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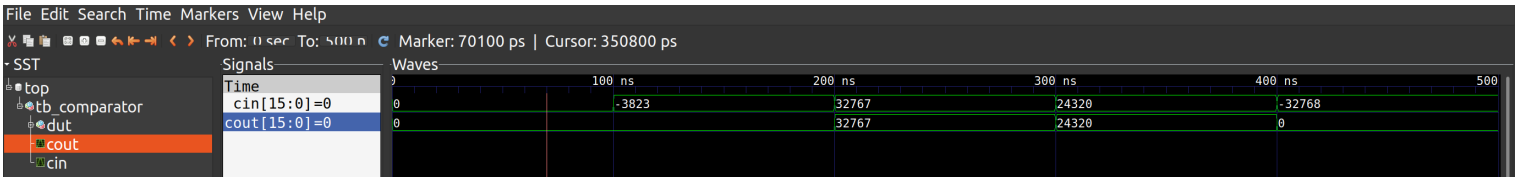
COL215P: Digital Logic & System Design
15 September 2022

3 Layer MLP- Modules

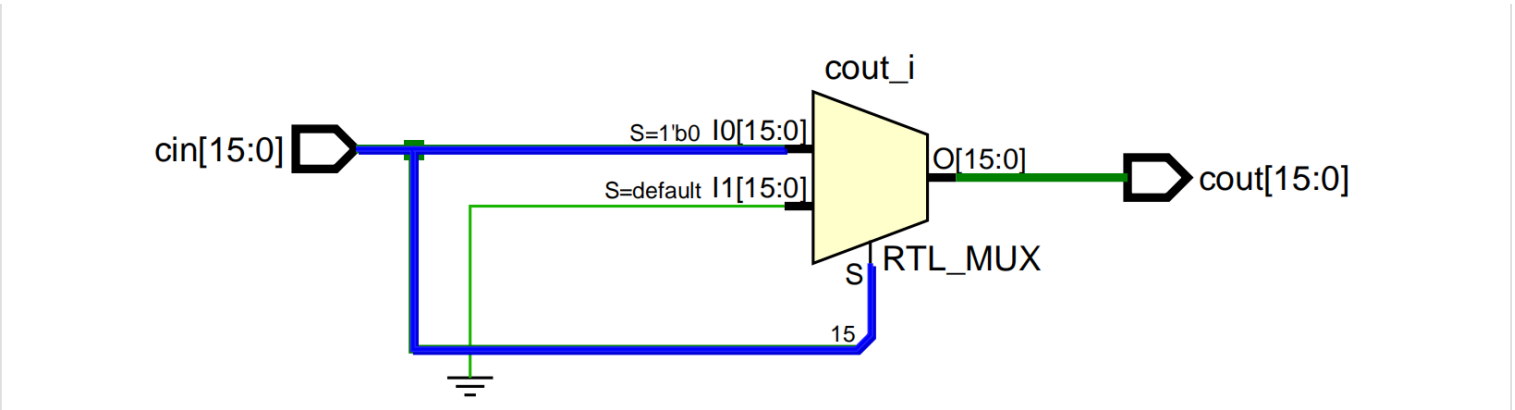
Comparator

This module implements the **ReLU** activation function, i.e. takes a 16-bit input and outputs the input if positive else outputs 0.

Waveform



Circuit

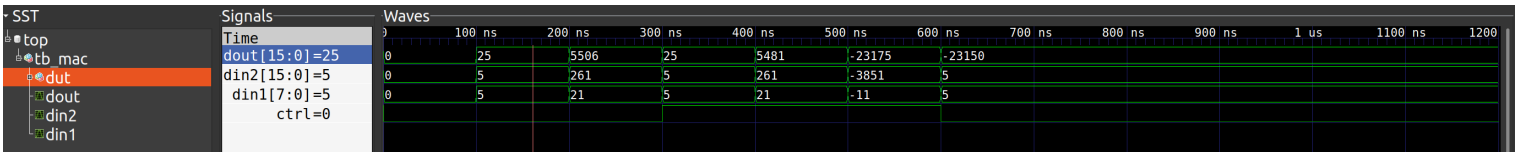


MAC (Multiply - Accumulate - Control)

