VarMan XMA Option

SILVACO

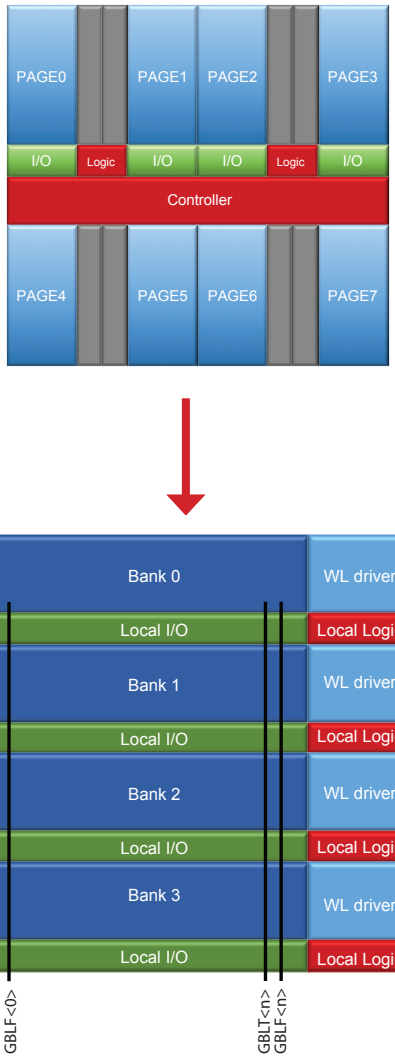
eXtreme Memory Analysis

Enabling Memory Full-Chip SPICE Simulation and Yield Estimation

Analyzing memory IP and accurately predicting its yield is a critical need. This is the challenge that XMATM (eXtreme Memory Analysis), the new solution from Silvaco, addresses. VarMan XMA is an option to the VarMan Memory product.

Due to the large size, creating a full memory SPICE simulation is a real challenge. Using Monte Carlo analysis is impractical.

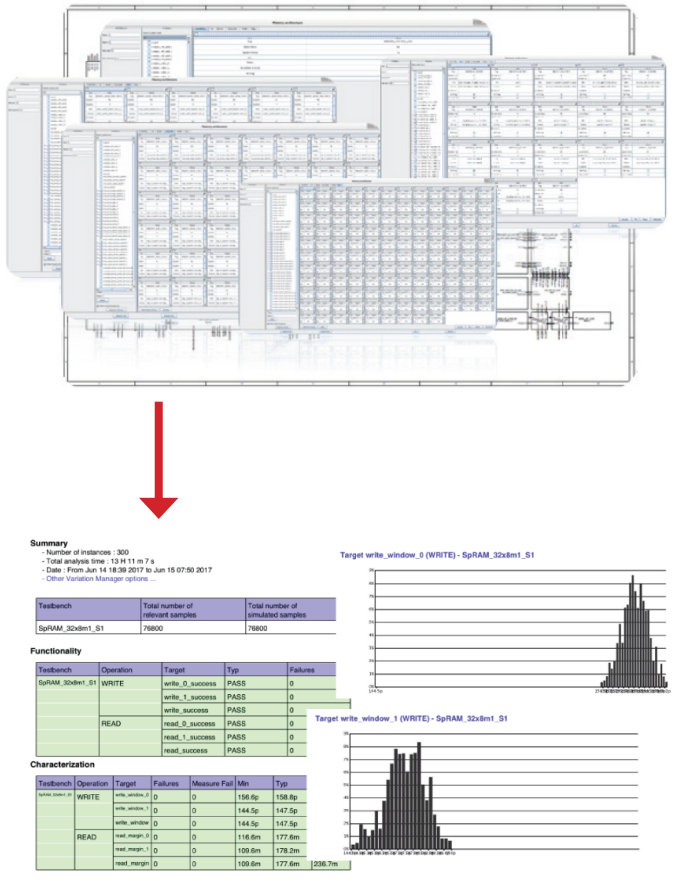
Existing solutions work by extracting memory slices or critical paths, simulating them, and performing limited Monte Carlo analysis, then extrapolating the results This could introduce significant error in the yield estimation. While Fast SPICE simulations seem practical, the accuracy could be compromised. Combining individual block sigma-corners may lead to unrealistic results.



