

Chapter 10

Conclusion



In this book we presented dual mode logic, a new paradigm for digital IC, and cover multiple aspects of DML utilization in digital circuits and systems in depth. The overarching DML approach is based on DML gates that operate in two modes, each optimized for a different design metric. DML gates can trade off energy efficiency and high performance at the circuit and architecture levels. This is because DML architectures enable on-the-fly switching between operational modes at the gate, block and system levels, thus enabling significant optimization flexibility without compromising robustness. Numerous control mechanisms for DML architectures were covered in this volume.

We hope to have given the reader a thorough introduction to DML gate-level design methodology, single and multiple gate optimization, and the architectural optimization of modules and larger constructs such as arithmetic circuits. We examined several different control strategies for DML designs based on the input data and the architecture. We also demonstrated new approaches for DML integration into standard design flows in a scalable way and showed how DML can enhance technologies such as FD-SOI, thus demonstrating that DML can harness this technology to provide larger gains.

This book is intended for researchers, engineers, and graduate students. Any interested reader can find detailed responses as to how and where to use DML and what types of improvements and flexibility it can provide.

Extensive studies conducted by a range of researchers in addition to the authors make it clear that DML can enrich a whole host of fabricated designs in a variety of technologies and different architectures, supported by fully custom to standard cell-based flows. Today, the DML effort has made enormous strides forward: DML has been demonstrated in a FINFET 16 nm complex SoC, and it is also being calibrated to boost many advanced architectures within complex datapaths, processing, and arithmetic blocks. We express our deepest gratitude to all the researchers whose contributions made this book a reality.