

Preface

Embedded memory plays a big role in digital systems applications due to the increase of the data size required by many of these applications, such as video games and communication protocols. Also, the ever-increasing gap between processor speed, main memory, and bus speed (memory wall) creates a need for more on-chip memory to keep the processor busy and increase throughput. In addition to the increase of processor frequency, the integration of many cores or functional units on the same chip, which is referred to as system on chip (SOC), requires larger memory size. Embedded memory compromises more than 50 % of the chip area and greater than 80 % of transistor counts. Increased process variation due to technology scaling and the desire for high density memory results in a big challenge to meet the stringent requirements on performance, power, and yield. Embedded memory does not only play a positive role in system performance, but it also has an impact on yield, timing, and power. Memory organization and early decision made by system level and architecture group have big influence on the role and the impact the memory has on the overall system. Tradeoffs from memory cell type, array organization, memory hierarchy, Design for Test, and overall memory subsystem have to be considered early on.

This book reflects the latest trends in memory design and build on incorporating the result of cutting edge research and build of real product during my over 16 years' experience in the field. It is expected to be used by researchers, engineers, and graduate students. The unique feature of the book is its breadth and depth of memory design in small geometry process technology from system level, RTL, verification, circuit design, and into Design for Test.

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on Chip

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