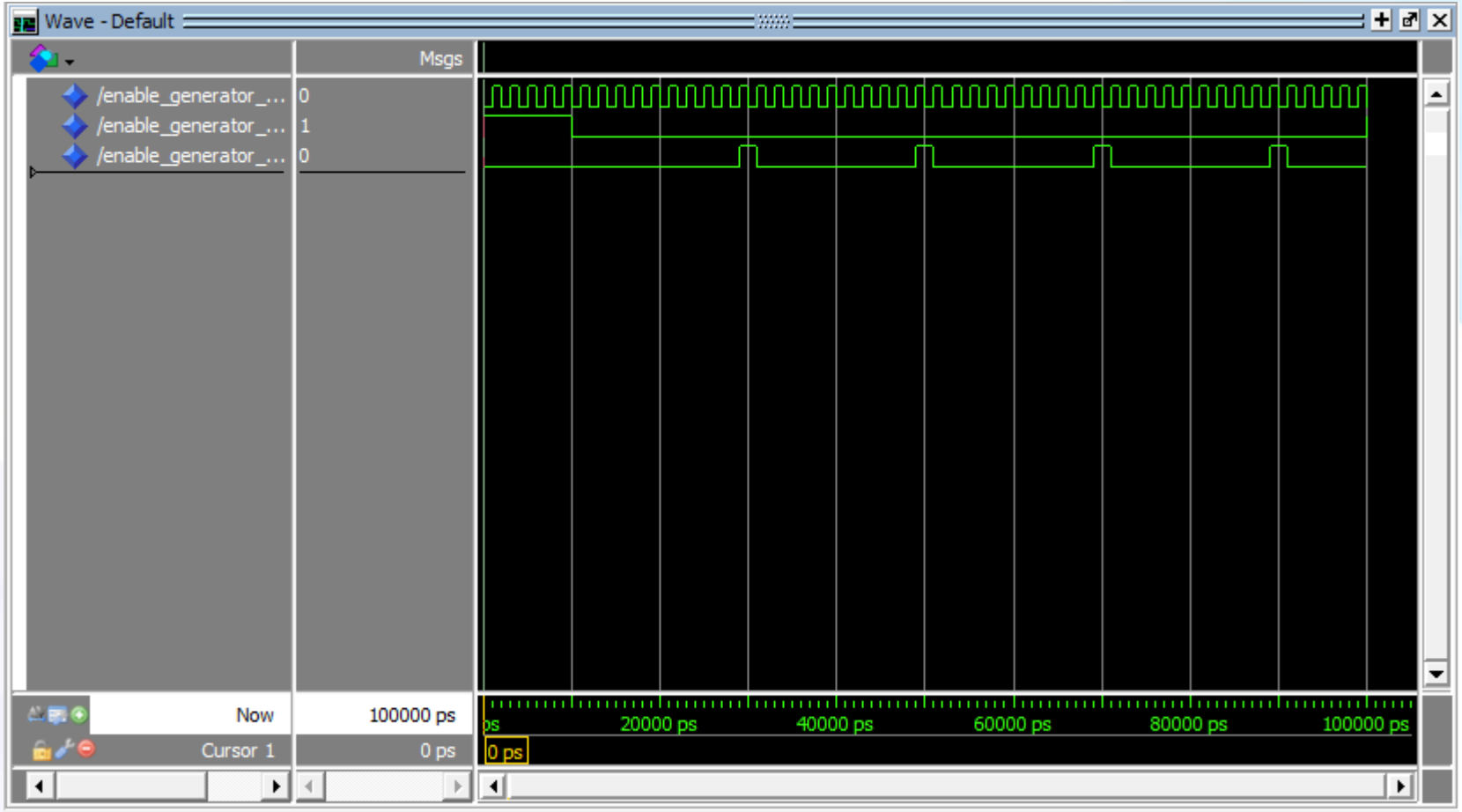


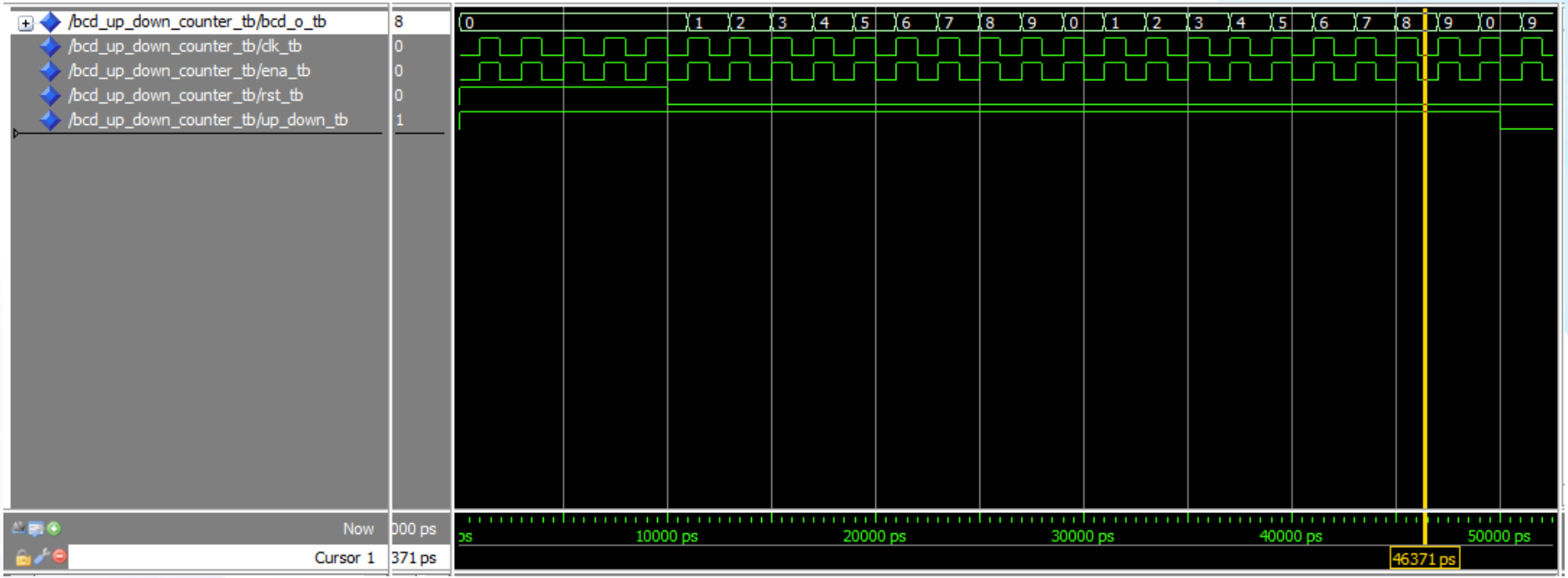
Diagrama en bloques vivado



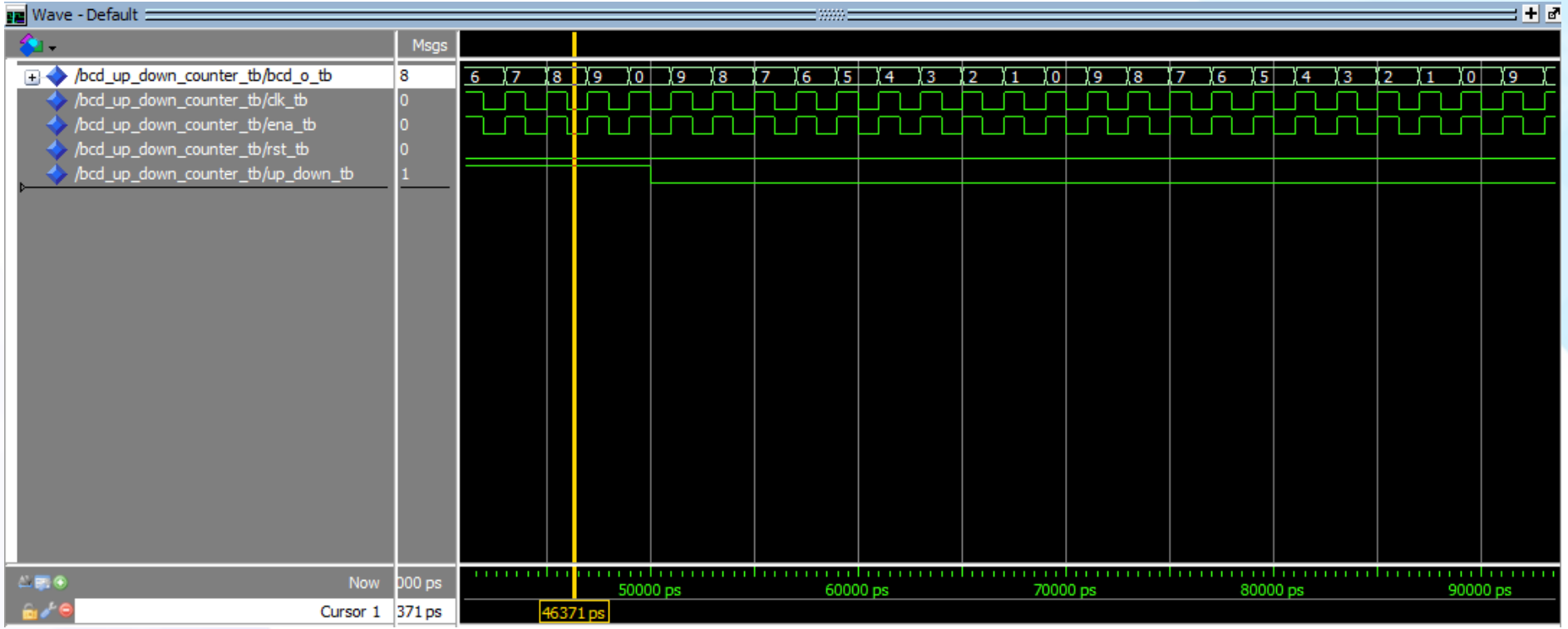
Generador de habilitación



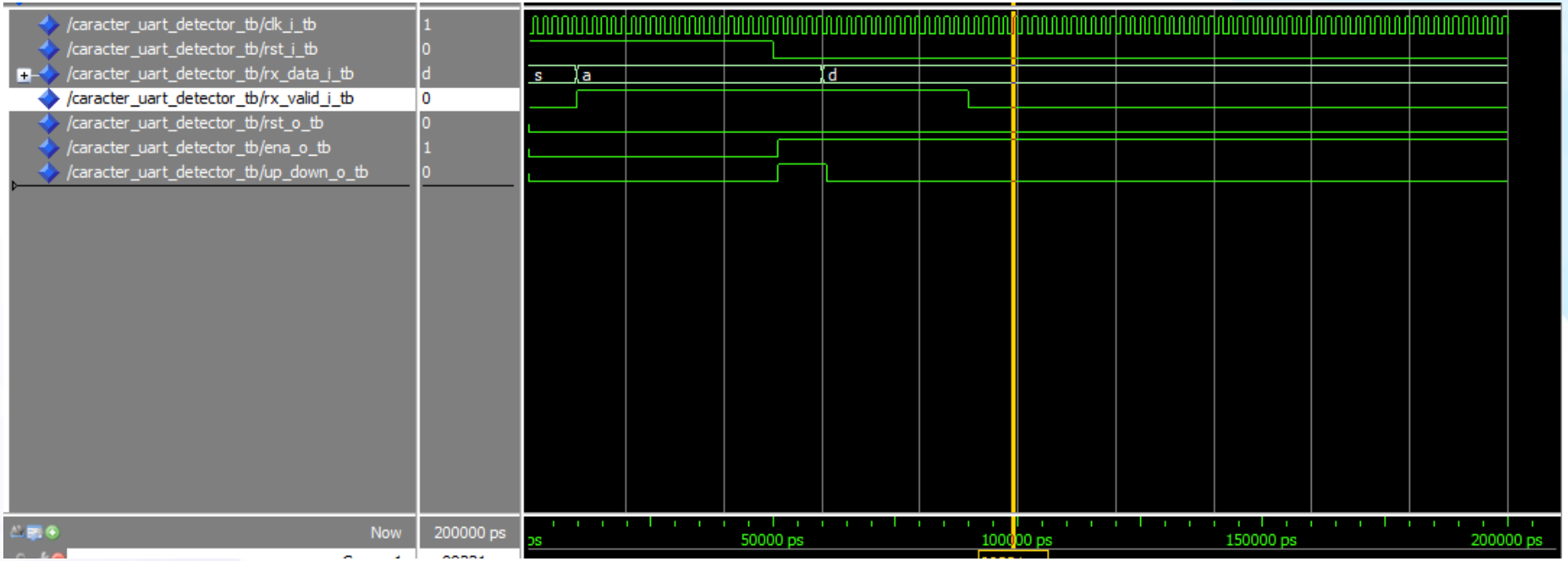
bcd_up_down_counter



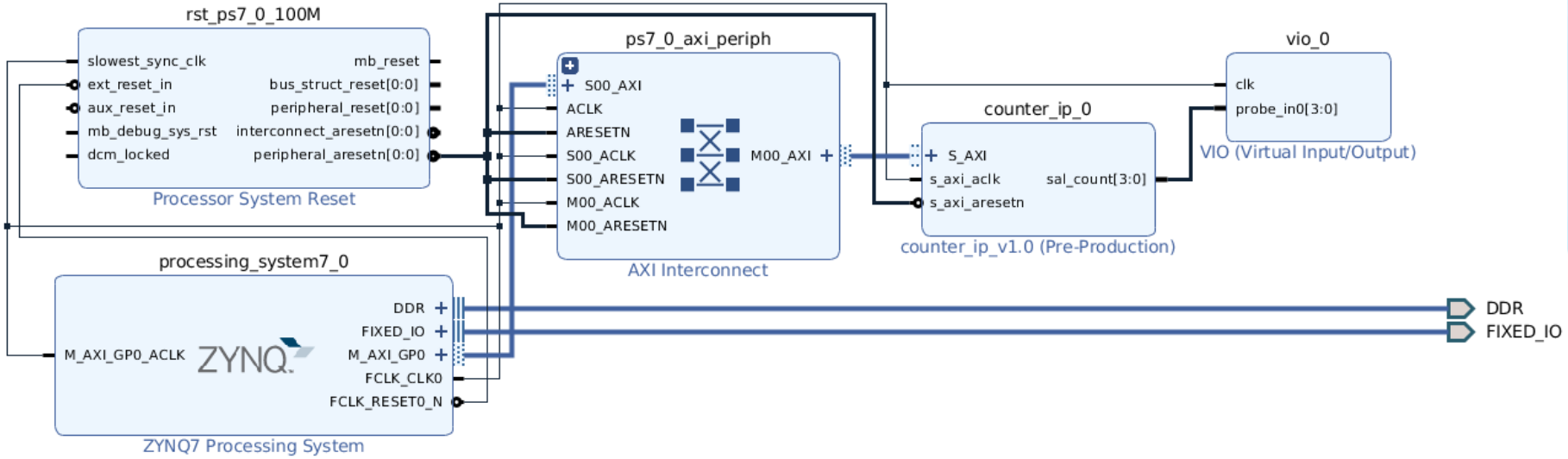
bcd_up_down_counter



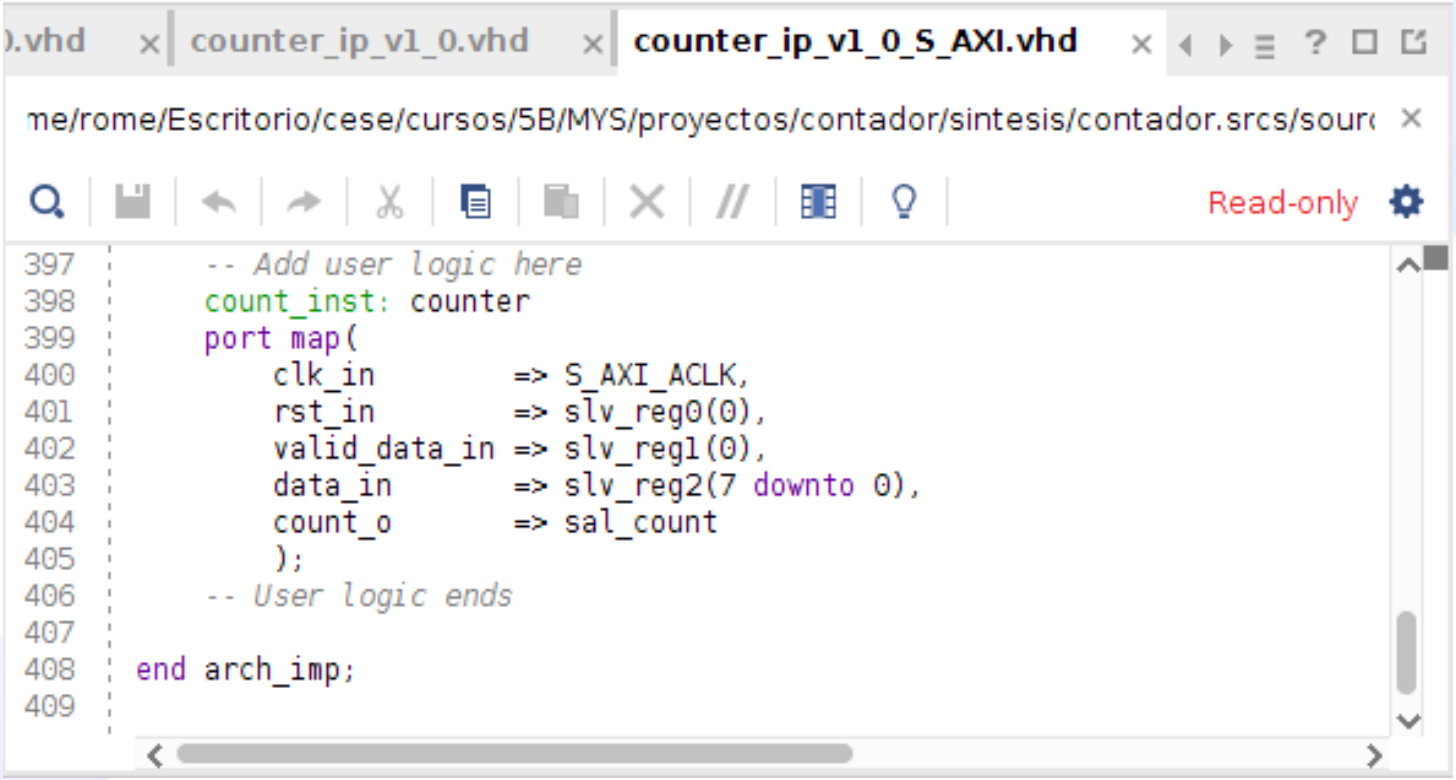
Caracter_detector



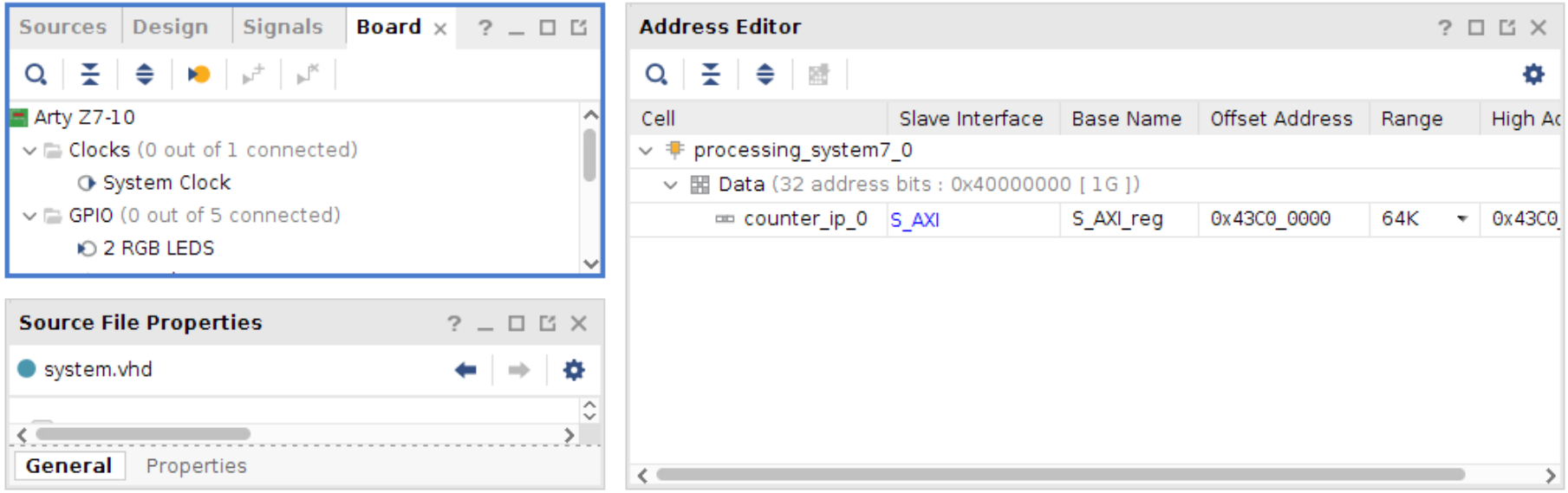
