

Never worry about instantiating RAM and its unfortunate effects on your design again

Never worry about instantiating RAM and its unfortunate effects on your design again! Leonardo infers RAMs and counters from behavior descriptions. This means that there is no need to directly instantiate RAMs as black boxes in synthesis and provide their behavior descriptions just for simulation.

The most important benefit of this approach is higher quality results - smaller designs with faster clock times. The example below uses Xilinx XC4000 technology, but you can use any technology that has efficient RAM implementations such as Lucent ORCA, Altera Flex10, Xilinx XC4000E, or Actel 3200DX.

This is the report from Xilinx XACT for the XNF file generated by Leonardo. Note the number of function generators used:

Partitioned Design Utilization Using Part 4005PC84-3

No.	Used	Max Available	%Used
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Occupied CLBs	14 196	7%
Bonded I/O Pins	15 61	24%
F and G Function Generators (*)	14 392	3%
H Function Generators	1 196	0%
CLB Flip Flops	5 392	1%
IOB Input Flip Flops	0 112	0%
IOB Output Flip Flops	0 112	0%
3-State Buffers	0 448	0%
3-State Half Longlines	0 56	0%
Edge Decode Inputs	0 168	0%
Edge Decode Half Longlines	0 32	0%

(*) If RAM/ROM elements are present in the design, this count includes the function generators used for them. A 16x1 memory uses 1 function generator; a 32x1 uses two.

We've found that Leonardo implements this design in Xilinx XC4000 technology with only 14 function generators - several times fewer function generators than other commercial synthesis tools.

Remember, this is just a small example. With larger on-board RAM devices, the results will be even more dramatic.

For many designers, another important benefit is a consistent approach. By using behavior descriptions instead of instantiating RAM, you have only one design

database to deal with, not a whole set of black boxes. Being able to infer RAM also means faster run times and less RAM required to run the design .

Try it yourself. Take the small design here and give it to any synthesis tool you have access to and compare it against the results from Exemplar Logic's Leonardo.