Running Monte-Carlo Analysis on the Entire Memory

XMA doesn't analyze only the critical path or a memory slice. This innovative solution considers the entire memory, analyzes the variation impact, performs Monte Carlo analysis, and estimates yield.

XMA is an intuitive and easy-to-use solution that makes it possible to rebuild the memory and simulate the design with the golden SPICE.



Accurate Estimate of the Entire Memory Yield

XMA provides the unique ability to run very efficient variation-aware analyses. XMA employs VarMan's innovative Fast Monte Carlo and robust high-sigma kernels for a fast-fail detection and yield estimation of the entire memory.

SRAM Application Example

- **SRAM with 8K x 80 bits**
- **10,000 simulations to cover 100K instances**
- **100K instances equivalent to 100K x 8192x80 = 65,536M runs**
- **2 Failures detected**

XFail Detection Memory Analysis

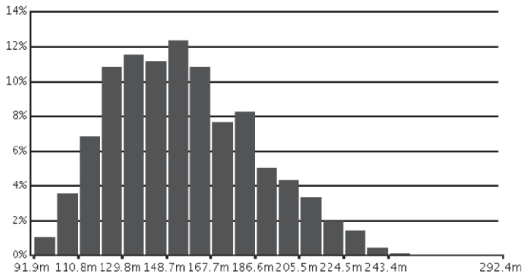
Summary

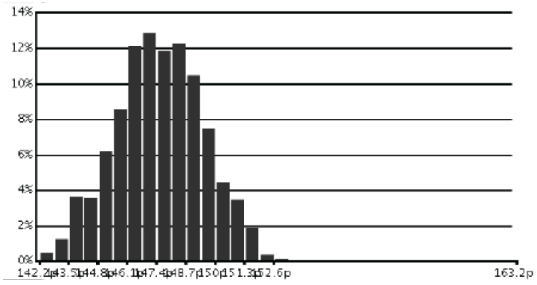
- Number of instances : 100000
- Simulation Budget : 10000
- Total analysis time : 201 H 26 m 21 s
- Date : From Jun 26 08:30 2017 to Jul 04 17:57 2017
- Other Variation Manager options ...

Testbench	Total number of relevant samples	Total number of simulated samples
SpRAM_8192x80m8_8S_GMC_LMC_0.79V_-40C	10000	10000

Functionality

Testbench	Operation	Target	Typ	Failures
	WRITE	write_good	PASS	1
	READ	read_good	PASS	2





Option Features

- Advanced and intuitive GUI
- Build for entire memory analysis takes only minutes
- Verified on leading planar CMOS, FDSOI and FInFET foundry technologies
- Works with industry golden SPICE circuit simulators
- Comprehensive statistical analysis of variation impact for yield estimation

Key Benefits

- Unique capabilities to simulate and analyze the entire memory with a SPICE simulator, and run Monte Carlo analysis
- Very effective fail detection with up to 100X performance gain compared to classical Monte Carlo analysis
- Accurate yield estimation of the entire memory

SILVACO
HEADQUARTERS
4701 Patrick Henry Drive, Bldg #23
Santa Clara, CA 95054

NORTH AMERICA sales@silvaco.com
BRAZIL br_sales@silvaco.com
EUROPE eusales@silvaco.com

JAPAN jpsales@silvaco.com
KOREA krsales@silvaco.com
TAIWAN twsales@silvaco.com
SINGAPORE sgsales@silvaco.com
CHINA cn_sales@silvaco.com

WWW.SILVACO.COM

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