Block design



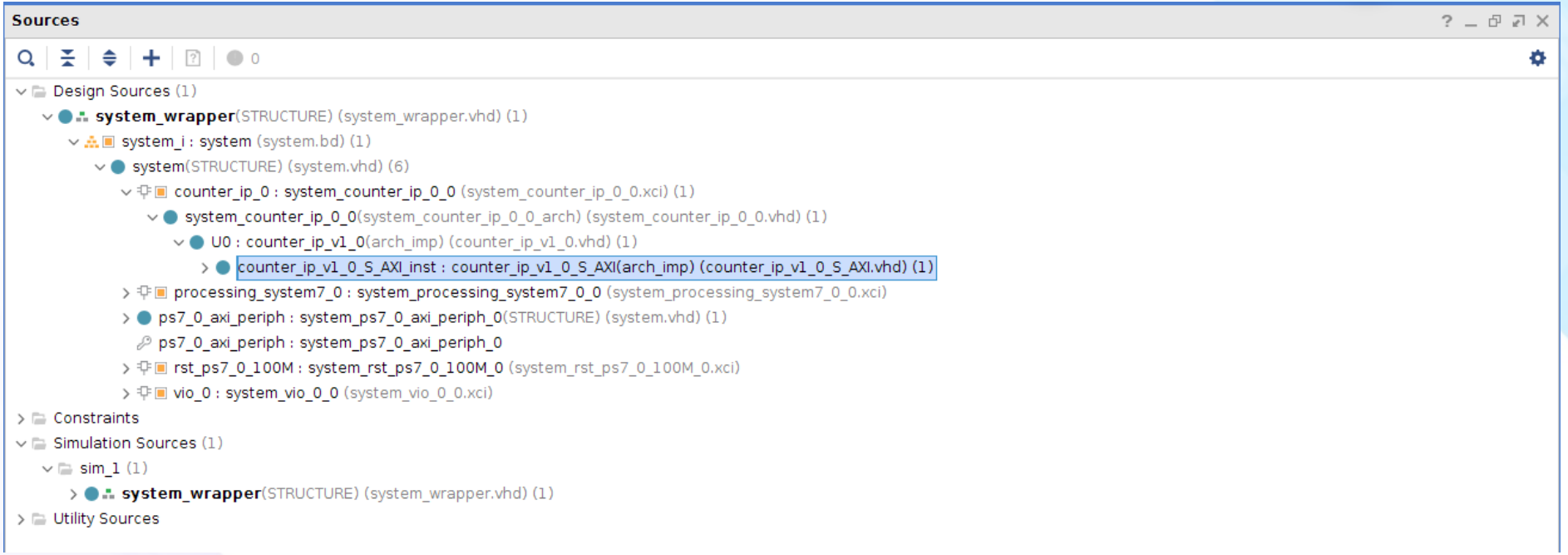
counter_ip. Señales y registros



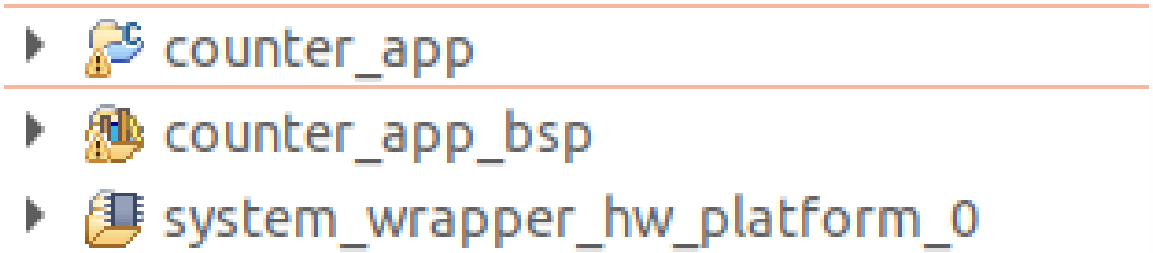
Board-Address



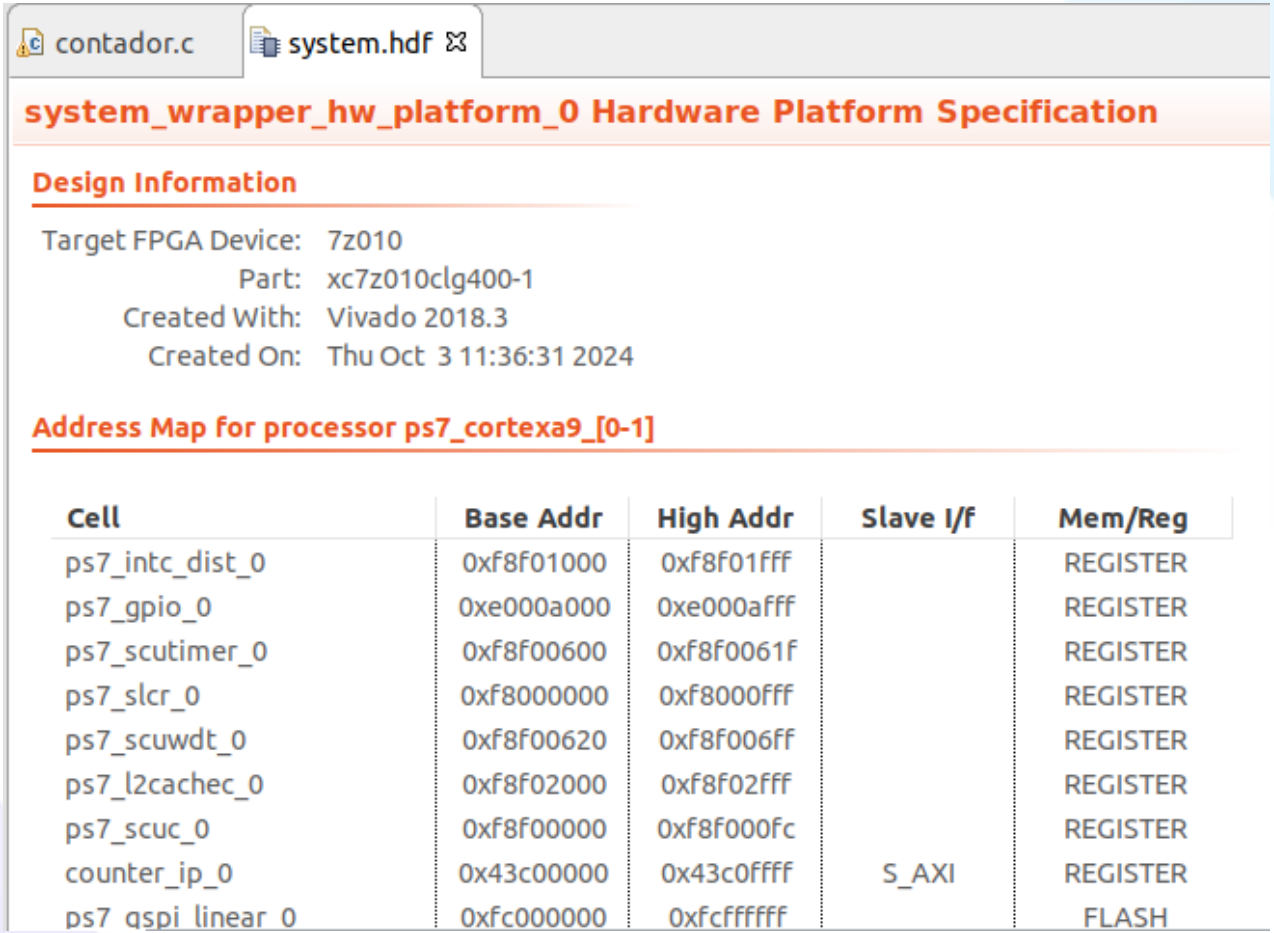
Jerarquía


Sources
0
Design Sources (1)
system_wrapper(STRUCTURE) (system_wrapper.vhd) (1)
system_i : system (system.bd) (1)
system(STRUCTURE) (system.vhd) (6)
counter_ip_0 : system_counter_ip_0_0 (system_counter_ip_0_0.xci) (1)
