

Squared difference accumulate

1. Introduction

兩項各自平方，再相減。

2. Csim / syn / co-sim

Csim

```
diff_sq_acc_csim.log X
1 INFO: [SIM 2] ***** CSIM start *****
2 INFO: [SIM 4] CSIM will launch GCC as the compiler.
3   Compiling ../../../../tb/diff_sq_acc_tb.cpp in debug mode
4   Compiling ../../../../src/diff_sq_acc.cpp in debug mode
5   Generating csim.exe
6 got 442798871 expected 442798871
7 got 262947932 expected 262947932
8 got 314183194 expected 314183194
9 got 465177013 expected 465177013
10 got 704061072 expected 704061072
11 got 575273685 expected 575273685
12 got 544620712 expected 544620712
13 got 521730637 expected 521730637
14 got 220538590 expected 220538590
15 got 229031173 expected 229031173
16 TEST SUCCESS!
17 INFO: [SIM 1] CSim done with 0 errors.
18 INFO: [SIM 3] ***** CSIM finish *****
19
```

Syn

Synthesis(Kintex_UltraScale)(diff_sq_acc_csynth.rpt) X

Performance Estimates

Timing

Summary

Clock	Target	Estimated	Uncertainty
ap_clk	4.00 ns	3.187 ns	0.50 ns

Latency

Summary

Latency (cycles)		Latency (absolute)		Interval (cycles)		
min	max	min	max	min	max	Type
13	13	52.000 ns	52.000 ns	13	13	none

Detail

Instance

Loop

Utilization Estimates

Summary

Name	BRAM_18K	DSP48E	FF	LUT	URAM
DSP	-	1	-	-	-
Expression	-	-	0	25	-
FIFO	-	-	-	-	-
Instance	-	-	-	-	-
Memory	-	-	-	-	-
Multiplexer	-	-	-	57	-
Register	-	-	44	-	-
Total	0	1	44	82	0
Available	1080	1700	406256	203128	0
Utilization (%)	0	~0	~0	~0	0

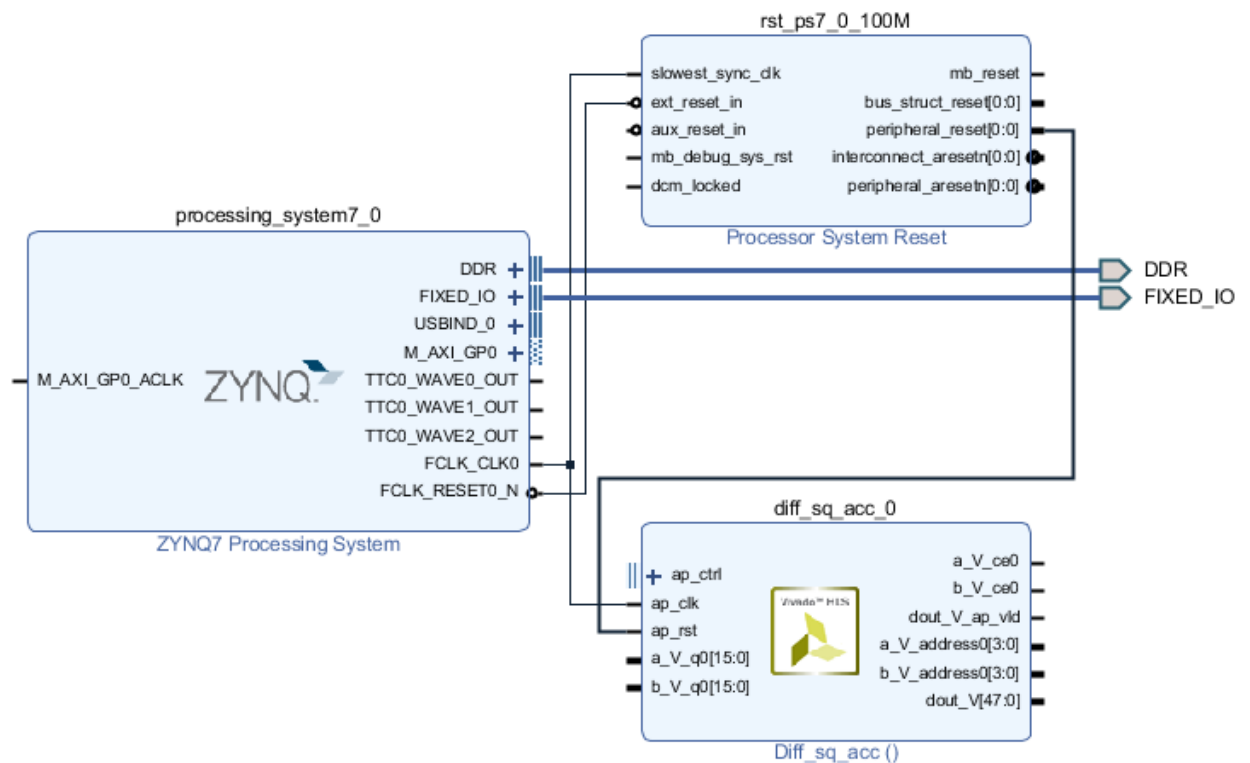
Detail

Interface

Summary

RTL Ports	Dir	Bits	Protocol	Source Object	C Type
ap_clk	in	1	ap_ctrl_hs	diff_sq_acc	return value
ap_rst	in	1	ap_ctrl_hs	diff_sq_acc	return value
ap_start	in	1	ap_ctrl_hs	diff_sq_acc	return value
ap_done	out	1	ap_ctrl_hs	diff_sq_acc	return value
ap_idle	out	1	ap_ctrl_hs	diff_sq_acc	return value
ap_ready	out	1	ap_ctrl_hs	diff_sq_acc	return value
a_V_address0	out	4	ap_memory	a_V	array
a_V_ce0	out	1	ap_memory	a_V	array
a_V_q0	in	16	ap_memory	a_V	array
b_V_address0	out	4	ap_memory	b_V	array
b_V_ce0	out	1	ap_memory	b_V	array
b_V_q0	in	16	ap_memory	b_V	array
dout_V	out	48	ap_vld	dout_V	pointer
dout_V_ap_vld	out	1	ap_vld	dout_V	pointer

3. Implement



4. Optimize

Array partition

```
void diff_sq_acc(din_t a[N], din_t b[N], dout_t *dout)
{
    int i;
    int acc= 0;
    int a_reg, b_reg, sub, sub2;
    #pragma HLS ARRAY_PARTITION variable=a_reg complete dim=1
    #pragma HLS ARRAY_PARTITION variable=b_reg complete dim=1
```

5. Github

<https://github.com/jeff-tong/MSOC---Application-Acceleration-with-High-Level-Synthesis->

6. reference