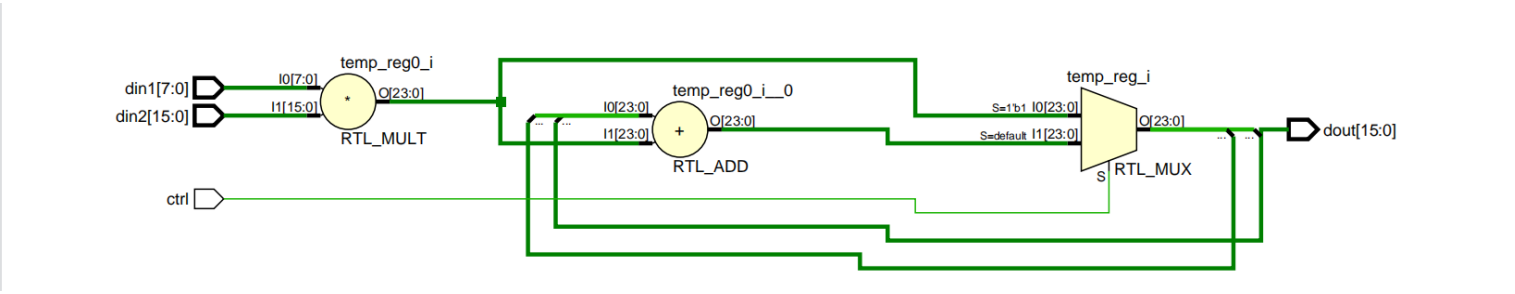
This module takes 3 inputs - 8-bit and 16-bit as operands and a control signal. When the control signal is LOW, the product of the operands is added to the current result, else the result is set to the product of the operands.

Note: The product of 8-bit and 16-bit operands is of size 24 bits which has been truncated to 16 bits

Waveform



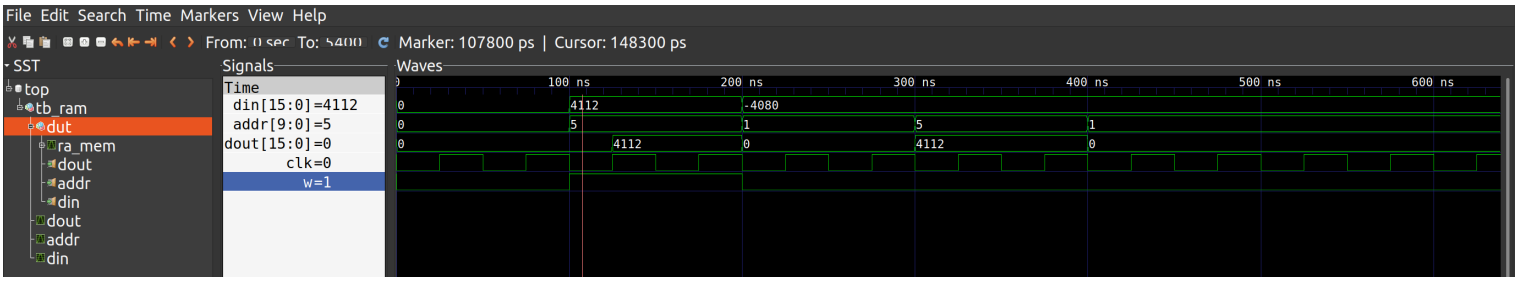
Circuit



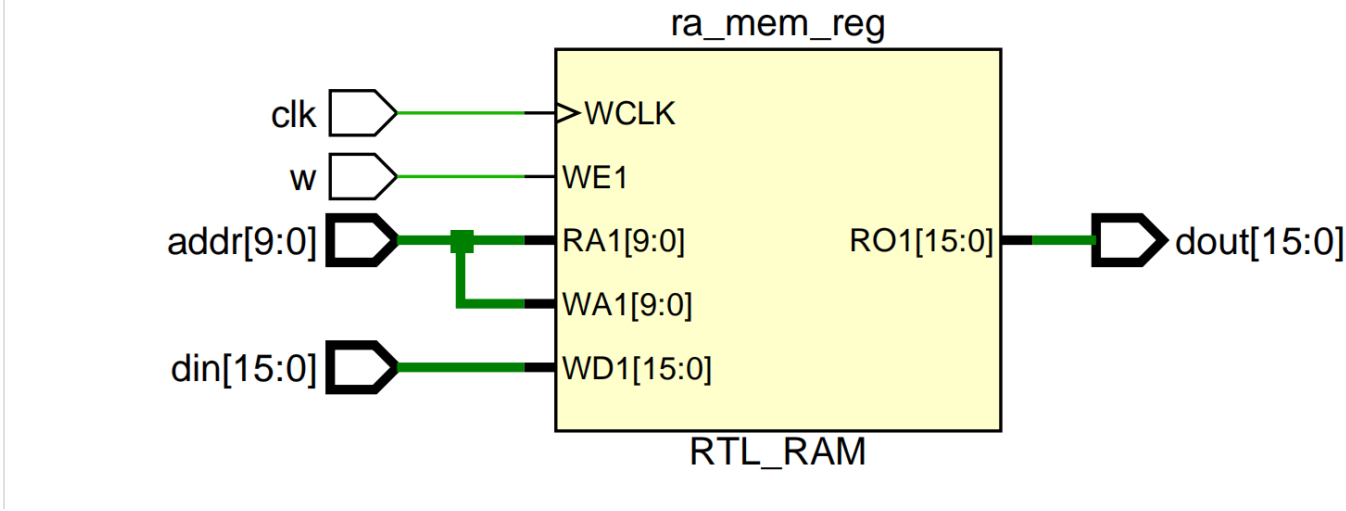
RAM (Random Access Memory)

This module implements a RAM of size 2kB with 16-bit inputs and outputs. Reads are asynchronous whereas writes are synchronous.