system_counter_ip_0_0(system_counter_ip_0_0_arch) (system_counter_ip_0_0.vhd) (1)
U0 : counter_ip_v1_0(arch_imp) (counter_ip_v1_0.vhd) (1)
counter_ip_v1_0_S_AXI_inst : counter_ip_v1_0_S_AXI(arch_imp) (counter_ip_v1_0_S_AXI.vhd) (1)
processing_system7_0 : system_processing_system7_0_0 (system_processing_system7_0_0.xci)
ps7_0_axi_periph : system_ps7_0_axi_periph_0(STRUCTURE) (system.vhd) (1)
ps7_0_axi_periph : system_ps7_0_axi_periph_0
rst_ps7_0_100M : system_rst_ps7_0_100M_0 (system_rst_ps7_0_100M_0.xci)
vio_0 : system_vio_0_0 (system_vio_0_0.xci)
Constraints
Simulation Sources (1)
sim_1 (1)
system_wrapper(STRUCTURE) (system_wrapper.vhd) (1)
Utility Sources

Proyecto de software. Estructura de carpetas



Archivo system.hdf



contador.c | system.hdf

system_wrapper_hw_platform_0 Hardware Platform Specification

Design Information

Target FPGA Device: 7z010
Part: xc7z010clg400-1
Created With: Vivado 2018.3
Created On: Thu Oct 3 11:36:31 2024

Address Map for processor ps7_cortexa9_[0-1]

Cell	Base Addr	High Addr	Slave I/f	Mem/Reg
ps7_intc_dist_0	0xf8f01000	0xf8f01fff		REGISTER
ps7_gpio_0	0xe000a000	0xe000afff		REGISTER
ps7_scutimer_0	0xf8f00600	0xf8f0061f		REGISTER
ps7_slcr_0	0xf8000000	0xf8000fff		REGISTER
ps7_scuwdt_0	0xf8f00620	0xf8f006ff		REGISTER
ps7_l2cachec_0	0xf8f02000	0xf8f02fff		REGISTER
ps7_scuc_0	0xf8f00000	0xf8f000fc		REGISTER
counter_ip_0	0x43c00000	0x43c0ffff	S_AXI	REGISTER
ps7_qspi_linear_0	0xfc000000	0xfcffffff		FLASH

Archivo contador.c

contador.c

```
#include "xparameters.h"
#include "xil_io.h"
#include "counter_ip.h"
// Comandos para trabajar con counter_ip "r", "a", "d", "p"

#define RESET_REG          0  // reset por registro
#define AVAILABLE_DATA     1  // Dato disponible para ser leido
#define NOT_AVAILABLE_DATA 0  // Dato no disponible

#define RESET_COMAND       114 // reset de la cuenta por comando
#define PAUSE              112 // pausa la cuenta
#define ASC_COUNT          97  // habilitación y cuenta ascendente
#define DES_COUNT          100 // habilitación y cuenta descendente
#define INVALID_COMAND     120 // comando inválido
```

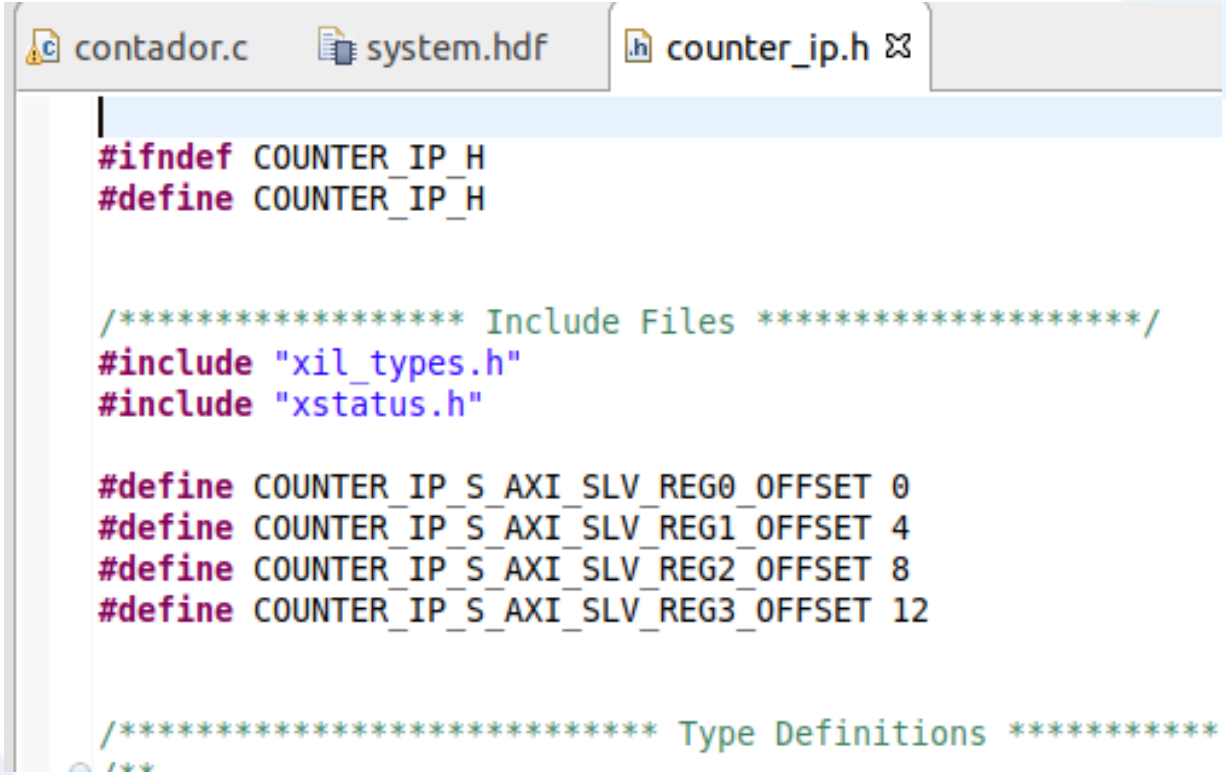
Archivo contador.c

```c
int main (void)
{
   int i = 0; // variable auxiliar para recorrer la secuencia de prueba
   int data[5]={ASC_COUNT,DES_COUNT,PAUSE,ASC_COUNT,RESET_COMAND}; // secuencia de prueba
   char ComandDataName[5][14]={"ASC_COUNT","DES_COUNT","PAUSE","ASC_COUNT","RESET_COMAND"};// secuencia de prueba. Etiquetas

   xil_printf("--------------------------\r\n");
   xil_printf("-- START PROGRAM COUNTER --\r\n");
   xil_printf("-- ALUMNO: RAUL ROMERO   --\r\n");
   xil_printf("--------------------------\r\n");

   // INICIALIZACIÓN
   COUNTER_IP_mWriteReg(XPAR_COUNTER_IP_0_S_AXI_BASEADDR,COUNTER_IP_S_AXI_SLV_REG0_OFFSET, RESET_REG); // reset count
   COUNTER_IP_mWriteReg(XPAR_COUNTER_IP_0_S_AXI_BASEADDR,COUNTER_IP_S_AXI_SLV_REG1_OFFSET, NOT_AVAILABLE_DATA);// dato no disponible
   COUNTER_IP_mWriteReg(XPAR_COUNTER_IP_0_S_AXI_BASEADDR,COUNTER_IP_S_AXI_SLV_REG2_OFFSET, INVALID_COMAND); // dato inválido
   xil_printf("-- INICIALIZACIÓN --> RESET_REG --%d\r\n",RESET_REG);
   xil_printf("-- INICIALIZACIÓN --> NOT_AVAILABLE_DATA --%d\r\n",NOT_AVAILABLE_DATA);
   xil_printf("-- INICIALIZACIÓN --> INVALID_COMAND --%d\r\n",INVALID_COMAND);
```

Archivo contador.c

```
while (1)
{
    if(i>4){
        i=0;
    }
    xil_printf("--------------------------\r\n");
    // Dato válido disponible
    COUNTER_IP_mWriteReg(XPAR_COUNTER_IP_0_S_AXI_BASEADDR,COUNTER_IP_S_AXI_SLV_REG2_OFFSET, data[i]);
    xil_printf("-- Comando enviado-dato: %s --> %d\r\n", ComandDataName[i],data[i]);
    // habilitación de dato disponible
    COUNTER_IP_mWriteReg(XPAR_COUNTER_IP_0_S_AXI_BASEADDR,COUNTER_IP_S_AXI_SLV_REG1_OFFSET, AVAILABLE_DATA);
    xil_printf("-- Dato habilitado --\r\n");
    // disponibilidad del dato por 1 segundos
    sleep(1);
    // dato de entrada no disponible
    COUNTER_IP_mWriteReg(XPAR_COUNTER_IP_0_S_AXI_BASEADDR,COUNTER_IP_S_AXI_SLV_REG1_OFFSET, NOT_AVAILABLE_DATA);
    xil_printf("-- Dato deshabilitado   --\r\n");
    // delay para visualizar el comportamiento del contador
    xil_printf("-- sleep --\r\n");
    sleep(10);
    i++;
}
```

Archivo counter_ip.h



Archivo xparameters.h

contador.c | system.hdf | counter_ip.h | xparameters.h

```
/******************************************************************/
/* Definitions for driver COUNTER_IP */
#define XPAR_COUNTER_IP_NUM_INSTANCES 1

/* Definitions for peripheral COUNTER_IP_0 */
#define XPAR_COUNTER_IP_0_DEVICE_ID 0
#define XPAR_COUNTER_IP_0_S_AXI_BASEADDR 0x43C00000
#define XPAR_COUNTER_IP_0_S_AXI_HIGHADDR 0x43C0FFFF


/******************************************************************/
```