Waveform



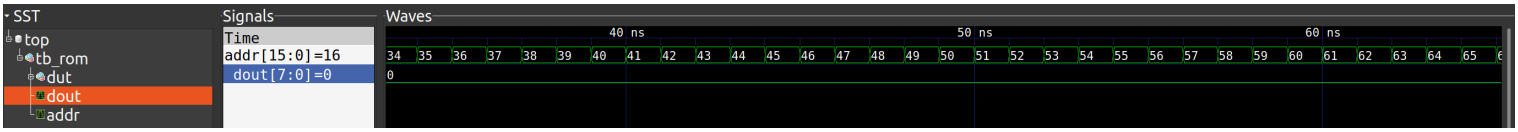
Circuit



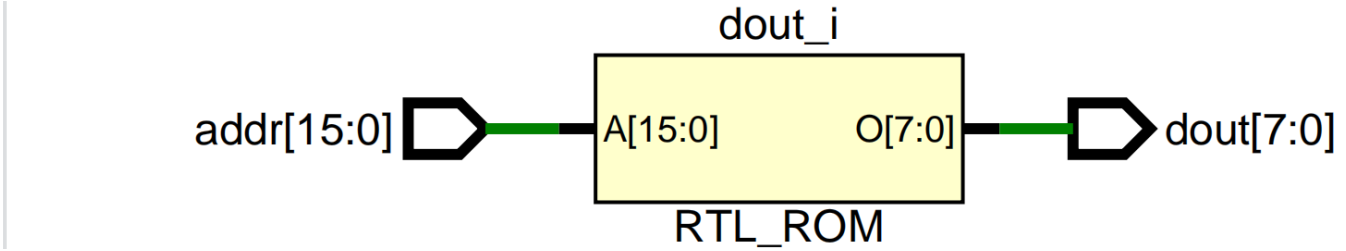
ROM (Read Only Memory)

This module implements a ROM of size 64kB with 8-bit inputs and outputs. Reads are asynchronous.

Waveform



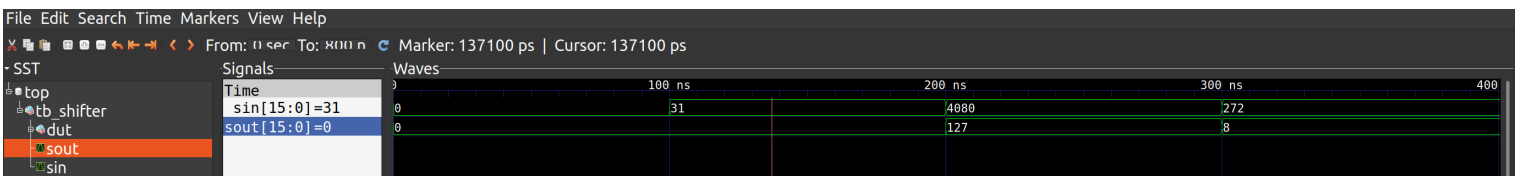
Circuit



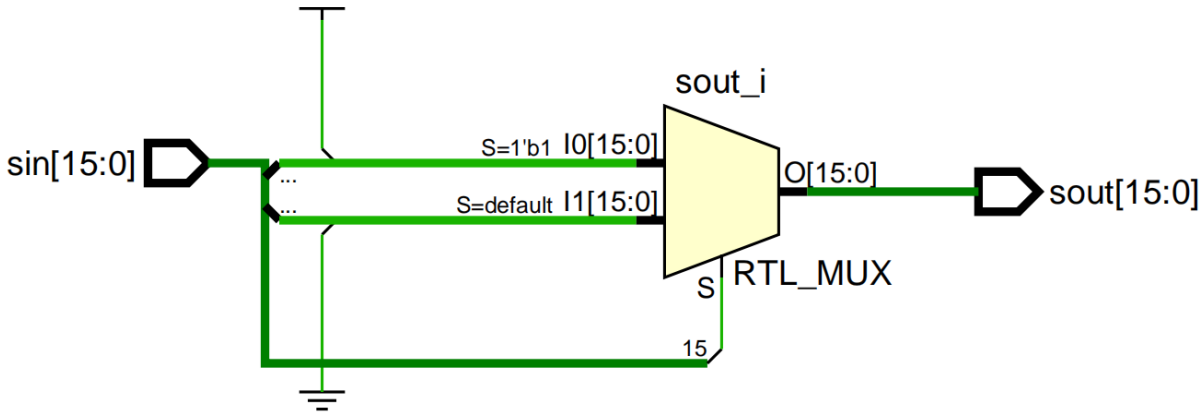
Shifter

This module implements integer division by 32 while taking care of the sign using the arithmetic shift right operation.

Waveform



Circuit


sout_i
sin[15:0]
S=1'b1 I0[15:0]
S=default I1[15:0]
O[15:0]
sout[15:0]
RTL_MUX
S
15